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Depositional and deformational structures in three 'esker-like' ridges, southwestern Ontario

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DEPOSITIONAL AND DEFORMATIONAL STRUCTURES IN THREE "ESKER-LIKE" RIDGES, SOUTHWESTERN ONTARIO

by

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THESIS

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Abstract

The Dundalk Till Plain in southwestern Ontario is crossed by five "esker-like" ridges, believed to have been formed simultaneously during the early stage of the mid-Port Bruce Stadial. The three middle ridges are the focus of this research, with each ridge having a different topographic form, but the length of, and distance between, ridges are similar. Occurrences of differing depositional structures and the presence of deformational structures over short lateral and vertical distances reveal the complexity of processes involved. The dominant primary sedimentary structures are large-scale tabular cross-beds. Many individual cross-beds are composed of poorly sorted, matrix-supported gravels. High variability in the type and characteristics of depositional structures over a short lateral distance is common within sections. The majority of deformational structures consist of high angle reverse faults and normal faults, associated with ice-contact support. Other deformational structures include a lateral series of "V-shaped" wedges which are exposed in two of the "esker ridges". Thin "till-like" units were observed in several sections as well as continuous units of the Tavistock Till and Elma Till, the latter being a new easternmost, known location of this till. Small-scale deformation is seen in sediments immediately above and below several of these tills and "till-like" units. From the location of the tills and the nature of the structures, revisions to the local stratigraphic record were suggested which place the formation of the eastern two eskers during the early phase of the mid-Port Bruce Stadial. The western ridge was formed later, by ice associated with the Tavistock Till. The summation of field observations of depositional and deformational structures, paleocurrents and laboratory results, indicate that the deposits

are eskers and not interlobate moraine. The interpretation of these results and observations indicate that the western ridge was formed separately, the other two ridges having been created earlier by similar processes.

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CHAPTER 1

Study Area and Objectives

1.1 INTRODUCTION

This thesis topic, which discusses depositional and deformational structures in esker or esker-like deposits, evolved from what was originally a sedimentological analysis. The evolution began during preliminary field work of five eskers which cross the Dundalk Till Plain (Chapman and Putnam, 1984). From field investigation, several interesting observations were made. For example, all the eskers when extrapolated downstream seem to be integrated as one large drainage network converging near Luther Marsh. Also, the three middle eskers each exhibit a different topography and unusual internal structures. Some of the internal materials and structures such as tills and pronounced deformation pose interesting questions as to their origin. Are they esker deposits or could they be moraine?

Initial review of literature from the area, consisting of Ontario Geological Survey (OGS) reports and maps and Ministry of Natural Resources Aggregate Resource Inventories, further emphasized the need for a detailed study of the area. The reports were general or superficial and did not mention the till units found during the preliminary field work. The

interpretations of several of the OGS reports were conflicting as to the processes responsible for the deposits.

Detailed field work was performed on the middle three ridges and concentrated on collecting information from all deposits and structures, including tills and the deformational structures. Laboratory and office work were then carried out in an effort to answer the question of the type and origin of the deposits. The literature search continued for studies on esker processes with deformational structures similar to those seen in the three ridges. Thus the research evolved into a detailed study of the internal structures of the three ridges.

Results from the field and laboratory work are presented in the following chapters. Descriptions and results have been divided into depositional and deformational structures as the deformation in two of the ridges was so significant that it should be treated separately. A following chapter will combine all of the results before the discussion and interpretation of the processes.

1.2 STUDY AREA

The study area containing the three esker ridges is located in northern Wellington County, southern Grey County and the northwest corner of Dufferin County having an area of approximately 120 square kilometers (km^2). The area is flanked by the towns of Mount Forest to the west, Arthur to the south and Dundalk to the northeast (Fig. 1.1). The closest cities are Guelph, 50 kilometers (km) to the south and Orangeville, 38km to the east.

The southernmost ridge is the Mount View Esker, which is 22km in length and contains seven active sites. The middle ridge is the Egerton Esker, 25km long with six sites through its length. The northern ridge is the Hopeville Esker, previously named the Brice Hill Esker (Cowan, 1976) which is 27km long and has nine sites. The southern limit of this esker reaches into Dufferin County, but there were not any exposures in this County. The eskers at the southern end are each approximately 8km apart with this distance increasing towards the northwest. A definite asset in this study area were the numerous County and concession roads which provided easy access to all the sites.

1.2.1 Bedrock Geology

The Paleozoic geology of the area has been well mapped by Liberty and Caley (1969) and Sandford (1969). However, the geological contacts between the two maps vary and the more detailed work by Liberty and Caley is used here. The study area is underlain by two formations of Silurian age. The Guelph Formation (Middle Silurian) is composed of yellowish grey, fine to medium crystalline dolostone and underlies most of the field area (Caley, 1941; Liberty and Bolton, 1971). To the west is the younger Salina Formation (Upper Silurian) which consists of grey to green calcareous shale and buff to brown dolostone. Locally, gypsum may be present in the shale beds. To the northwest, shale may also have a reddish colour (Liberty and Bolton, 1971). The geologic contact between formations has a general orientation of northwest to southeast, 4km west of Conn through to 3km east of Arthur.

The bedrock topography is generally high and fairly flat, sloping only

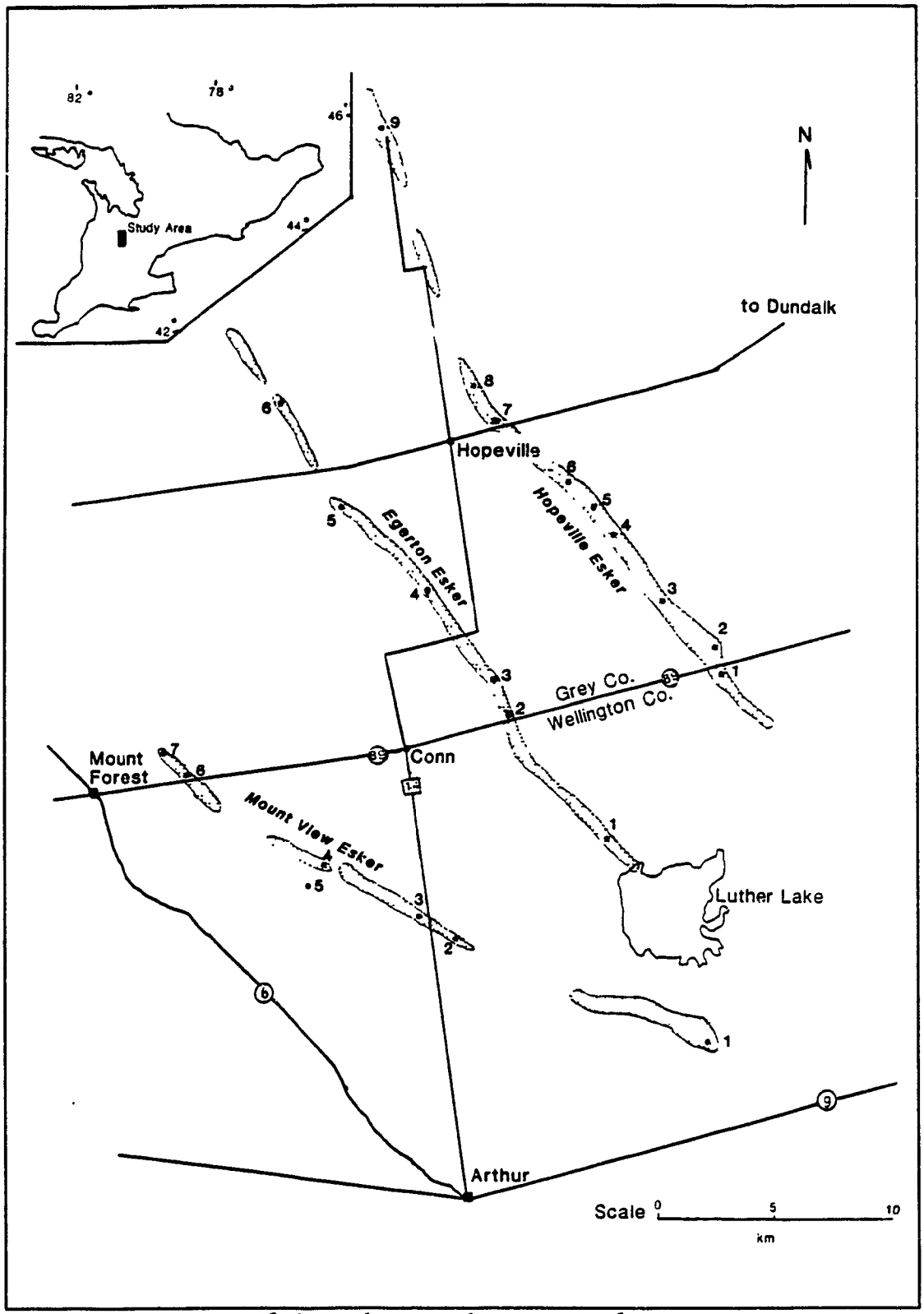


Fig. 1.1 Location of the eskers and position of sites.

gently to the south-southwest (Karrow, 1973). The drift thickness above the bedrock ranges from 8 meters(m) to 45m and increases towards the northwest (Cowan, 1976; 1979). There are no outcrops in the study area, the closest being 10km west of Mount Forest along the South Saugeen River where the Salina Formation is visible.

1.2.2 Geomorphology

Elevation ranges from 450m to 480m above sea level making it one of the highest areas in south-central Ontario. On the Dundalk Till Plain, one of Chapman and Putnam's (1984) physiographic regions, topography is flat to slightly undulating with local relief seldom exceeding 20m. The surface is broken by the three eskers which are quite visible as is the Maple Lane Moraine to the northwest.

The land is poorly drained and often swampy due largely to the underlying clayey till. The soil is often silty from having been deposited by eolian processes, with depths ranging from 2 centimeters(cm) to 26cm (Gillespie and Richards, 1954; Hoffman et al., 1963; Chapman and Putnam, 1984). The South Saugeen River crosses the northwest portion of the area flowing towards the west. The eastern side of the area is partially bounded by the Grand River and in the south is Luther Lake. This lake is surrounded by extensive swamps and marshes making up the large Luther Marsh.

1.2.3 Glacial History

Formation of southern Ontario's landscape is a direct result of the

work of glacial ice, as this area has been covered several times by continental ice masses during the Pleistocene Epoch. Evidence of these glaciers is predominantly from the later period of the Wisconsinan glaciation (Dreimanis and Goldthwait, 1973). The study area is no exception as Cowan (1979) shows that there is no evidence of the Middle Wisconsinan Substage (the Catfish Creek Till is found immediately overlying bedrock).

Ice entered southern Ontario during the Late Wisconsinan Substage from various directions in the form of several ice lobes. The Ontario and Erie Lobes were centered in their respective Great Lake basins and generally moved east to west, with the Erie Lobe having a slightly more northerly flow direction, as indicated in Fig. 1.2. Early in the Late Wisconsinan, ice entered the region from the Huron Lobe flowing north to south. As the Late Wisconsinan Substage progressed, the Huron Lobe split with a lobe centered in Georgian Bay acting independently, flowing towards the southeast. Finally, ice entered southern Ontario from the northeast via the Lake Simcoe Lobe (Chapman and Putnam, 1966; Prest, 1970; Dreimanis and Goldthwait,1973).

The Huron-Georgian Bay Lobe entered from the north during the Nissouri Stadial, 23,000 to 16,000 years before present (yrs B.P.), in the first major advance of the Late Wisconsinan Substage (Dreimanis and Karrow, 1972). It was this advance of ice from the north which was responsible for depositing the Catfish Creek Till, a stony sand to sandy silt till, yellowish in colour (Karrow, 1988). The ice retreated beyond the northern limits of the study area during the Erie Interstadial (16,000 to 15,000 yrs B.P.). During this phase drainage was blocked to the south creating minor glacial lakes and lacustrine deposits. The Erie Interstadial was broken by a minor advance from the Georgian Bay Lobe from the

northwest. It is not clear whether this advance extended east into northern Wellington County, as the Stirton Till deposited by this advance has only been reported to the west in the Conestogo River basin (Karrow, 1974; Cowan, 1979).

Retreat of the Stirton ice was followed by a major advance of the Georgian Bay and Simcoe Lobes from the north and northeast respectively, marking the middle period of the Port Bruce Stadial (15,000 to 13,500 yrs B.P.). Lobes in the Erie, Ontario and Huron basins also advanced and their approximated positions are shown in Figure 1.2. This advance of the Georgian Bay Lobe created the fine-grained Tavistock Till, as the advancing ice incorporated the lacustrine sediments. Tavistock Till is silty to clayey silt and is grey to brown to reddish in colour (Sharpe and Broster, 1977; Cowan, 1979). The southern margin of the Georgian Bay Lobe during the Port Bruce Stadial fluctuated widely creating minor, locally restricted tills. This is also the period during which esker formation occurred as the ice began retreating. Cowan (1976) discusses the minor fluctuations of the ice margin and local tills and places the formation of the eskers after the deposition of the Tavistock Till. Cowan (1979) found evidence of the Tavistock Till overriding the Mount View Esker near Mount Forest, suggesting a minor re-advance of the ice. The middle stage of the Port Bruce Stadial saw another advance of the ice from the northwest depositing the Elma Till with an eastern limit near Conn. The Elma Till is stony sand to sandy silt in texture with a yellowish brown colour. The change in texture from the fine-grained Tavistock Till to the coarser Elma Till has several theories, including the logical assumption that the ice margin became fragmented allowing large-scale deposition of coarse material prior

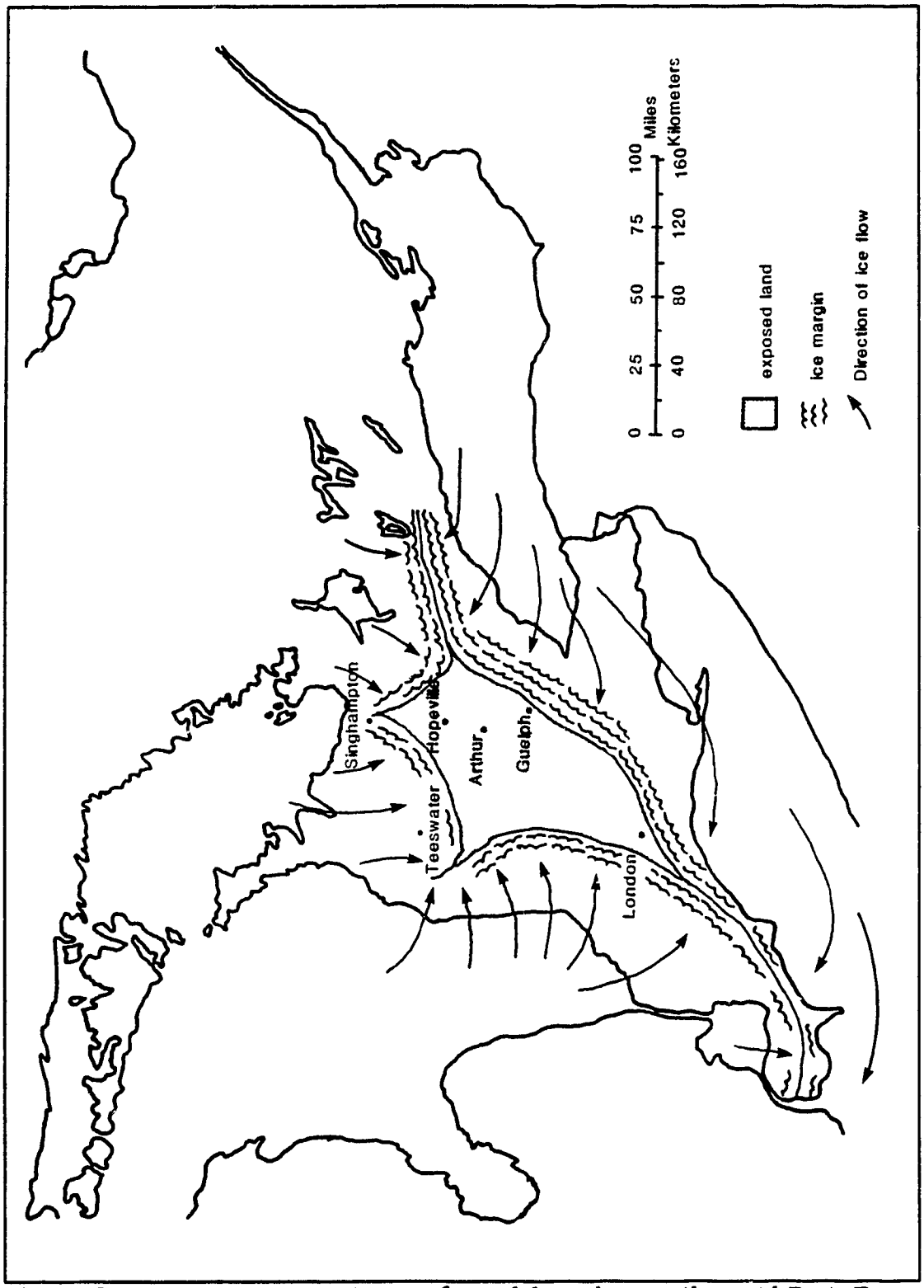


Fig. 1.2 Approximate positions of ice lobes during the mid-Port Bruce Stadial, summarized after Chapman and Putnam, 1984.

to the re-advance (Sharpe and Broster, 1977). Retreat of the Elma ice marked the last presence of glacial ice in southern Grey County and Wellington County. There were several advances towards the end of the Port Bruce Stadial and an advance from the Simcoe Lobe during the Port Huron Stadial (13,000 to 11,500 yrs. B.P.), which did not extend far enough south to affect the ridges.

The Two Creeks Interstadial, Greatlakean Stadial and the North Bay Interstadial close the Late Wisconsinan Substage. During these phases, as there was not any ice in Dufferin and Wellington Counties, the principal change to the area was in drainage where the Grand River developed as a meltwater channel and the minor glacial ponding drained away.

The Dundalk Till Plain is composed of Catfish Creek Till, Tavistock Till, Elma Till and possibly the Stirton Till. The eskers were possibly deposited during a period of the mid-Port Bruce Stadial through fluctuations of the Georgian Bay ice lobe. The exact period of deposition remains in question as does the question of whether the Mount View Esker was deposited separately from the Egerton and Hopeville Eskers.

1.2.4 Previous Reports

There are no specific previous reports or studies concerning these eskers, but there have been several general reports and maps of the Quaternary Geology. The OGS is responsible for most of the literature from the area which covers portions of four National Topographic Service (NTS) map sheets. Gwyn (1972) prepared a preliminary Quaternary Geology map of the Dundalk area, Sharpe and Broster (1977) have done likewise for the Durham region, and the marginal notes provide good descriptions of the

tills in the region. The most detailed observations come from Quaternary Geology reports and maps from W.R. Cowan. Cowan (1976) describes the eskers, tills and events responsible for their deposition in the Orangeville area which encompasses the southeastern portion of the ridges. In 1979, Cowan produced another Quaternary Geology report for the Palmerston area, with a differing view as to the events surrounding the deposition of the Mount View Esker and the Tavistock Till. All of these OGS reports and maps were essential in grasping an understanding of the deposits as each map and report differed only slightly in the description of the deposits but enough to see variation of lithology, especially in tills.

The OGS, through the Ministry of Natural Resources, have published Aggregate Resource Inventories for each township. These inventories are focused on applications to mining and aggregate industries but the maps contained in the reports make excellent base and field maps and although the descriptions of material within the eskers are general, provide a good reference when checking samples for grain size analysis.

1.3 PREVIOUS STUDIES OF ESKER PROCESSES

This is obviously a broad heading and no attempt will be made to discuss all the reports concerning esker processes. A review will be made of significant reports which have stood out, clearly defining differing processes of esker formation. Good reviews of some of the earlier theories of esker development can be found in texts by Embleton and King (1971), Flint (1971) and Sugden and John (1976). A recent overview of glaciofluvial environments including esker formation is found in Ashley, Shaw and Smith

(1985). Most of these earlier studies focus on large eskers found in northern latitudes where the ice mass was more stable.

One benchmark study describing formation of complicated eskers was by Banerjee and McDonald (1975). This study defines surface morphology of the esker, relating this to the internal structures of the esker and hence the depositional environment. Banerjee and McDonald's findings were from eskers near Peterborough, Ontario and Windsor, Quebec where the conditions responsible for esker formation are similar to those on the Dundalk Till Plain. During the mid-1970s, research attention on the sedimentology of glaciofluvial deposits was peaking and several reports focused on sediments within a single esker. Saunderson (1975a) gave a detailed description of the sedimentary structures and paleohydrology of the Brampton Esker. Saunderson (1977a) followed this with a similar study of the Guelph Esker which included identification of a sliding-bed facies. A fourth esker in southern Ontario, the Norwood Esker, has also been described in great detail. The study on the Norwood Esker also found evidence of sliding-bed deposits and used Banerjee and McDonald's work to deduce the origin of the esker (Dixon, 1978).

With the anatomy of esker formation well examined, recent studies have concentrated on restrictions and controls of esker formation. Henderson (1988), studied eskers near Kingston, Ontario, giving descriptions of their internal structures and focusing upon bedrock valleys as a control on sedimentation. A recent study of eskers in the Skane province in Sweden reveals structures, including tills, within the eskers and a hypothesis of reworking of basal debris from a stagnant ice mass by an advance and retreat of the ice (Hebrand and Amark, 1989). Hebrand and Amark's study

was of particular interest as the descriptions of the sediments are similar to those found in the eskers in this study.

1.4 OBJECTIVES

The principal objective of this thesis was to perform a detailed sedimentological analysis on the Mount View, Egerton and Hopeville Eskers in an effort to deduce the processes responsible for their formation. Results from this analysis will provide a better answer to the question of whether they are eskers or moraine and, if not moraine, why these deposits exhibit structures similar to moraine.

A secondary objective which arises from meeting the first objective is to update the local stratigraphic record. Determining the order of events leading to and following the formation of the eskers is necessary. There is obviously a gap in the Port Bruce Stadial record as Cowan (1979) indicated by finding the Tavistock Till overlying the northwestern portion of the Mount View Esker. Preliminary field work revealed several tills and till-like units further south, also within the Mount View Esker.

CHAPTER 2

Methodology

2.1 FIELD WORK

2.1.1 Section Measurements

Methods followed in the field began with observations and descriptions of primary sedimentary structures from exposures along the length of the eskers. Description of the primary sedimentary strictures involves the identification of the type of structure, thickness of the structure, degree of sorting, presence of grading, particle size, mineralogy and roundness as well as the general paleocurrent direction. Exposures which are complicated, containing different sedimentary structures, tills or deformation structures require a more detailed description. At such sites observations were made of the thickness of the till, and sketches or photographs were taken to record the location in the exposure. Where deformation structures were present, measurements of the amount and direction of displacement were made.

Along the course of the eskers, numerous sites had old, abandoned exposures. These exposures were usually heavily slumped with no apparent sedimentary structures. The location of such exposures were mapped and a sample collected from a section least disturbed. These samples were

collected in an effort to correlate the material within the esker as well as any variation between the three eskers.

2.1.2 Sampling

At sites which were active with fresh exposures, several types of samples were collected to ascertain the particle size distributions of deposits. The most frequent type of collected sample were channel samples. The number and size of each channel sample was dependent on the variation of sedimentary structures and the thickness of the units. Where an exposure had predominantly the same structure and material, only a few samples were required. Channel samples were collected at right angles to stratification in the unit and from its entire thickness as first described by Otto (1938) and summarized by Saunderson (1977b). These channel samples, used for grain size analysis, establish the overall range of sizes present in the section. The second type of sample collected for grain size analysis was chosen specifically to document the size characteristics of particular structures, such as cross-bedding of deltaic or bar origin. Spot samples were also collected with the purpose of identifying particular attributes of a structure such as vertical grading. The third type of sample comprised measurements of the largest boulders present in the section. These boulders were removed from the face of the exposure and the three principal axes measured. These boulders were classed as crystalline (mostly Precambrian) or sedimentary (mostly Paleozoic) indicating source and maximum size of material transported. Samples were also collected of unusual stones which were faceted or had striations indicating the presence of ice.

Unfortunately, sample collection was restricted to accessibility in the exposure. Units in the upper portions of the face were not always sampled due to a steep face or instability of the face. Care was taken to minimise contamination of the samples during collection from material in the surrounding units which had a tendency to collapse and to be entrained by wind where of sand and silt sizes.

2.1.3 Paleocurrent Measurements

Paleocurrent measurements were collected using two techniques from ripple laminations, cross-bedded sand and cross-bedded gravel. The first technique employed when measuring the paleocurrent direction of ripples initially involved determining whether the ripples were transgressive or regressive. This was accomplished by comparing the trend of the ripples with the general paleocurrent direction. A one-meter to half meter shelf was cut into the ripples to expose the laminations in a plan view, and a vertical cut approximately 50cm. deep was used to see the general dip direction of the same laminae. From this surface individual ripple crests were visible. A line was drawn at right angles to the tangent to the point of maximum curvature of the ripple crest. The orientation of the line was then measured using a Brunton compass (Saunderson, 1975b). The number of samples collected depended largely on the accessibility of ripples, the moisture of the deposit and the stability of the shelf. Unfortunately, due to the coarse nature of two of the eskers, ripple laminations were not abundant.

The second technique required collecting sets of apparent dips from cross-bedded units. A column was cut into the section at right angles to

the face, revealing two apparent dip directions and angles for the same bed. These were measured and recorded from a Brunton compass. Sand units were easier to use because of their stability and ease of excavation. When measuring gravel cross-beds, the same technique was followed except for larger material where columns cut by gully erosion were used.

2.2 LABORATORY AND COMPUTER TECHNIQUES

2.2.1 Laboratory methods for particle size determination

Samples collected for grain size analysis were divided into three groups: gravel, sand and fines (silt and clay). Each group required a different technique. Gravel samples were sieved for 15 minutes with a "Ro-Tap" mechanical shaker following the procedure described by Folk (1968). The nest of sieves ranged from -6.50 phi(ϕ) to +4.00ϕ with one-half phi intervals to -4.50ϕ followed by one-quarter phi intervals to increase the accuracy of the results. By using the entire sample, clogging of a sieve may occur. In this event multiple runs of sieving were done with less material until the entire sample was sieved. Sand samples were initially split to approximately one quarter of the sample's original weight. This split sample was then sieved following the above procedure. With both sand and gravel samples, if five percent or more of the initial weight passed through the +4.00ϕ screen, this amount was set aside for pipette analysis. The procedure followed for pipette analysis is also from Folk (1968) where drawn samples were 20 milliliters(ml) and only collected five times up to 10ϕ.

Finer grained samples (silt and clay) presented several problems. Firstly, the material had cemented together, and thus mechanical disaggregation was not possible. Second, most of the samples were till-like

containing pebbles and coarser clasts so that sieving was necessary to obtain the entire grain size range. The solution was to split the sample in half and soak this split sample in sodium metaphosphate. The solution was allowed to evaporate and the dried sample was then easily broken down using a mortar and pestle. The sample was then sieved and the remaining fines pipetted using the above procedures.

The results from the sieve and pipette runs were tabulated and the results computed using NAWK commands on UNIX, System V, version 3.2.1. The cumulative percents were plotted and the frequency distributions were summarized where possible using Folk and Ward's (1957) statistical measures; otherwise coarser measures of Inman (1952) were employed. The results from the 84 samples sieved, and the summary statistics, are contained in Appendix A. Problems arise when trying to match tails of curves from two different techniques. Fortunately there was an overlap at +4.00ϕ which provides an estimation of how well the curves fit. The results from the till-like samples were correlated to previously published OGS reports. This correlation is tenuous as the OGS identifies tills based on percents sand, silt and clay, excluding the portion larger than -1.00ϕ. In an effort to support the correlations and results, three samples were sent to the OGS for laboratory analysis. The above procedures were followed for 73 gravel and sand samples and 14 fine-grained samples.

2.2.2 Statistical Analysis of Paleocurrent Data

Two-dimensional paleocurrent data collected in the field from ripple laminations were summarized using vector analysis (Curray, 1956). The vector resultant and magnitude were calculated using a simple BASIC

program. Three-dimensional data taken from cross-beds were reduced to azimuths and summarized using vector analysis (Curray, 1956). The resultant vector and magnitude were calculated using the same BASIC program after the field data was transformed using a Wulff stereonet. The results from the ripples were plotted on rose diagrams whereas the three-dimensional data is shown in a scattergram of azimuths and dips on polar coordinate paper. The results of the paleocurrent data are contained in Appendix B.

CHAPTER 3

Depositional Structures

3.1 OVERVIEW OF DEPOSITIONAL STRUCTURES

Depositional structures are large-scale features formed during the period of deposition by geomorphic processes. These structures are obviously primary and proper identification and description of them are used commonly to interpret depositional processes and environment of deposition. Types of depositional structures include tabular and trough cross-beds which have a thickness greater than 1cm and cross-laminations, which are less than 1cm thick (McKee and Weir, 1953). Such structures are highly variable, in that the angle of dip, thickness and contacts with other structures change within one exposure (McKee and Weir, 1953; Allen, 1963). Thickness of a cross-bed can range to several meters and the angle of dip usually varies from 0 degrees(°) to 30°, but can be greater than 45° through secondary processes such as deformation (McDonald and Shilts, 1975). Cross-laminations also vary but not to the same extent as cross-beds because of restrictions in unit thickness and sediment type (Walker, 1963; Jopling and Walker, 1968; Ashley et al., 1982).

Deposition is affected by location with respect to ice, sediment type, and hydrology, which are all interrelated and equally important (Jopling,

1965a). Large-scale depositional structures can often be correlated with bedforms in a channel. Generally, trough cross-beds are associated with migrating dunes; cross-laminae in single sets are interpreted as ripple marks which are associated with low flow velocity conditions; horizontal, parallel beds are correlated to a flat bed to in-phase waves indicating high velocity periods; a structureless deposit comprised of a wide range of particle sizes is associated with a sliding-bed in a full-pipe flow condition (Saunderson, 1977a). The bedforms and their general hydrological conditions are summarized in size-velocity-depth diagrams (Simons et al., 1965; Guy et al., 1966; Southard, 1971; Saunderson, 1982).

The size-velocity diagrams provide a general indication of the hydrology, but other characteristics of the depositional structure besides the large-scale form can also reveal hydrological conditions. Tabular cross-beds are associated with depression-filling, with bars or a deltaic environment where increased water depth causes a reduction in flow velocity allowing particles to fall out of suspension. The thickness of cross-beds is affected by the depth of water with thickness increasing with water depth. The angle of dip of the cross-bedded unit is controlled by relative depth, flow velocity and particle size of the solid load. The angle of dip remains constant as flow velocity and amount of sediment remains constant and progradation of the delta front continues through avalanching and particles falling out of suspension. As flow velocity increases, a more concave bed, and thus a reduced angle of dip, is created by more attenuated particle trajectories and possible erosion from backflow created through flow separation (Jopling, 1963, 1965a, 1965b). On a smaller scale, ripple marks do not vary greatly as they are restricted to low flow conditions in fine

sand and silt. The type of ripples can vary from symmetrical to asymmetrical with the stoss-side either preserved or eroded, indicating changes in the suspended to bed load ratio during deposition (Jopling and Walker, 1968). The above processes have been verified in laboratory studies and the dispersal pattern of particle trajectories have been applied to tabular cross-beds in an esker to obtain estimates of hydraulic conditions (Saunderson and Jopling, 1980).

Grain size from a structure can be used to estimate a flow velocity for the threshold of erosion using flow competency diagrams such as the one established by Sundborg (1956) and extrapolated to gravel sizes by Komar (1987). The range of grain sizes in a depositional structure can be shown in grain size curves. When plotted on log-probability graphs the curves may contain straight line segments indicating differing modes of transport, namely bedload creep, saltation and suspended load (Visher, 1969; Middleton, 1976; Bridge, 1981). Grain size curves can also help to indicate sorting within the depositional structure. More detail on these features can be found in several recent texts (Middleton, 1965; Allen, 1984; Middleton and Southard, 1984; Fritz and Moore, 1988).

3.2 DEPOSITIONAL STRUCTURES IN THE MOUNT VIEW ESKER

The Mount View Esker has a beaded morphology consisting of four well-defined beads, ranging in length from 2km to 5km. Within the beads, sediment changes from coarse to fine in a southeast direction. The width of the beads is approximately 200m but near Luther Marsh, is over 400m

wide. The esker contains seven sites of which five were active providing fresh exposures (Fig. 1.1).

Site 7, (Fig. 3.1) east of Mount Forest in the northern bead, contains an active exposure in the core of the esker. Height of the exposure is approximately 8m and the width is 40m. The core consists of tabular cross-beds, with each cross-bed consisting of unsorted, rounded gravel supported by a coarse sand matrix. The largest clasts in unsorted gravel are only 15cm to 20cm across the principal axis. Cross-beds of pebble gravel dip in opposite directions and cross-bedded sand and cobble gravel are interfingered towards the north. The northern flank (not shown in Fig. 3.1) is nearly all sand in thick (75cm) cross-beds, separated by cross-laminations and ripples of finer sand and silt.

Towards the southeast, site 6 contains two active exposures. The northern exposure (Fig. 3.1), only 300m from site 7, is in the core of the esker and is nearly 10m high and approximately 80m wide in a horseshoe shape. This exposure is complicated by structures dipping at differing angles and by rapid changes in sediment sizes. Cobble gravel cross-beds are tabular, supported with a sand matrix although there are several openwork gravel beds. The cross-beds of pebbles have a fairly constant thickness of 20cm to 40cm, and particle size ranges in all beds from cobbles to pebbles, even though the core at the base is comprised of boulder gravel. Both flanks have a higher content of sand and silt in parallel beds, cross-laminations and ripple marks. The western exposure (Fig. 3.1) is smaller (7m high, 40m wide) in a semi-circular shape. The core has been covered from slumping, with well-sorted pebble cross-beds, 40cm thick, and thin (1cm to 4cm) cross-bedded sand, located above the talus near the surface.

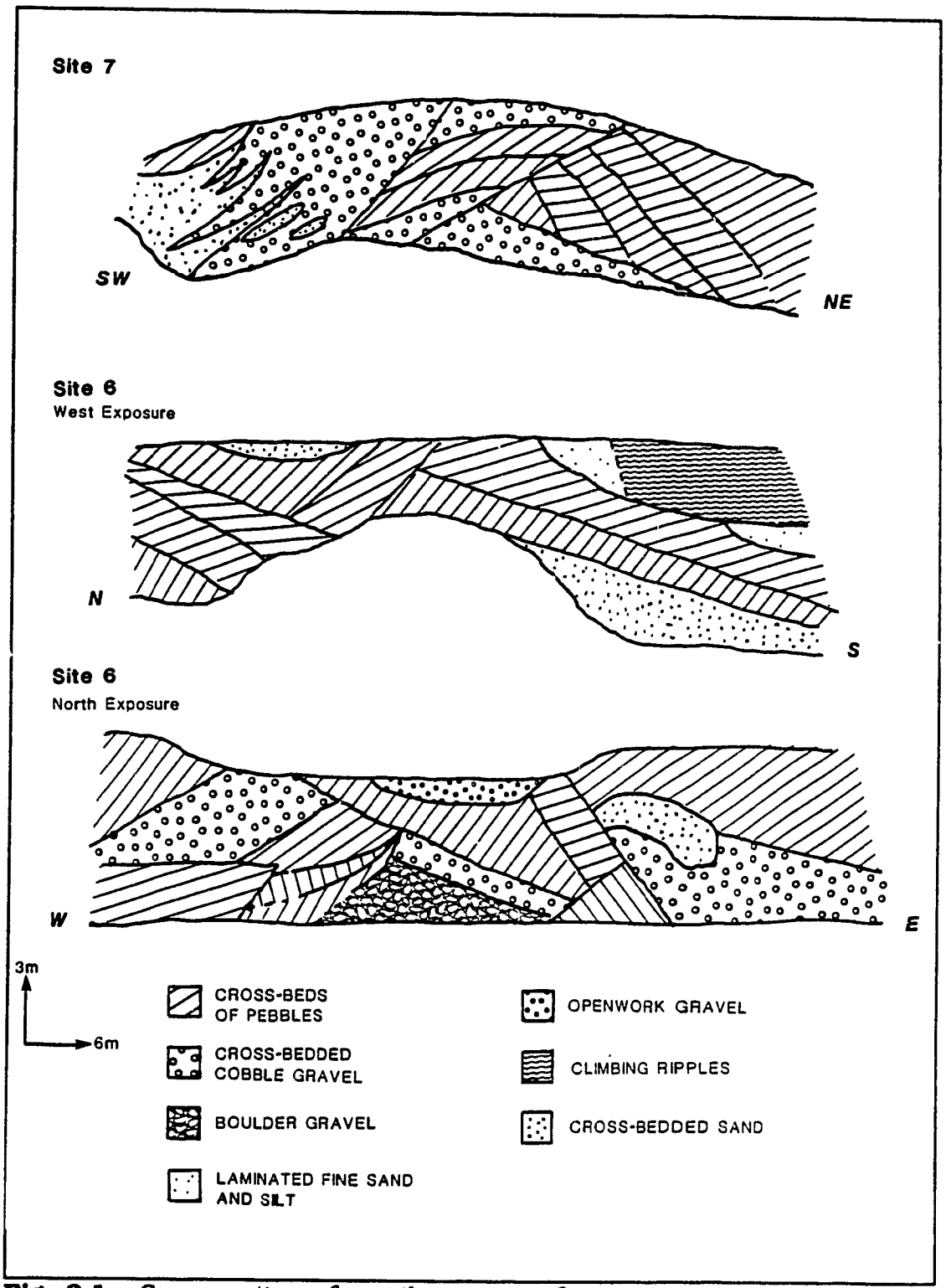


Fig. 3.1 Cross-sections from the center of exposures at sites 7 and 6, Mount View Esker. The dashed line between units marks a transitional contact.

Within the pebble beds are lenses of cross-laminated fine sand. The southern flank (not shown in Fig. 3.1) contains cross-bedded gravel (30cm thick) which is graded and alternates with 30cm-thick, cross-bedded medium sand. The northern flank also contains sand and silt, in addition to cross-bedded, well-sorted pebbles through the majority of the flank.

Site 5, just south of the main esker ridge, is a high (12m) exposure of low-angle cross-bedded gravel and sand. The units vary in thickness from 10cm to 60cm and are cyclic between sand and gravel. There are boulders (30cm to 40cm) near the base in a horizontal bed, with boulders imbricated near the upper contact. Several of the gravel cross-beds are inversely graded.

Near the southwestern end of the bead is site 4, containing an active exposure 10m high and 50m wide (Fig. 3.2). This exposure has tabular cross-beds of unsorted, matrix-supported cobble gravel near the surface. Underlying this unit are alternating thinner cross-beds of pebble gravel and sand. There is an abundance of sand and silt in the middle of the core and in the flanks with a large section of type A and type B ripples (Jopling and Walker, 1968). A thin bed of laminated clay was observed 1m from the surface underlying units of cobble gravel and cross-bedded sand. This clay is intermittent at this level through the west side of the esker.

Continuing towards the southeast, site 3 is found in a different bead, west of County road 14 (Fig. 1.1). Site 3 has two exposures nearly a kilometer apart. The northern exposure (Fig. 3.2) is coarse, containing tabular cross-beds of rounded, unsorted boulder gravel supported with a sandy matrix at the base. Overlying this unit, through the middle of the exposure is cross-bedded coarse sand which varies in thickness from 20cm

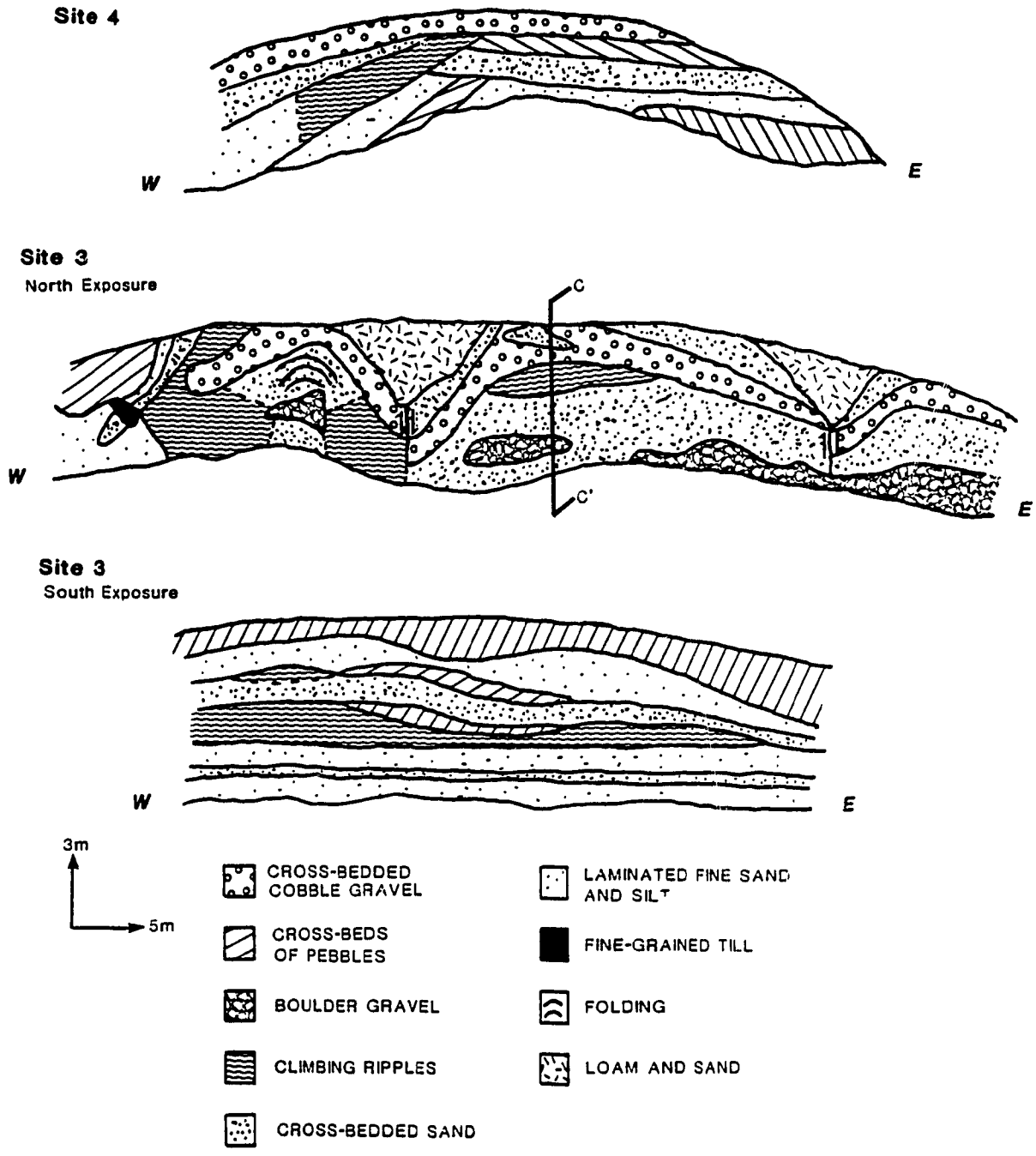


Fig. 3.2 Cross-section from exposures at sites 4 and 3, Mount View Esker. The line C-C' marks the column section in Fig. 3.4. "V-shaped" wedges are seen in the north exposure of site 3, below units of loam and sand, as are high-angle reverse faults. The dashed lines between units represents a transitional contact. The orientation of lines of cross-beds of pebbles and climbing ripples marks the general direction of dip.

to 80cm (Fig. 3.4). Tabular cross-beds of cobbles were observed dipping steeply in places due to deformation. The middle portions also contain sections of climbing ripples which have a gradual transition into either cross-bedded sand or laminated silt. Thickness of the units through the core are shown in Fig. 3.4. Throughout are small pockets of openwork gravel and lenses of cross-laminated fine sand. The upper third of the exposure contains two till-like units (not seen in Fig. 3.2), a lens of weathered grey, silty clay till with only 10 percent stones and a discontinuous bed of reddish brown clayey till, 5cm thick through the center of the section. The southern exposure (Fig. 3.2) consists of more silt and sand with alternating tabular cross-beds of sorted pebble gravel to openwork granules, 20cm to 50cm thick. The sand is seen in thicker tabular cross-beds containing laminations of silt. Towards the west and in the upper portions of the section is an abundance of ripples and cross-laminations. Near the base, between the silt and gravel units is a thin (4cm to 5cm) continuous unit of laminated reddish clay. A second discontinuous unit of laminated clay occurs 15cm below the larger clay unit within cross-laminated silt.

Further southeast, within the same bead is site 2, a small abandoned exposure only 4m high and 30m wide. This exposure contains nearly all sand and silt. The basal unit, 1.2m thick, is cross-bedded sand with some pebbles. Overlying the basal unit are alternating units of sand and silt containing cross-laminae and ripples. The mineralogy of the silt changes, as the colour of the silt units varies from grey to yellow to brown. The silt units are approximately 70cm thick and are separated by thin

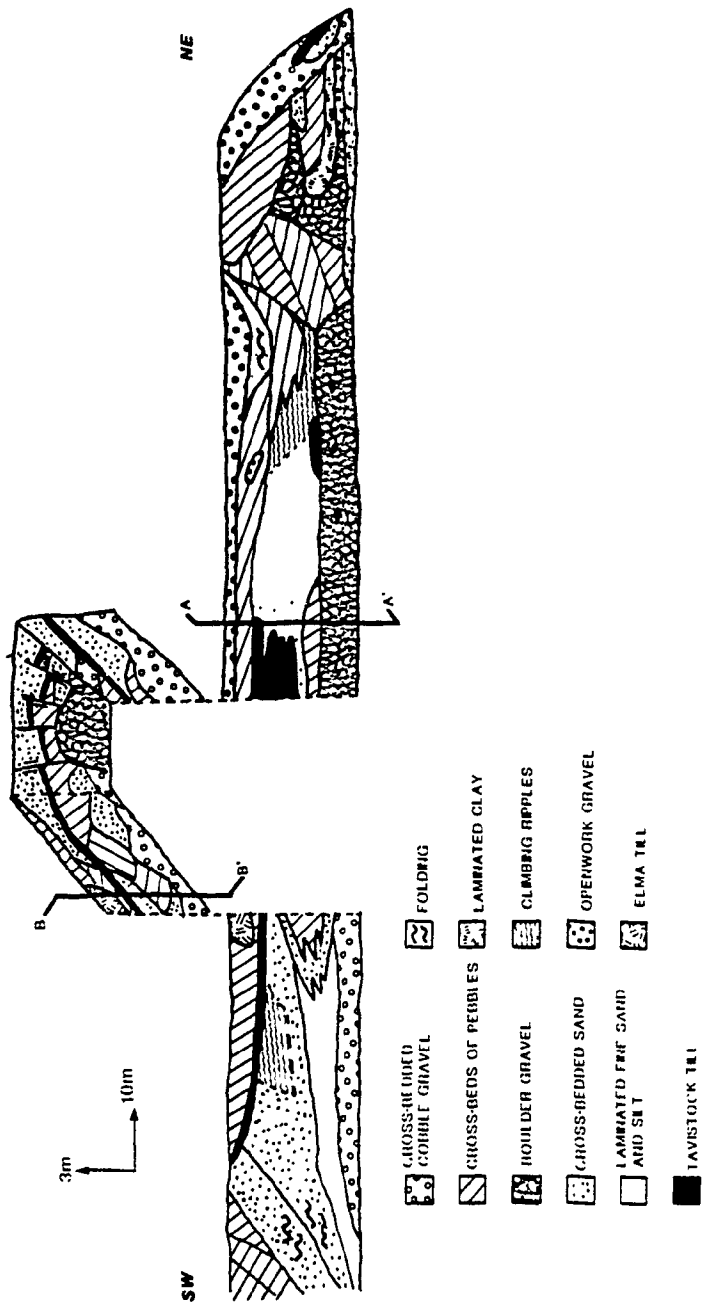


Fig. 3.3 Cross-section of site 1, Mount View Esker which neglects a small section to the southwest. Thicknesses of individual units through lines A-A' and B-B' can be found in Fig. 3.4. Lines extending from boulder gravel in the raised portion, are high-angle reverse faults, marked by arrows showing direction of displacement. Dashed lines between units indicates a transitional contact. The orientation of the lines for cross-bedded pebbles shows the general dip direction.

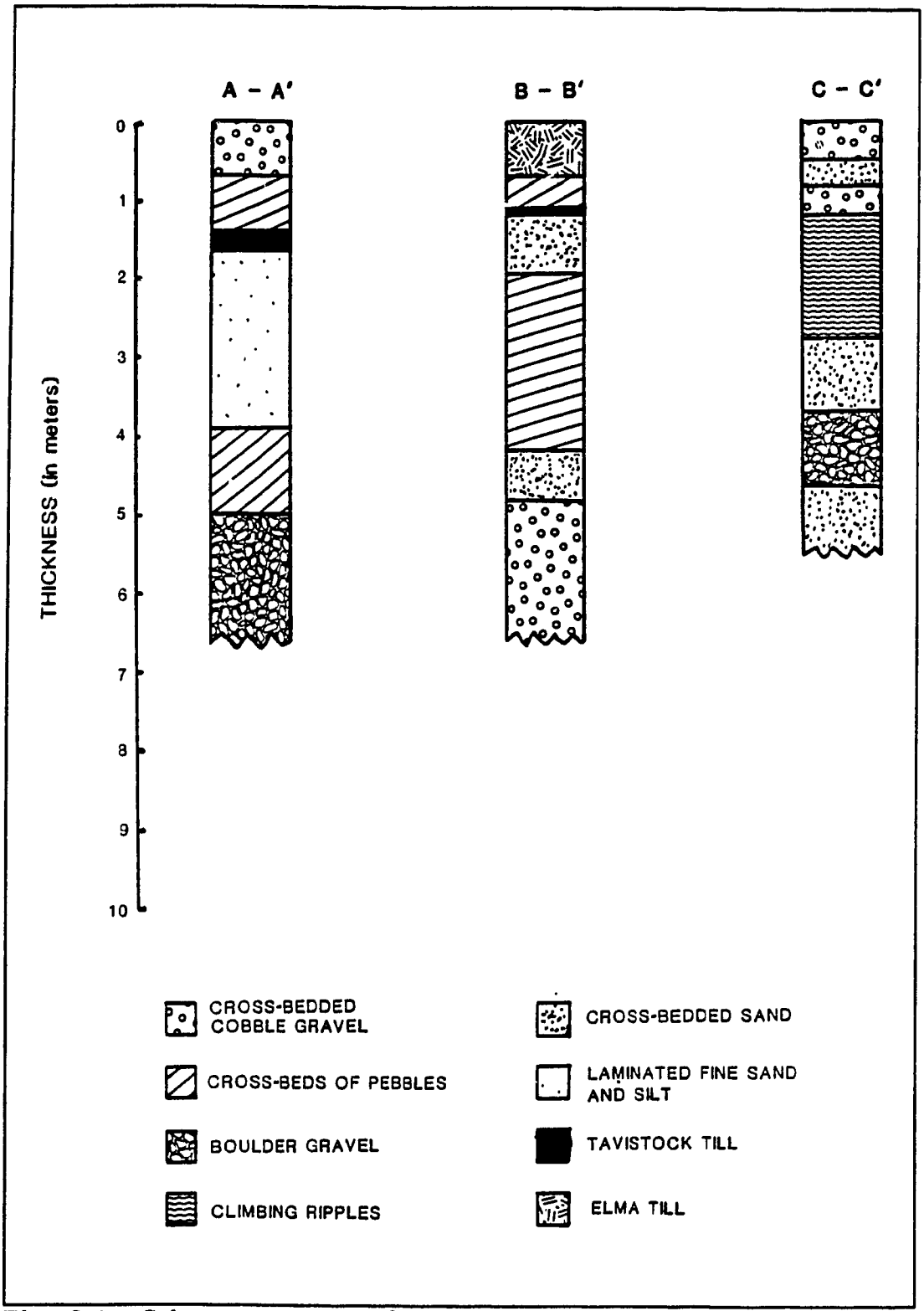


Fig. 3.4 Columnar sections from site 1 (A-A', B-B') and site 3, north exposure (C-C'), Mount View Esker.

parallel sand beds. The majority of ripples are asymmetrical with the stoss side eroded, except near the surface where the ripples are sinusoidal.

Site 1, (Fig. 3.3) is the largest with an exposure across the esker ridge, which is approximately 250m wide. The height of the exposure increased during the field season as aggregate extraction progressed. This site, due to the size, is the most complicated with various depositional structures and a wide range of sediment sizes. The most prominent structures throughout the exposure are tabular cross-beds of unsorted cobble gravel and cross-beds of pebbles, with thicknesses between 40cm and 70cm (Fig. 3.4). From the north to the center of the exposure, the bottom layers remain consistent with a large (1m to 1.2m) tabular cross-bed of unsorted boulder gravel with a coarse sand matrix underlying a thin, discontinuous unit of laminated reddish clay. Overlying the clay is fine sand and cross-beds of pebble gravel and granules. The angle of dip for cross-beds in the middle to upper portions often vary, with neighbouring units dipping in opposite directions. Interfingering between cross-bedded gravel and sand units and between a silty clay till and laminated silt was also observed. Depositional structures in the upper half of this section include: well-sorted pebble cross-beds, openwork gravel cross-beds, cross-bedded coarse sand, parallel-bedded gravel, cross-laminated and rippled silt, a reddish silty clay till containing angular stones and numerous lenses of clay till and armoured till balls. The silty clay till was observed several meters from the surface with the lenses of till and till balls below, in the middle units. Towards the core, there are pockets of thick (2m to 3m), laminated sand and silt and structureless sand. This sand has a high-angle contact with a thick, unsorted cobble gravel cross-bed.

The center of the exposure has the greatest relief (10m) and contains numerous gravel cross-beds (Figs. 3.5, 3.6), similar to the northern exposure of site 6. Within the basal unit, which is unsorted gravel, imbricated at the upper contact, is a large block, 4m by 6m, of structureless, unsorted gravel. Overlying are thinner (20cm to 40cm) pebble gravel cross-beds which are unsorted with some large clasts. There are units of laminated silt, and most of the gravel cross-beds are supported with a silty matrix. A continuous reddish, silty clay till is traced throughout the core, near the surface. Detail of the thicknesses of the units, through columns A-A' and B-B' (Fig. 3.3) are shown in Fig. 3.4.

Moving south of the core, sediment becomes finer with a high percent of sandy cross-beds and laminated silt (Fig. 3.7). Near the base, is a 1.5m thick unit which resembles a till, with angular gravel, no stratification and a high percent of yellowish sand and silt, shown in Fig. 3.3 as cobble gravel. Overlying this unit, are a series of low-angle, tabular cross-beds of sand and thin (10cm to 20cm) cross-beds of pebbles supported with a silt matrix. Further south, the units become thinner with cross-bedded coarse sand prevalent. The few gravel cross-beds present are composed of pebbles and granules.

3.3 DEPOSITIONAL STRUCTURES IN THE EGERTON ESKER

The middle ridge, the Egerton Esker, is the smallest with a continuous ridge for most of its length, becoming intermittent at the northern end. Relief of the esker ridge ranges from 5m to 8m with a width of 50m, which increases to 100m towards the north. There are six sites

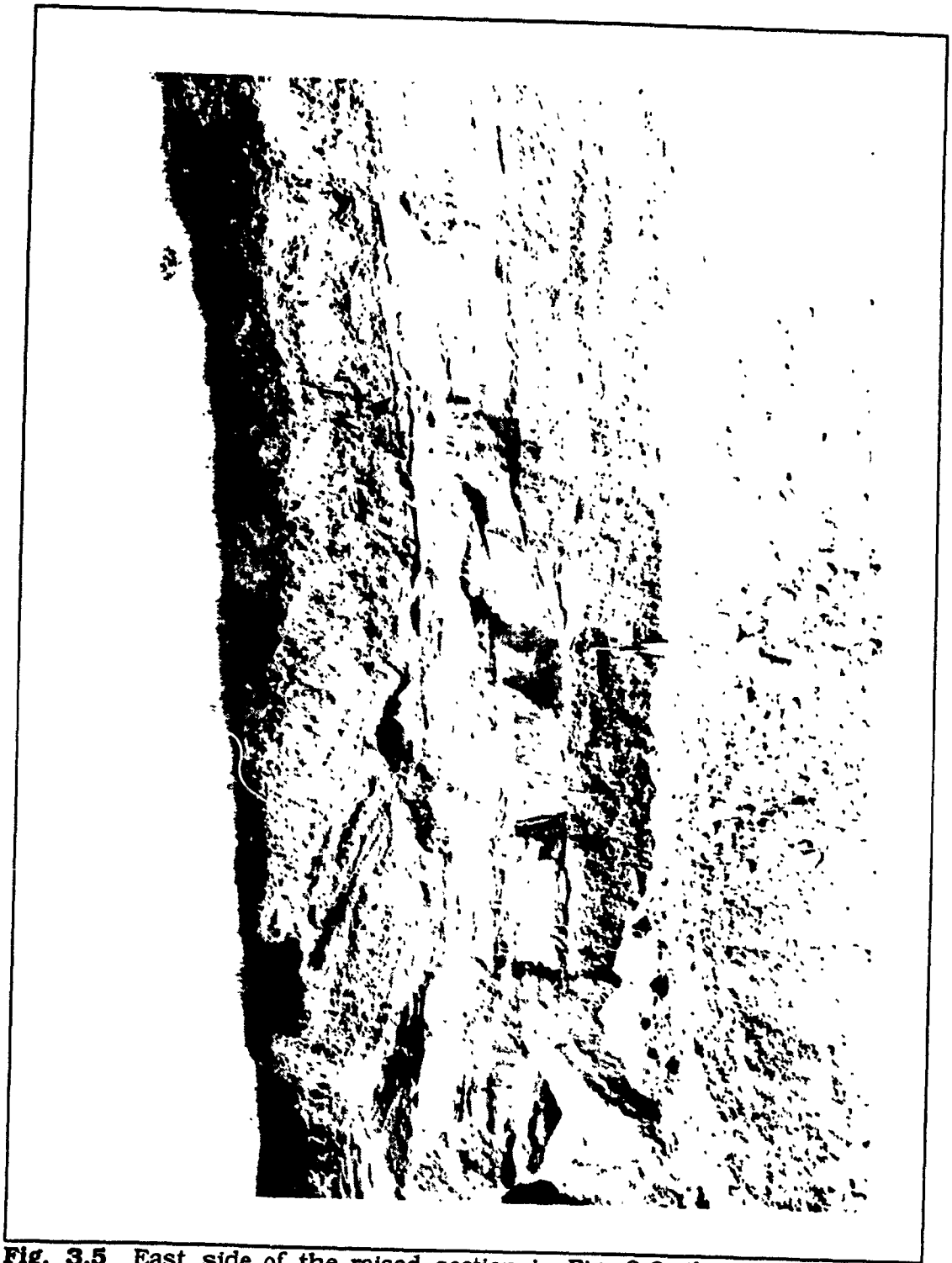


Fig. 3.5 East side of the raised section in Fig. 3.3, the side not visible in the drawing. Shovel 80cm long, is placed in front of cross-bedded cobble gravel. Arrow marks location of a thin, continuous unit of Tavistock Till.

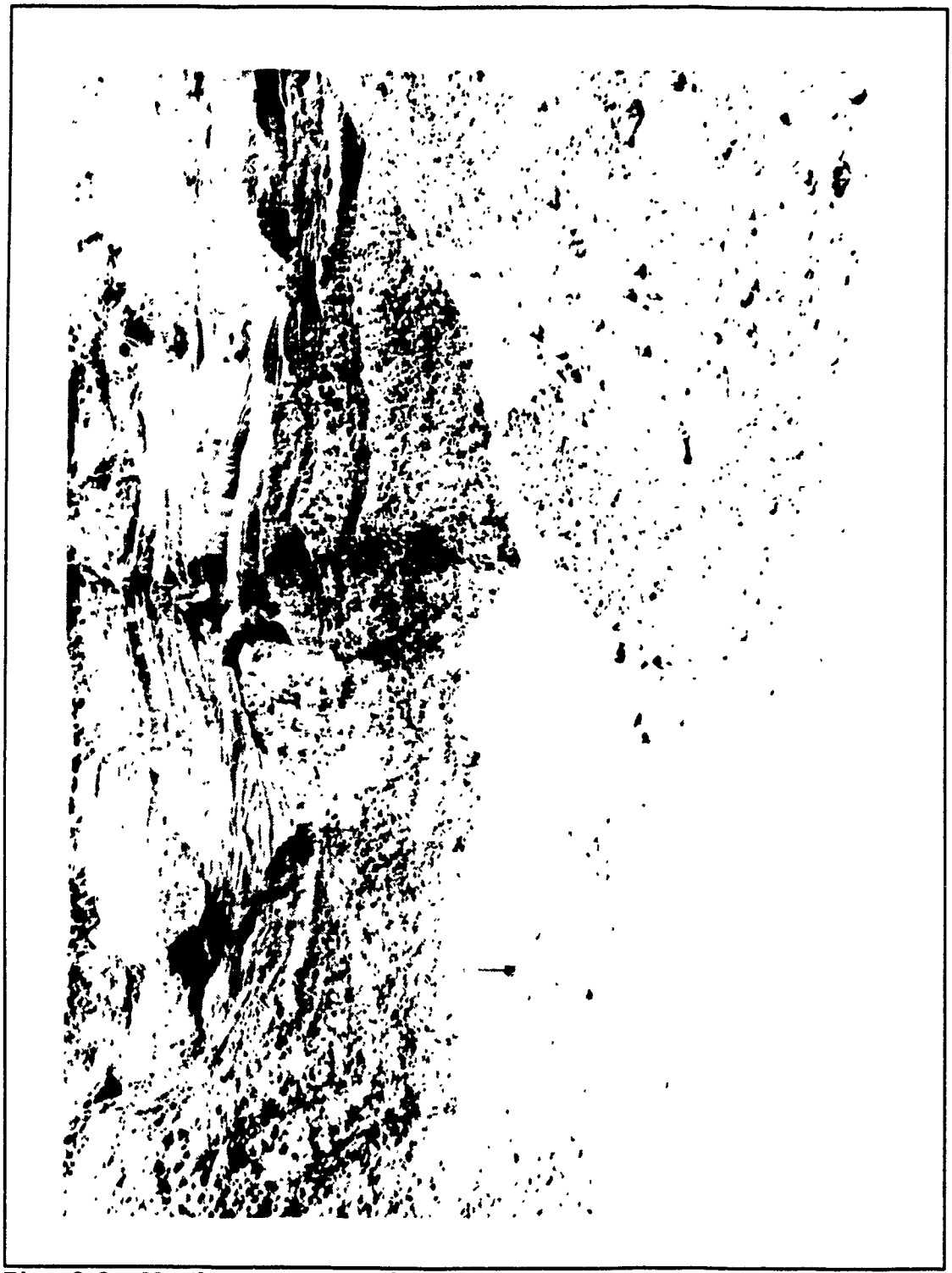


Fig. 3.6 Northeast corner of the raised portion in Fig. 3.3. Visible on the left hand side is the block of structureless boulder gravel with a high-angle reverse fault above. Above the shovel is a variety of dip angles in cross-bedded sand.

along the length of the ridge, of which only two are active (Fig. 1.1).

Site 6, near the northern end of the esker is one of the active sites. The site is wide with exposures to the west and east of the main exposure in the esker core. Relief at the esker core is approximately 8m. This exposure is mainly sand and silt in cross-beds (10cm to 50cm) and ripples (Fig. 3.8). There is faint interfingering between cross-bedded fine sand and cross-bedded coarse sand and contacts between laminated silt and climbing ripples are transitional. Gravel cross-beds are present in the middle and top of the section; one bed in the middle, 60cm thick, exhibits varying amounts of sandy matrix. This bed is also visible in a columnar section (line D-D') in Fig. 3.11. Overlying basal cross-bedded sand, is a thin unit of laminated reddish clay. Above the clay, and to the east is a thick (1.5m) unit of rippled fine sand and silt.

The west exposure is 40m long, but only 2m to 3m high and contains numerous, thin fine-grained units. The units are either parallel bedded, laminated or low-angle cross-beds. These lower units range from 3cm to 8cm thick and consist of laminated silt, coarse sand and a layer of well-sorted, imbricated pebbles. The bottom silt unit, which is structureless with angular pebbles, resembles a silty till. A thin (3cm to 5cm) unit of a reddish, silty clay till, overlies the imbricated pebbles and is underlying cross-bedded coarse sand. Above the coarse sand is yet another till-like unit composed of unsorted, angular gravel in a silty bed, without any stratification. A distinct contact is obvious between the fine-grained lower units and the thick cross-bedded gravel unit which rises 1m to 1.5m above the silt bed to the surface. Within the gravel cross-beds is a 40cm tabular cross-bed of coarse sand which is parallel with the

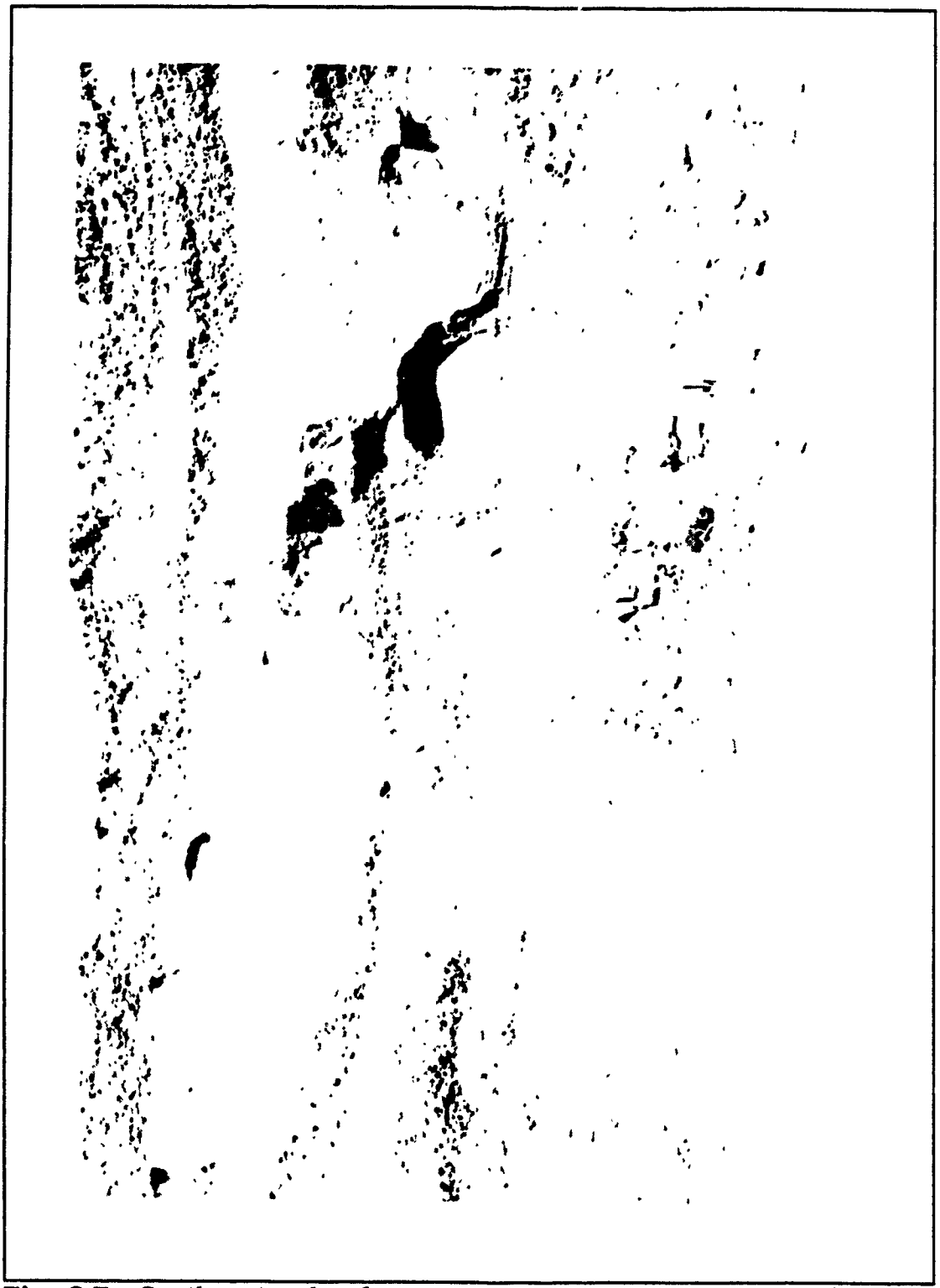


Fig. 3.7 Southwest side of site 1, Mount View Esker, shovel from top of blade to handle is 80cm. The light coloured units above the shovel are laminated silt. Above and below the silt are cross-beds of cobble gravel.

surrounding gravel beds. These cross-bedded gravels are 30cm to 50cm thick, unsorted and supported with a coarse sand matrix. Near the surface there is a 30cm-thick cross-bed of graded, openwork cobbles and pebbles.

The eastern section is higher (5m) but not as accessible as the previous two exposures with vegetation and talus covering most of this exposure. Two sections along this exposure revealed horizontal beds (5cm) of sorted gravel with a sandy matrix, alternating with parallel units of laminated medium to fine sand. Further south there was less gravel and more silt. The units were parallel, and the silt contained numerous climbing ripples.

The next series of sites from 5 through 2, were all abandoned exposures, with most of the exposure covered by slumping and vegetation. The exception is site 4, which provided a clean exposure revealing large-scale tabular cross-beds of unsorted gravel in the core (Fig. 3.8). The eastern flank contains thin cross-beds and cross-laminations of well-sorted sand. Unsorted gravel cross-beds overlying the core, had a convex shape, parallel to the esker surface. At sites 5, 3, and 2, with little of the exposure visible, depositional structures could not be determined. The sediments were often rounded, unsorted gravel with a sand matrix.

At site 1 there are two exposures of which one, 3m-high, is abandoned. Although heavily vegetated, this abandoned, northern exposure contains a thick horizontal bed of rounded, unsorted gravel (20cm across the principal axis) in a sand matrix. Overlying the gravel, 20cm below the surface are parallel beds of well-sorted, openwork pebbles. Further south

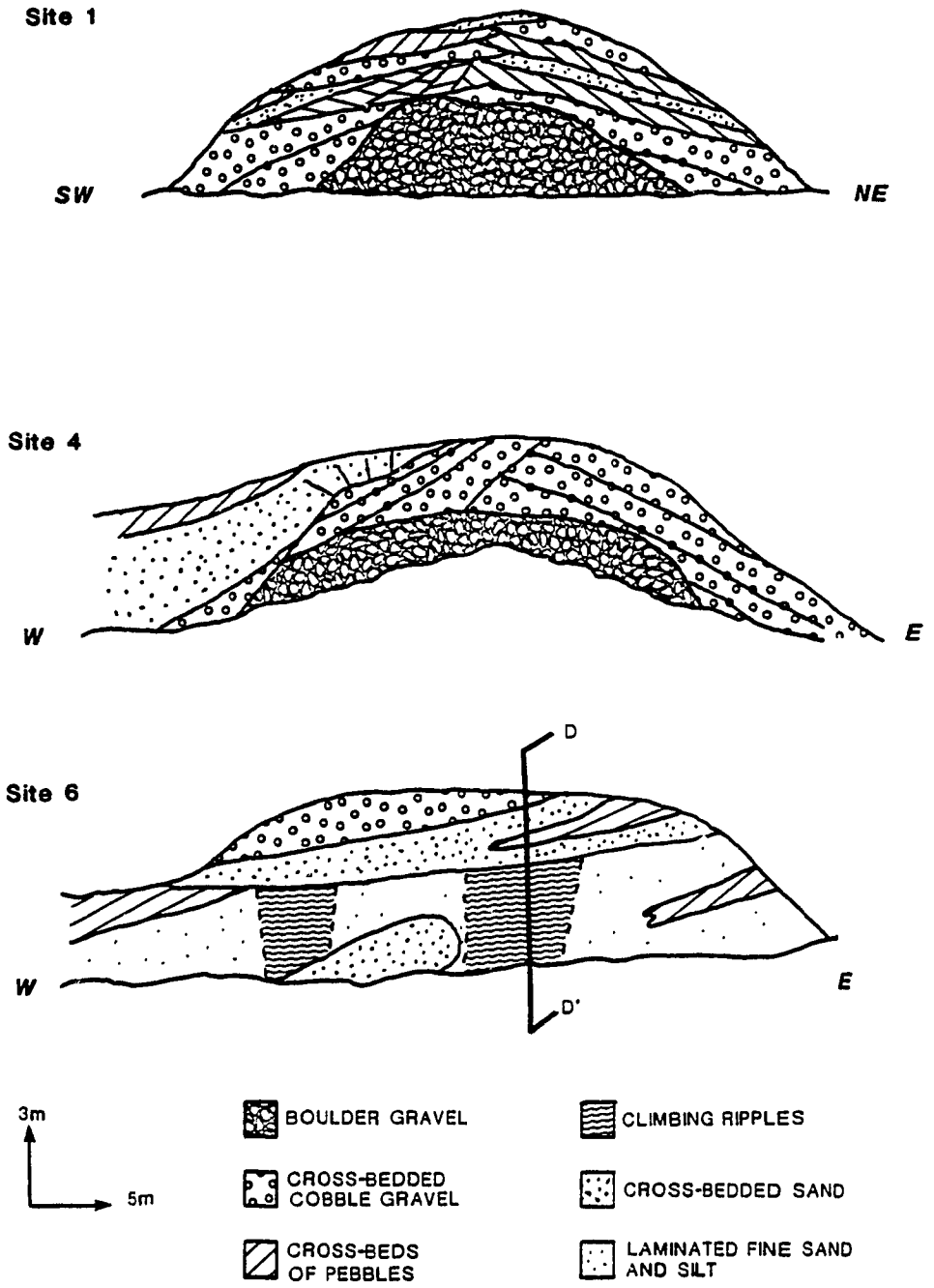


Fig. 3.8 Cross-sections from exposures along the Egerton Esker. Lines near the center of the cross-bedded sand in site 4, are high-angle reverse faults. The line D-D' at site 6, marks the location of the column shown in Fig. 3.11. Dashed lines between units indicate a transitional contact. The general dip direction of cross-bedded pebbles is shown by the orientation of the lines.

the second exposure, 6m high and 20m wide (Fig. 3.8), was active with aggregate extraction. The basal unit, 1.5m to 2.5m thick, contained matrix supported, unsorted boulder gravel in horizontal beds. Above the basal unit, individual beds are thinner (5cm to 20cm) except for a 50cm-thick sand bed near the surface on the western flank. The dip angle of cross-beds near the top is parallel to the flanks of the esker surface, resembling convex bedding observed at site 4. The thinner cross-beds contain either well-sorted, openwork pebbles or well-sorted, coarse sand.

3.4 DEPOSITIONAL STRUCTURES IN THE HOPEVILLE ESKER

The Hopeville Esker is the longest and the largest with relief up to 15m and a width ranging between 100m and 300m (Fig. 1.1). The esker has a continuous steep-sided ridge which reaches its maximum height and width at its southern limit. Towards the north the ridge is broken by the South Saugeen River. Four of the nine sites along the Hopeville Esker were active, providing fresh exposures.

Near the northern end of the esker the ridge is not as pronounced and at site 9 the exposures were only 5m high. Slumping is extensive at all three exposures, covering most of the sections. The middle exposure contains tabular cross-beds of unsorted gravel. Three of the gravel cross-beds in the center of the section are separated by thin layers of ripple and laminated sand and silt. Within the gravel cross-beds, particle size was consistent in each bed but decreases in size towards the surface. Exposures to the west and east are similar with abundance of coarse sand and silt in climbing ripples and parallel laminations.

Site 8 contains one active exposure which runs parallel with the eastern flank of the esker. The exposure is 12m to 15m high and approximately 70m long (Fig. 3.9). The basal unit is partially buried with talus, but is a continuous horizontal bed of unsorted, boulder gravel, supported with a sand matrix. The boulders measured 30cm to 40cm along the principal axis. Above the horizontal boulder gravel is a complicated assemblage of structures and sediment types, including thick sand units containing faint laminations and interfingering of cross-bedded sand and pebbles with cross-bedded cobble gravel. There were lenses of fine sand and silt through the stratigraphic middle as well as pockets of well-sorted openwork, pebble gravel. The two most common structures are large-scale tabular cross-beds of sand and silt and cross-beds of cobble gravel with a fine silt matrix. The sand and silt cross-beds contain some cross-laminations and thinner cross-beds of varying thickness (2cm to 7cm). A columnar section (E-E', Fig. 3.9) showing the range of structures and their thicknesses is shown in Fig. 3.11.

Site 7 is a large abandoned pit with most of the exposures covered. At the southern end, through the core of the esker is an exposure 10m high and 40m wide (Fig. 3.9). The lower units were covered because of slumping but the upper 4m contained tabular cross-beds of sand and gravel. The basal unit, where partially visible, contained boulder gravel with a very coarse matrix. A depositional structure could not be determined, but the upper contact was horizontal. In the core, overlying the boulder gravel

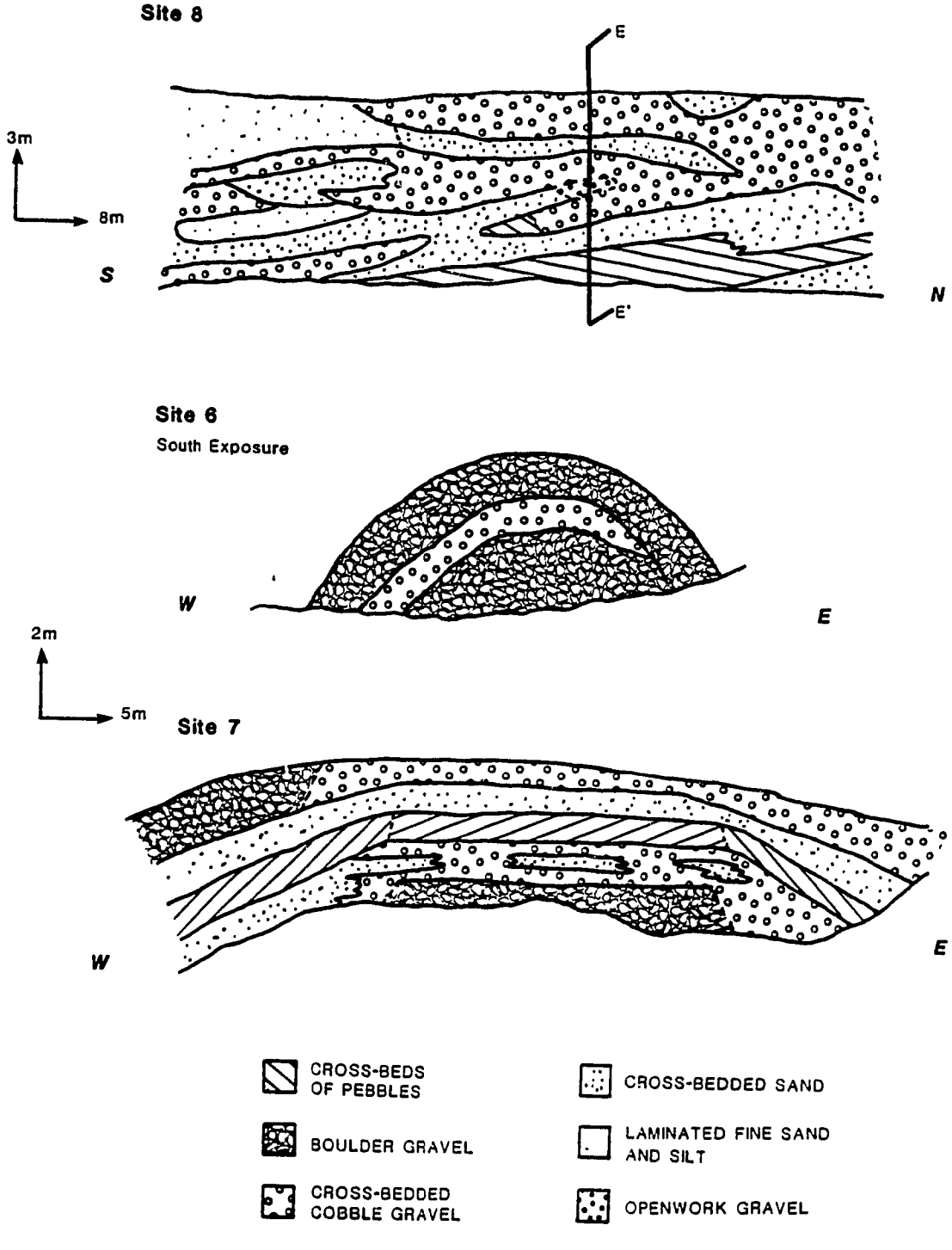


Fig. 3.9 Cross-sections from sites 8, 7, and 6, Hopeville Esker. The line E-E', site 8, marks the location of the column shown in Fig. 3.11. Dashed lines between units indicate a transitional contact. The orientation of the lines for cross-bedded pebbles shows the general dip direction.

were thin cross-beds containing either coarse sand or stones with interfingering between cross-beds common. Overlying this unit of thin cross-beds was a 50cm-thick cross-bed of inversely graded gravel with openwork large gravel in the upper 7cm to 10cm. Immediately above the openwork gravel is a 1cm layer of clay followed by a 40cm to 80cm-thick (increasing towards the eastern flank) unit of laminated coarse sand. The highest unit is a cross-bed of rounded medium gravel, supported with a coarse sand.

Deformation is prevalent in the northern exposure of site 6, making accurate identification of the depositional structures difficult. In the core, at the base is a large block of unsorted boulder gravel with a coarse sand matrix. Most of the units are stratified, but the angles have been altered. Bed thickness ranges from 2cm to 40cm and sediment is generally cobble gravel. Several sections contain laminated sand and well-sorted beds of pebbles and granules. The southern exposure (Fig. 3.9) contains very coarse sediment in the only three units visible. The exposure is relatively small, 6m to 7m high and only 25m wide. The lowermost unit is a horizontal bed of boulder gravel with clasts having a length of 30cm to 55cm along the principal axis. Overlying this is a 1m-thick, tabular cross-bed of cobble gravel. Beneath the esker surface is a 1.2m-thick convex bed of boulder gravel supported with a fine-grained matrix.

Site 5, has a small exposure, 6m high, 30m wide and contains markedly finer sediment. The basal unit, is composed of a horizontal bed of unsorted gravel with a silt matrix. Overlying this is a parallel bed of graded granules to silt, 20cm thick. Towards the top of the exposure are tabular cross-beds dipping out of the section. The thickness of the beds

ranges from 5cm to 30cm and the sediment, as well as being finer, is also more sorted.

Sites 4, 3, and 1 have abandoned exposures and all three sites exhibited rounded boulders to cobble gravel, supported with a sand matrix. Site 1 contained several horizontal layers (2cm to 3cm) of pebble gravel within the larger unit of boulder gravel. Site 4 had flanks with a higher percent of sand with angular cobbles.

The five exposures at site 2 contain many depositional structures. Site 2 is located along the eastern flank of the esker and most of the exposures have been excavated downward through the floor. Each exposure has a semi-circular shape, ranging from 5m to 9m high and 30m to 70m wide. Through all the exposures is a basal unit (Fig. 3.10), 1m to 2m thick, consisting of horizontal and low-angle, cross-laminated silt and sand. A general trend is apparent with coarser material near the esker ridge and fining towards the east. Exposure A, at the northern end of the site contains cross-bedded sand overlying the basal units with an irregular upper contact with parallel bedded, unsorted gravel. This parallel bed is 1m to 2m thick with boulders, cobbles, pebbles, and a sandy matrix. Associated with the irregular contact are small pockets of sorted pebble cross-beds. Within the parallel beds of gravel are isolated lenses of rippled silt. The northern edge of the exposure has a block (5m by 3m) of laminated silt and clay which appears to have been pushed into the section, on top of the basal sand.

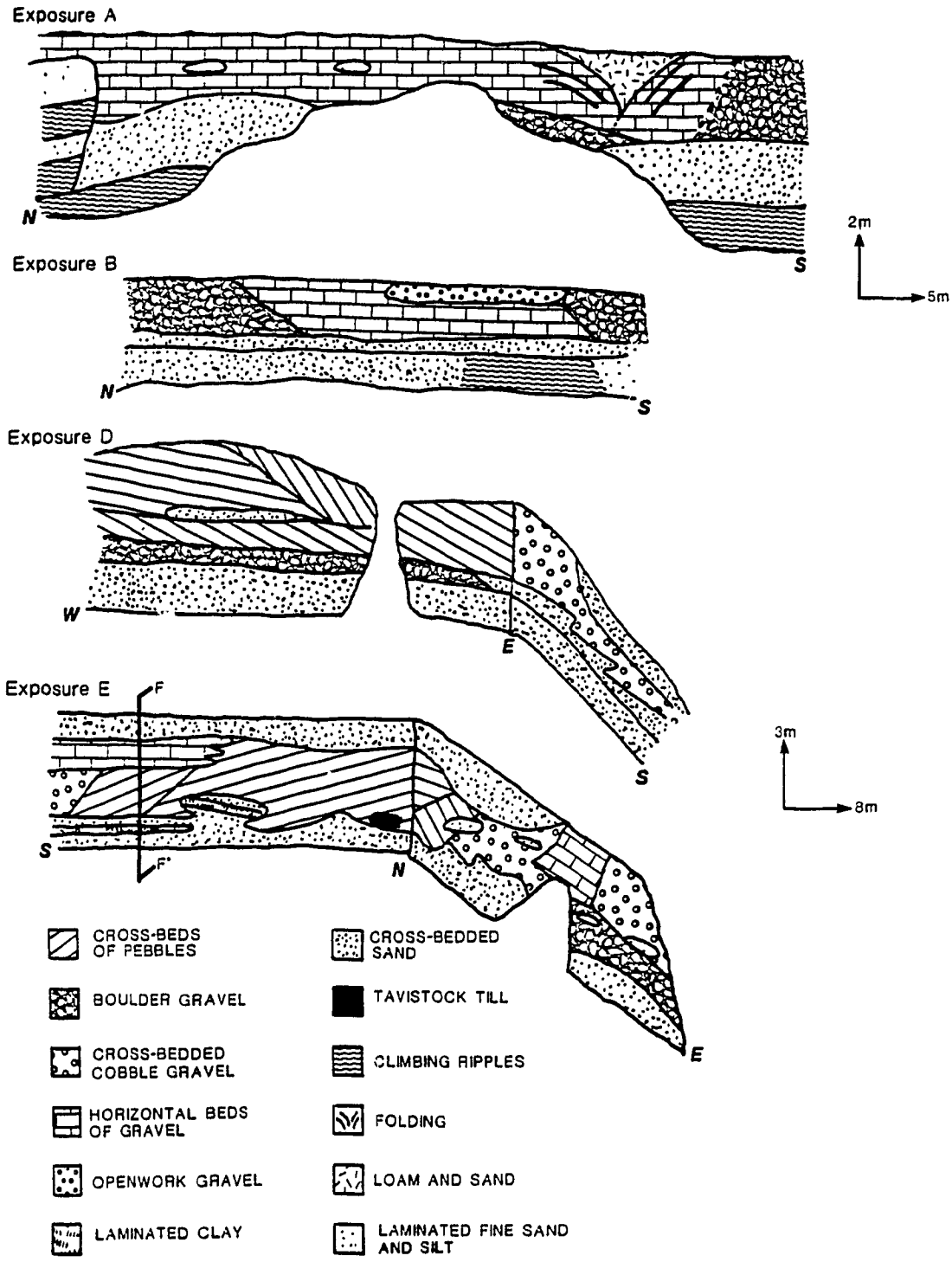


Fig. 3.10 Cross-sections of exposures at site 2, Hopeville Esker. Exposure A, contains a "V-shaped" wedge below the unit of loam and sand. The line F-F' in exposure E, is the location of the column shown in Fig. 3.11. Dashed lines between units represents a transitional contact. Orientation of the lines in cross-bedded pebbles shows the general dip direction.

Exposures B and C (Fig. 3.10), in the center of the section, are the smallest containing horizontal beds of sorted sand and gravel. The upper unit at exposure B is 1m thick and has several thinner beds alternating between unsorted cobbles supported with a sand matrix and well-sorted openwork pebbles. Exposure C is similar to B but contains more parallel beds of unsorted gravel.

Exposure D (Fig. 3.10) is the largest and contains a few more structures. Overlying the basal unit is a 50cm-thick parallel bed of boulder gravel. The upper two-thirds of the exposure, overlying the boulder gravel, has thinner cross-beds of cobbles, pebbles, and sand. Truncating several of the cross-beds is a lens of silt and clay, 70cm high and roughly 6m long. To the east is a series of trough-shaped cross-beds of coarse sand and pebbles. Overlying the trough cross-beds is a 1m to 1.5m unit of unsorted cobble gravel.

At the eastern edge of the site is exposure E (Fig. 3.10), with a 9m-high face. The basal unit here contains numerous climbing ripples with laminated clay at the top. Above the clay is a thick unit (5m) of thin cross-beds (10cm) of sand and gravel. The base of several of the gravel cross-beds is composed of openwork gravel, which is slightly larger than the other gravel in the matrix-supported bed (Fig. 3.11). Amongst the thin cross-beds is a block of reddish silty, clay till. Towards the north, this 5m-thick unit becomes more complicated as well as increasing the percent of sand. Interfingering occurs in cross-bedded sand with silt at one end, and gravel at the opposite end, and in the upper portion are cross-beds of gravel dipping in opposite directions. At the same stratigraphic height, there are a series of silt lenses, similar to those in exposure A.

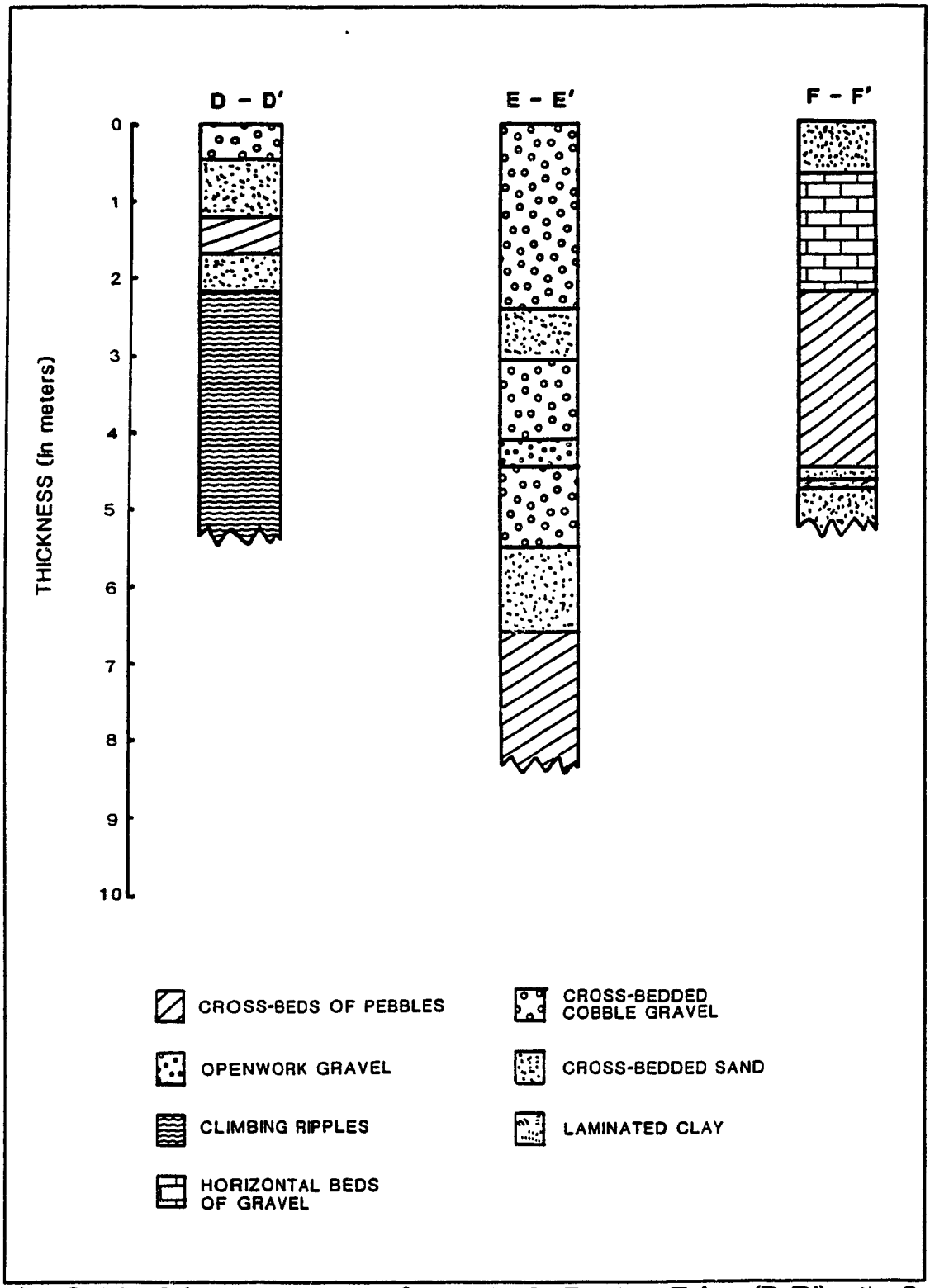


Fig. 3.11 Columnar sections from site 6, Egerton Esker (D-D'), site 8, Hopeville Esker (E-E'), and exposure E, site 2, Hopeville Esker (F-F').

CHAPTER 4

Deformational Structures

4.1 SIGNIFICANCE OF DEFORMATION

Deformation is usually present in eskers or other glaciofluvial deposits because of the proximity of the ice and the volume of sediment which may cause folding through increased pore pressure. Folding through increased pore pressure also occurs when the amount of water within a unit increases. Speed of deposition may also fold the underlying sediments because of increased shear stress. The abundance and location of deformation varies for each deposit and seldom is deformation considered an interpretative tool for understanding the processes within the esker. The deformation observed in the eskers for this study is significant in terms of process interpretation, and cannot be overlooked. Understanding the processes which created the deformational structures is important for three reasons. First, the type of deformation can give clues about the local depositional environment, such as the presence and location of ice (McDonald and Shilts, 1975). Second, deformation can reveal an order or time series of the depositional events, when deformation is restricted to only one or two beds and indicates a pause in sedimentation or a change in the

depositional environment (Shotton, 1965). Finally the type of deformational structure can indicate broader climatic conditions such as a prolonged period of a periglacial environment (French, 1986).

Faulting is one of the most common deformational structures in glaciofluvial deposits and occurs as a relatively sudden event where the vertical force is usually dominant (Billings, 1972). Transcurrent faults or strike-slip faults may also occur where a horizontal force displaces beds parallel to the strike (Billings, 1972). The orientation of the fault plane is commonly steep, approaching vertical, and if viewed in a section coincident with the fault plane, displacement may not be evident. Faults are not usually restricted to one bed or sediment type and can have a total displacement of several meters (McDonald and Shilts, 1975). Normal faults are commonly created from melting of an ice mass at the base of the deposit (Banerjee and McDonald, 1975) and less frequently from compression of an overlying mass (Shotton, 1965). High-angle reverse faults are associated with loss of support along the flanks or from melting of ice wedges within the deposit (McDonald and Shilts, 1975). Other deformational processes include differential compaction and excessive lateral pressure.

Folding, another common deformational structure, occurs on both large and small scales, with the processes creating folds varying with scale. Unlike most faults, folds form gradually with the horizontal force dominant (Ragan, 1973). There are three principal causes of large-scale folding: 1) by horizontal compression from the sides; 2) from lateral movement above the deposit such as fluid drag and 3) from gradual melting of basal support (Allen, 1984). Small-scale folding is routinely observed in finer-grained sediments and can be restricted to one bed (Shotton, 1965). Small-

scale folding may be responsible for convoluted beds as described by Potter and Pettijohn (1977). This deformation can be created through increased shear stress from an overlying bed during deposition or from increased pore pressure within the bed created through compression of the overlying beds (Banerjee and McDonald, 1975). Dewatering processes are also responsible for creating flame structures and dish structures, as material is pulled up into the bed above.

4.2 DEFORMATION IN THE MOUNT VIEW ESKER

Sites 6 and 7 (Fig. 1.1) in the northwest end of the Mount View Esker reveal only minor deformation. Site 7 (Fig. 3.1) contains small-scale folding in sand and silt beds in the middle of the section near the top on the northern side of the exposure. The folding is restricted to the sand and silt beds which are no more than 10cm thick. The western exposure of site 6 has small normal faults along both north and south sides through sand and gravel units. The faults are visible although little displacement has occurred. The northern exposure, along the eastern flank of the esker, contains small normal faults on the eastern side through cross-bedded gravel and cross-laminated sand with little displacement. Site 4, located on the southern end of a bead, has minor deformation. Small-scale folding is present near the top and center of the exposure. Folding occurs in silt beds above and below a thin, fine-grained lacustrine or till-like unit.

Further south, the northern exposure of site 3 contains numerous deformational structures throughout the entire exposure. Deformation includes folds, faults and most prominent, "v-shaped" wedges (Fig. 3.2).

The two wedges in the exposure thin in the upstream direction and are filled with structureless sand and silt of differing lithology from the rest of the exposure. When first observed, the two wedges were 3m to 4m deep and approximately 4m wide across the top. Three months later, only one wedge was visible with dimensions of 1.5m deep and 2m wide due to continued quarrying at the exposure. Associated with the wedges are large-scale synclines and high-angle reverse faults through a thin till unit and cross-bedded sand and gravel. Displacement along the fault on the west side of the wedge was difficult to measure (as displacement and deformation continue down past the floor of the exposure or was covered by slumping) but was estimated to be 1.5m. Four to five meters from either side of the wedges were normal faults in sandy units located two meters from the base (Fig. 3.2). Towards the edges of the exposure there was small-scale folding within cross-laminated silt.

Site 1 (Fig. 3.3), which is the largest exposure of all three eskers and by far the most complicated, contains numerous deformational structures but not of the magnitude of site 3. Starting north of the core of the exposure there were a series of six high-angle reverse faults in cross-bedded coarse sand and pebbles (Figs. 3.6, 3.7). These faults near the base of the exposure were small, ranging in length from 40cm to 150cm with displacement varying between 5cm and 30cm. In the middle of this area a thin till unit was contorted through the neighbouring sand units. The lower portion of the core in the exposure was a block of unsorted, structureless gravel. Above the structureless gravel were a series of normal faults penetrating large-scale cross-bedded gravel. Tracing the faults to measure displacement was difficult because of the lack of a marker bed and the

Fig. 4.1 Photo from southwest end of site 1, Mount View Esker, showing normal faults through cross-bedded sand. The normal faults are within a larger block bounded by high-angle reverse faults.

thickness of the cross-bedded gravels. A till unit near the surface could be traced throughout the section. The lower contact of the till was synclinal and dipped towards the core (Fig. 3.3).

South of the core within a thick (1m) cross-laminated sand unit, a reddish till was injected into the middle of the sand. The till follows the dip of the bed, 1m to 4m from the surface with sand above and below the till, convoluted although the deformation did not extend through the entire thickness of the sand unit. Underlying the sand unit there was small-scale folding in cross-bedded sand. Below this, near the base, there were small high-angle reverse faults and normal faults, again in cross-bedded sand (Fig. 4.1). These faults were similar to the small faults in the north part of this exposure with only 10cm of displacement. Near the southern edge of the exposure, where sediment was primarily sand and silt, several small normal faults were measured with the lengths from 20cm to 50cm. Approaching the base within a massive sand unit there was a large flame structure (90cm high) and a succession of chevron folds.

4.3 DEFORMATION IN THE EGERTON ESKER

The Egerton Esker contains relatively little deformation when compared with the other two eskers in this study. The northernmost exposure, site 6, contains some minor deformation. Towards the center of the north exposure, small normal faults and small-scale folding were visible in cross-laminated coarse sand. The deformation in the sand may or may not be related to an underlying thin (1cm) clay unit. Along the faults, displacement was minimal, never exceeding 2cm.

In the middle of the Egerton Esker, site 4 contains many normal

and high-angle reverse faults. The high-angle reverse faults do not exceed 40cm in length, range from 65° to 80° and occur where the eastern sandy flank overrides the gravel core (Fig. 3.8). The displacement along these faults is between 5cm and 10cm. To the east in the cross-bedded sand, small low-angle reverse faults were observed when digging into the section for paleocurrent measurements. These reverse faults were nearly horizontal and the length could not be determined, but displacement was a fairly constant 5cm (Fig. 4.2).

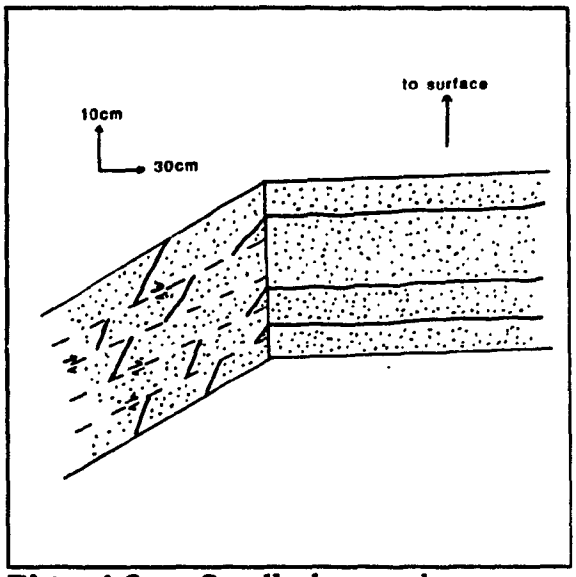


Fig. 4.2 Small low-angle reverse faults, eastern flank at site 4, Egerton Esker.

4.4 DEFORMATION IN THE HOPEVILLE ESKER

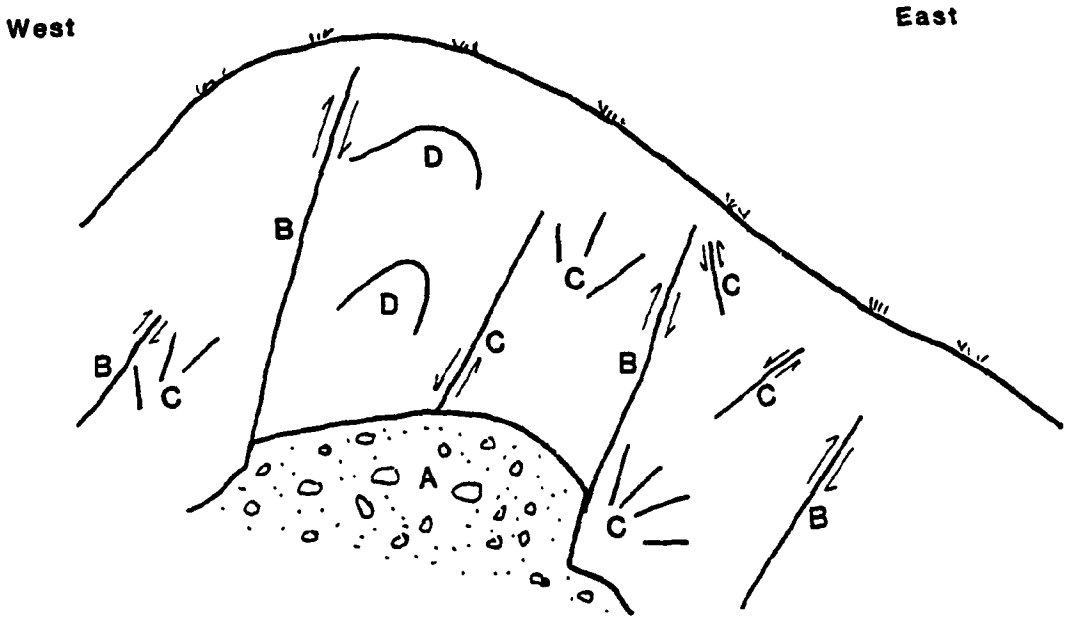
On the eastern side of site 9, a series of high-angle reverse faults were visible in cross-laminated silt. The faults were small, estimated at 60cm in length with displacement of 3cm to 6cm. Site 8 also revealed deformation on the east flank of the esker. Small normal faults were

present in cross-bedded sand and silt near the top of the exposure (Fig. 3.9). Access to the faults was not possible so length or displacement can only be estimated. The thickness of the cross-bedded sand and silt was approximately 4m and the deformation was restricted to these beds.

The north exposure of site 6 is not large, only 8m high and 25m wide but was strongly deformed. The cross-bedded gravel and sand appear fragmented and folded due to the severe faulting (Fig. 4.3). Anticlinal folds appear at the base and just above in cross-bedded boulder gravel and on the eastern margin in cross-bedded sand. From west to east there are four major high-angle reverse faults. Associated with the western high-angle reverse fault are a series of smaller normal faults, with the angle of the normal faults increasing towards the major reverse fault. Displacement is difficult to measure due to the abundance of faults, but despite this, the eastern high-angle reverse fault had an estimated displacement of approximately 2.5m.

Site 2 also contains numerous deformational structures but are much further apart because of the large area of the site and the many exposures. The northernmost exposure contains two "v-shaped" wedges similar to those in site 3 from the Mount View Esker. Folding occurs in gravel beds around the "v-shaped" wedges but faulting was not visible (Fig. 3.10, Exposure A). Small-scale folding occurs in the middle of the section towards the northern end in fine laminated sand. The western exposure contains normal faults in cross-bedded fine sand. The faults range in length up to 2m, and have very little displacement. The largest exposure at the southern end contains high-angle reverse faults approaching the base in cross-laminated silt. The

greatest displacement is approximately 40cm and near the faulting are several flame structures, also in the silt (Fig. 3.10).



A - Boulder Gravel
B - High-Angle Reverse Faults
C - Normal Faults
D - Anticlines

Fig. 4.3 Schematic diagram of major deformational structures in site 6, Hopeville Esker. Overlying the boulder gravel are cross-beds of sand to cobble gravel. Depositional structures are difficult to determine due to the amount of displacement of the major deformation and the smaller folds and fractures. Displacement of the high-angle reverse faults ranges from 1m to 2.8m, increasing to the east. Displacement of the normal faults varies from a few centimeters to 70cm.

CHAPTER 5

Synthesis of Structures and Paleocurrents

5.1 MOUNT VIEW ESKER

Numerous samples and measurements were taken from the sites along the Mount View Esker and are summarized in Table 5.1. Table 5.2 summarizes grain size data from the Mount View Esker through graphic statistics. Table 5.2 also indicates whether the grain size curves are unimodal or multimodal, indicating subpopulations deposited through bedload, saltation or suspension as reviewed in Chapter 3. Sites 6 and 7, through the esker core, contain fairly consistent grain sizes, which comparatively are not large (15cm - 20cm). Site 7 features tabular cross-beds of cobble gravel and pebbles or coarse sand to silt (Fig. 5.1). Bed thickness ranges from 20cm to 60cm and several gravel beds are graded. In the core, thin beds of sand and silt surrounded by gravel have small folds, likely created through dewatering. Paleocurrents from gravel beds in the core indicate a northeast flow direction. Towards the north, cross-beds of pebbles have a similar flow direction and cross-beds of sand through the middle level in the northern flank have an eastern flow direction (Figs. 5.2, 5.3).

The exposures at site 6 (Fig. 3.1) are comprised mostly of tabular

Table 5.1 Individual site summary of grain size and paleocurrent data.

MOUNTVIEW

SITE	GRAIN SIZE - #	PALEO.
1	F - 10	XBG 8
	G - 11	XBS 8
	S - 3	RIP 92
	L - 1	
2	G - 1	
	S - 1	XBS 26
3	F - 5	XBG 17
	G - 3	XBS 57
	S - 2	RIP 32
4	G - 3	XBS 19
	S - 1	RIP 34
5	G - 1	
	S - 1	
6	G - 6	XBG 11
	S - 3	XBS 11
7	G - 2	XBG 11
	S - 2	XBS 10

EGERTON

SITE	GRAIN SIZE - #	PALEO.
1	G - 2	XBG 11
	S - 1	XBS 6
2	G - 1	
3	G - 1	
4	G - 2	XBG 3
	S - 1	XBS 45
	L - 1	
5	G - 1	
6	G - 7	XBG 5
	S - [illegible]	XBS 48
		RIP 35

HOPEVILLE

SITE	GRAIN SIZE - #	PALEO.
1	G - 2	
2	F - 1	XBS 18
	G - 2	RIP 9
	S - 6	
	L - 1	
3	G - 2	
	S - 1	
	L - 1	
4	G - 1	
	S - 1	
5	G - 1	
6	G - 3	XBG 5
	S - 1	
	L - 1	
7	G - 1	XBS 17
	S - 2	
	L - 1	
8	G - 2	
	S - 1	
9	G - 1	
	S - 1	

F = Fine Grained Samples
G = Gravel Samples
S = Sand Samples
L = Boulder Measurements
PALEO = Paleocurrent structures (bedforms) and number of observations
XBS = Cross-Bedded Sand
XBG = Cross-Bedded Gravel
RIP = Ripple Marks

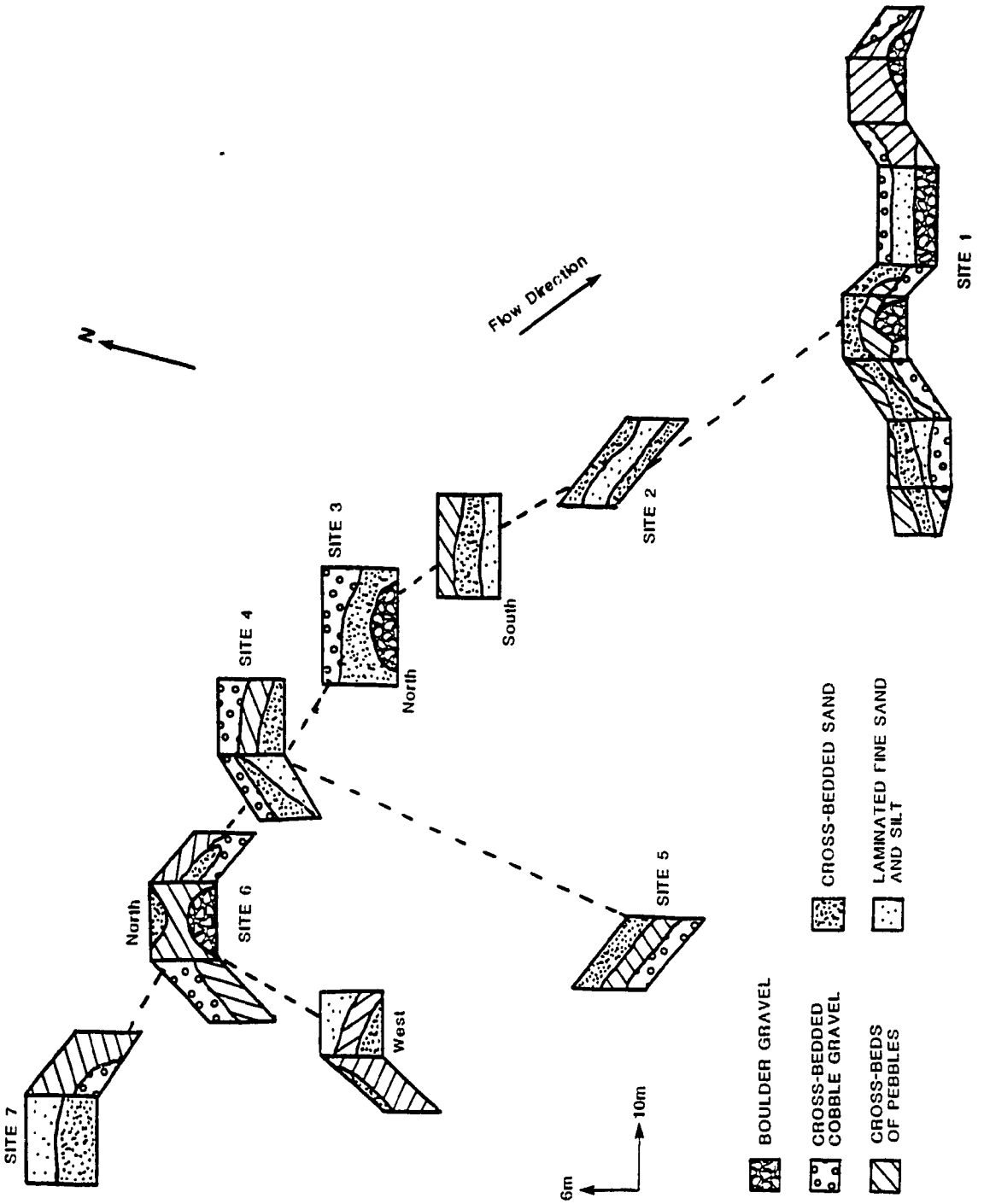


Fig. 5.1 Fence diagram of exposures along the Mount View Esker, showing spatial relationships of the dominant structures. Note, the horizontal distances are not to scale.

Table 5.2 Summary statistics of grain size curves from the Mount View Esker. The N and S at Site 3 indicated either north or south exposures. Complete grain size data is available in appendix A.

UNIMODAL						MULTIMODAL					
Site #	Sam. #	M (ϕ)	σ (ϕ)	Sk	K	Site #	Sam. #	M (ϕ)	σ (ϕ)	Sk	K
7	60_D	1.5	0.7	-0.2	1.0	7	57_F	-4.2	1.9	0.5	1.0
						7	59_F	-4.2	2.0	0.4	1.2
6	94_D	1.8	0.6	-0.1	1.2	6	89_C	-2.9	3.2	0.5	0.6
6	96_D	-2.3	2.1	0.3	0.8	6	91_F	-4.3	2.4	0.7	1.8
						6	92_F	-1.7	2.1	0.5	1.0
						6	93_C	-3.1	2.8	0.4	0.6
5	29_D	2.3	1.1	-0.1	1.0	5	28_D	-3.8	2.2	0.6	1.5
4	25_F	-0.6	2.1	0.1	0.9	4	26_D	-3.3	2.9	0.7	1.1
						4	27_T	-1.0	4.5	-	-
3-S	67_T	1.4	1.9	-	-	3-N	65_F	-4.6	2.2	0.6	1.5
3-S	68_D	1.4	0.6	0.1	2.0	3-S	66_D	-3.4	2.6	0.4	0.7
						3-N	88_T	1.9	1.9	-	-
						2	61_D	0.7	1.6	0.1	2.0
1	04_F	-3.4	2.4	0.2	0.6	1	02_T	0.7	2.7	0.1	1.1
1	07_F	-3.7	2.3	0.5	0.8	1	08_T	0.9	2.2	-	-
1	11_F	-3.8	2.7	0.5	1.2	1	09_C	-4.9	2.4	0.8	2.7
1	12_D	-4.4	0.9	0.3	0.7	1	10_D	-2.6	3.3	0.6	0.9
1	16_D	2.5	1.0	-	-	1	13_F	-4.5	2.2	0.6	1.2
1	17_T	3.1	0.8	-	-	1	15_D	-0.9	1.7	-0.1	1.1
1	18_D	2.2	0.7	0.1	1.1	1	22_F	-0.8	3.9	-	-
						1	23_T	-0.9	4.9	-	-

M = Graphic Mean
σ = Graphic Standard Deviation
Sk = Graphic Skewness
K = Kurtosis
C = Complex assemblage
D = Deltaic deposit
F = Glaciofluvial
L = Glaciolacustrine
T = Till

cross-beds, 20 to 40cm-thick, of sands and gravels, with more sand and silt on the flanks (Fig. 5.1). The northern exposure had small normal faults through cross-beds of sand in the eastern flank at both upper and lower levels. Paleocurrents from the west flank in cross-beds of sand and gravel taken at the middle height had a southeast direction. The western exposure also contained small normal faults in sand, through the middle portions of both flanks. Paleocurrents from cross-bedded sand in the southern flank, at the same stratigraphic level as the deformation, had a northwestern flow direction. The upper level of the core, reveals a range of flow directions from north to northeast in cross-bedded gravel. A northwest paleocurrent direction was determined from gravel cross-beds near the base along the north flank (Figs. 5.2, 5.3).

At site 5, south of the main esker ridge, deformational structures were not observed and no paleocurrent measurements were taken. Site 4 did have small-scale folds in the matrix-supported gravels which are associated with a lacustrine clay or clay till layer running under and parallel to the tabular gravel cross-bed. This site also has a basal tabular cross-bed of unsorted gravel supported with a sand matrix, but is mainly coarse to fine sand and silt in cross-beds and climbing ripples through the middle of the exposure (Figs. 3.2, 5.1). Paleocurrents from cross-bedded sand in the middle have a west to northwest flow direction. Several meters from the surface, cross-bedded sand had scattered flow directions with the mean trend towards the north. Underlying the cross-bedded sand are asymmetrical ripples of medium sand with a south to southeastern paleocurrent direction (Fig. 5.2).

The northern exposure of site 3 (Fig. 3.2), consists mainly of tabular

cross-bedded, rounded, unsorted gravel with a coarse sand matrix, cross-bedded sand, lenses of grey till and a layer of reddish, stony clay till. The flanks have a higher percentage of sand and silt, predominantly in cross-laminations and climbing ripples. There is extensive deformation, much of which is centered around two "V-shaped" wedges. The wedges are seen in the upper units of the exposure, but the related anticlinal folds and high-angle reverse faults penetrate down into the lower cross-beds. On the flanks there are small normal faults with little displacement in cross-laminations of silt. Paleocurrent measurements were taken across the exposure at different levels, avoiding the deformation. Flow direction from climbing ripples taken in the core, but near the base, was to the east and southeast. This variability is indicated by a low magnitude of the resultant vector, shown in Appendix B. Gravel cross-beds overlying the ripples in the core had flow directions ranging from southwest to northwest. Results from cross-bedded sand from the east flank, through the core, to the west flank were internally consistent in that flow directions varied from southwest to the southeast.

Depositional structures of the southern exposure, from Fig. 3.2, consisted of low-angle cross-beds of sand or gravel, parallel units of cross-laminated sand and silt, thick units of ripples in sand and silt, and laminated clay near the base. Overall, the sediment sizes are finer than those in the northern exposure, and the units, including the gravel, are better sorted (Fig. 5.1). Deformation was not apparent and numerous paleocurrent measurements were recorded. Cross-bedded gravel in the center of the exposure had flow directions ranging from east to southeast to southwest. Cross-laminated sand from the west side had a south to

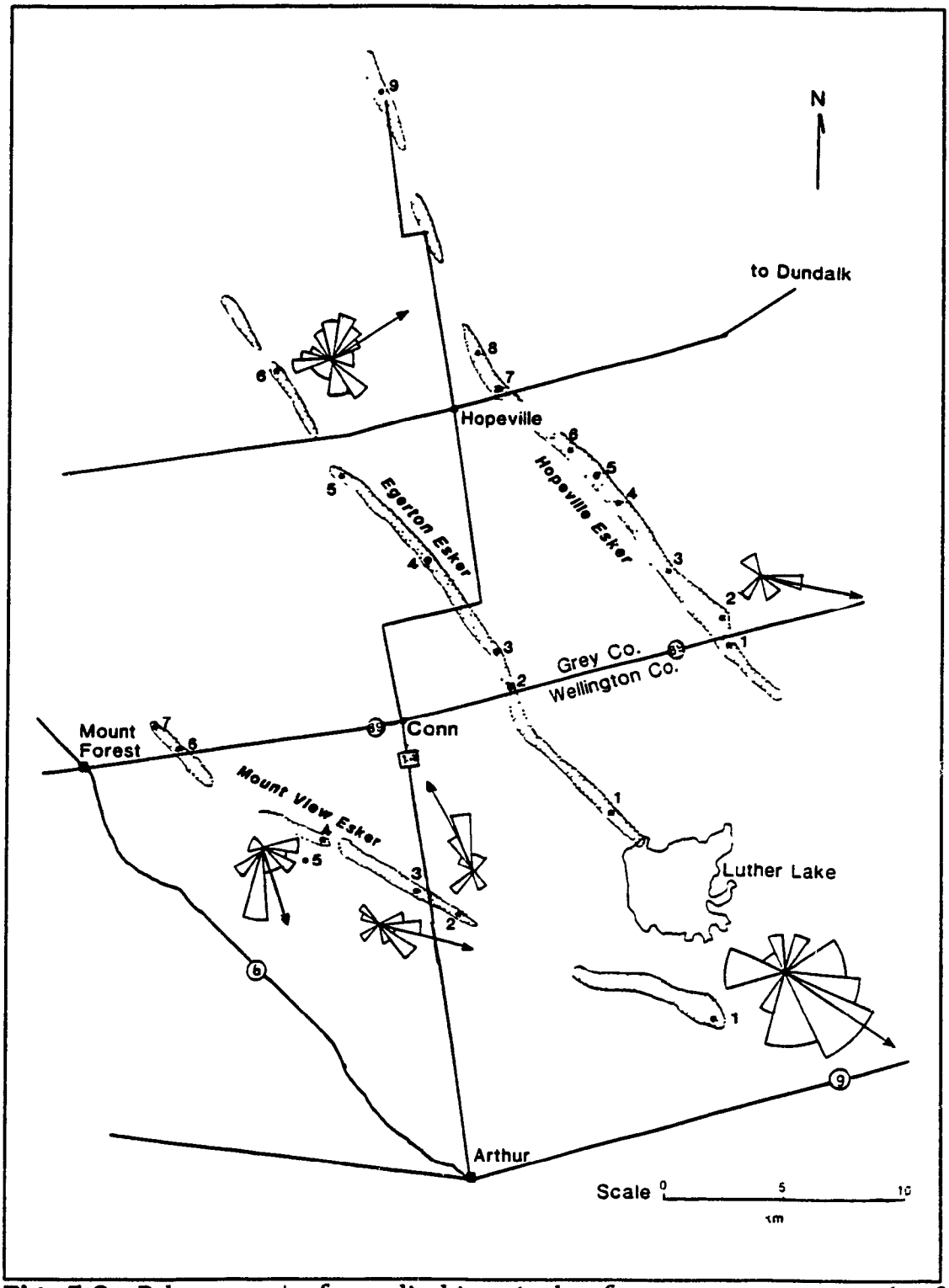


Fig. 5.2 Paleocurrents from climbing ripples from exposures in each of the eskers. The arrow extending from the rose diagrams marks the direction of the mean vector.

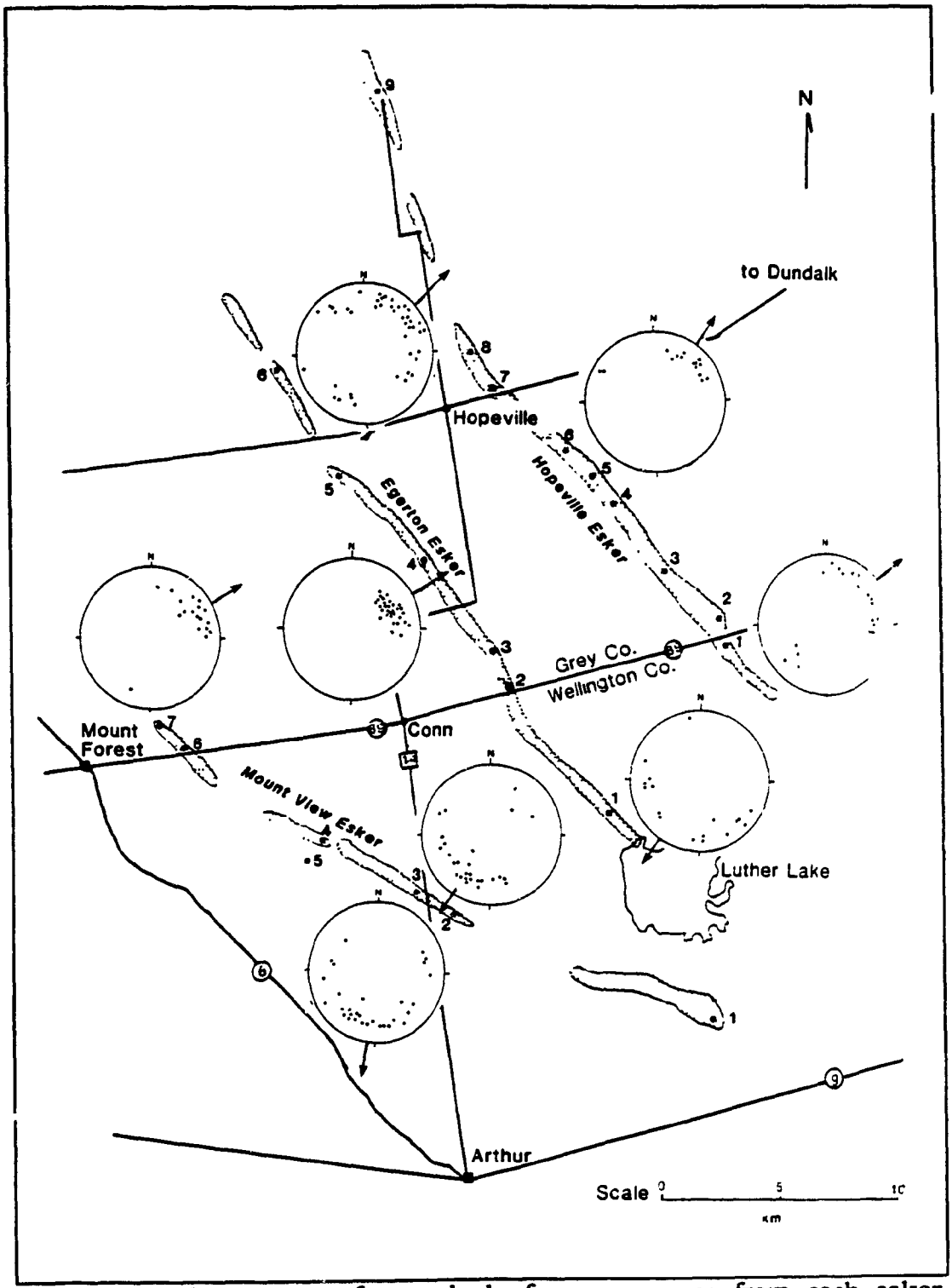


Fig. 5.3 Paleocurrents of cross-beds from exposures from each esker. The arrow at the edge of the scattergrams is the direction of the vector mean which at several locations is similar to those in Fig. 5.2.

southeast flow direction. In the center, cross-laminated sand was sampled through a unit 1m thick. The direction of flow varied from south to southeast to northeast at the top of the unit. Climbing ripples west of the center and at mid-height were deduced to be regressive, as the vertical cut through several flame structures also in the silt (Fig. 3.10), revealed that the strike of the ripples was opposite to the general orientation of the ridge, and had a strong northern flow direction (Fig. 5.2).

Site 2 revealed a trend of decreasing particle size and unit thickness towards the southeast within a bead (Fig. 5.1). Sand and silt are dominant in parallel units of cross-laminations and ripples. Paleocurrents taken across the exposure from cross-bedded and cross-laminated sand ranged from west on the western flank to south and southwest in the center, to southwest from the eastern flank (Fig. 5.3).

The large exposure of site 1 encompassed a wide range of depositional structures and sediment sizes (Fig. 3.3). The base consisted of large-scale tabular cross-beds of unsorted boulder gravel with a sand matrix. Overlying the basal units were thinner cross-beds of gravel and sand. There were three till or till-like units, one coarse-grained, the other two, fine-grained with angular, faceted stones. There was a laminated clay unit and thick units of cross-laminated sand and silt. The northern and southern flanks revealed a slight fining of sediments (Fig. 5.1). Deformation consisted of low-angle normal faults, small folds and flames in cross-laminated medium sand, near the base along the southern flank. There were also small folds in sand units underlying and overlying a clayey till unit to the north, near the surface. In the core there were several high-angle reverse faults at differing angles through thinner cross-beds of gravel

in the upper two-thirds of the core section. The faults disappeared into a large unsorted block of gravel at the base. Paleocurrents from cross-bedded sand or gravel were difficult to measure and were restricted to either the upper layers where enough talus was present to permit access or the bottom layers when the exposure was stable. Near the surface the flow direction varied from south to southwest. The lower units of climbing ripples were measured, one north of the center near the surface, the other, south of the center at a middle height. Flow direction was highly variable but the vector mean was to the southwest (Fig. 5.2).

5.2 EGERTON ESKER

The core of the Egerton Esker can be seen in the northern exposure of site 6 (Fig. 3.8). The depositional structures consist of tabular cross-beds of sand, thick blocks of ripples in silt, and cross-laminated sand and silt. There are a few tabular cross-beds of gravel near the surface. Small normal faults are seen in cross-laminated sand near the base. Paleocurrents from cross-bedded sand and gravel in the center indicated a north to northeast direction of flow (Fig. 5.3). Cross-laminated sand, again in the center but near the surface had a northwest flow direction. Underlying cross-laminated sand had a more northerly direction. Climbing ripples in silt, on the east side and near the base, which were regressive, fluctuated widely but the mean was to the northeast (Fig. 5.2).

The western exposure, which was only 2m to 3m high and ran parallel to the esker ridge, consisted of thin, fine-grained horizontal units with thicker unsorted, rounded gravel supported with a sandy matrix near

the surface (Fig. 5.4). Small-scale folding was observed in several of the sandy laminations near the base. Paleocurrents were measured from thin units of ripples which gave a northeastern direction of flow. A continuous unit of low-angle cross-bedded sand was measured across the width of the exposure with the flow direction remaining fairly constant to the northeast.

The eastern exposure also runs parallel to the esker ridge and consisted generally of finer sediments in horizontal, parallel units. Near the center, units were low-angle cross-beds of cobble gravel with a sandy matrix. The upper units were thinner, comprising cross-laminations and climbing ripples in fine sand and silt (Fig. 5.4). Paleocurrents from cross-laminated to thin cross-beds of sand varied from a western flow direction near the bottom to a northwestern flow direction at the top.

Sites 5, 3, and 2 had abandoned exposures revealing only partial depositional structures, if any at all. Site 4 consisted of boulder gravel supported by a sand matrix in the core with overlying tabular cross-beds of cobble gravel (Fig. 3.8). The eastern flank was sandy with minor silt in thin cross-beds and laminations. Where the cross-bedded sand overrode the cross-bedded gravel of the core, a series of small high-angle reverse faults were observed in the sand. Within the cross-bedded sand in the middle of the flank, numerous low-angle reverse faults were seen (Fig. 4.2). Paleocurrents were taken across the sandy flank and into the eastern edge of the gravel core. Paleocurrent measures were taken through four sections in the sand, each a meter thick. The flow directions were consistently to the east and northeast (Fig. 5.3), indicated by the magnitude of the resultant vector (Appendix B).

At the southern exposure of site 1, more paleocurrent measurements

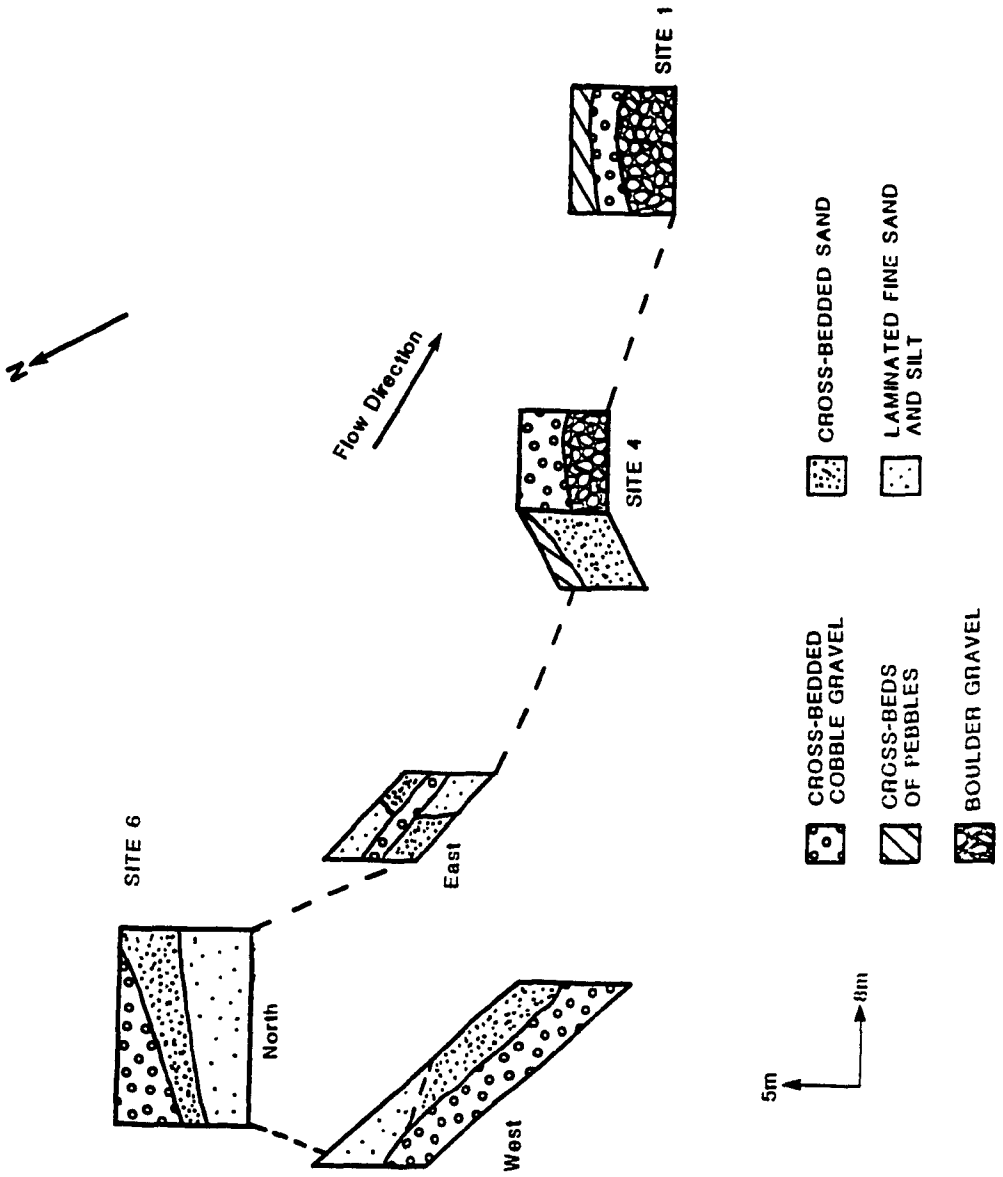


Fig. 5.4 Fence diagrams of the active exposures of the Egerton Esker. From each exposure the dominant structures are shown, indicating the spatial relationships between structures and exposures. The ratio of height to width is accurate but the horizontal distance is not to scale.

were taken. This exposure contained tabular cross-beds of cobble gravel in a convex shape (Fig. 3.8). The core contained boulder gravel with a sandy matrix. Overlying the core was a thick sand unit and thinner cross-beds of gravel, several of which were openwork. The paleocurrent measures were

Table 5.3 Summary statistics of grain size curves from the Egerton Esker. Complete grain size data is seen in Appendix A.

UNIMODAL						MULTIMODAL					
Site #	Sam. #	M (φ)	σ (φ)	Sk	K	Site #	Sam. #	M (φ)	σ (φ)	Sk	K
6	77_F	-5.3	1.6	0.3	2.5	6	79_D	-2.2	3.0	0.2	0.6
6	83_D	1.2	0.4	0.1	2.2	6	80_F	-1.1	3.1	-0.6	0.5
						6	81_C	-0.8	3.9	-0.4	0.5
						6	82_F	-5.5	1.5	0.6	2.4
						6	84_F	-3.4	2.4	0.6	1.3
						6	85_F	-4.2	1.3	0.6	1.5
						5	76_F	-3.5	3.2	0.7	0.5
4	47_F	-4.4	2.2	0.4	1.0	4	46_C	-4.5	2.6	0.9	4.0
						3	50_F	2.4	3.3	0.4	0.6
2	54_F	-1.7	3.0	-0.1	0.7						
1	53_F	-1.8	2.1	0.3	0.7	1	52_F	-4.3	2.2	0.6	1.0
						1	51_F	-5.0	1.8	0.7	1.5

M = Graphic Mean
σ = Graphic Standard Deviation
Sk = Graphic Skewness
K = Kurtosis
C = Complex assemblage
D = Deltaic deposit
F = Glaciofluvial

determined from the center, halfway up the section, through pebble gravel

and cross-bedded sand. The flow direction was to the south and southeast. Similar units were measured at the western edge with flow directions varying from west to southeast, as indicated in Fig. 5.3. Size and sorting characteristics of units is shown in Table 5.3. This table summarizes grain size data with graphic statistics, with standard deviation representative of the degree of sorting.

5.3 HOPEVILLE ESKER

Tabular cross-beds of poorly sorted gravel and laminations of coarse sand are the most frequently occurring depositional structures in site 9. The eastern and western flanks contain cross-bedded sand and cross-laminated silt. In several of the sandy cross-laminations in the eastern flank, near the base, a series of small, high-angle reverse faults were observed.

The exposure at site 8, which runs parallel to the east side of the esker ridge, consists of numerous cross-beds (Fig. 3.9). There are thick units containing thinner cross-beds of gravel, including well-sorted openwork gravel, units of large, tabular cross-beds of boulder gravel with a coarse matrix, alternating cross-laminations between sand and silt, and till-like units with cobbles in a fine silt matrix. At this exposure, only minor deformation was observed in the form of small normal faults in cross-laminated silt and sand near the surface.

Site 7, a large abandoned quarry, contained a good exposure at the southern edge, through the core of the esker. The basal unit of boulder

gravel had a horizontal upper contact with cross-bedded sand (Fig. 3.9). This cross-bedded sand was interfingered with thin cross-beds of gravel. The upper units consisted of tabular cross-beds of gravel underlying tabular cross-bedded coarse to fine sand. Just below the surface was another tabular cross-bed of cobble gravel with a coarse sand matrix. Paleocurrents from tabular cross-bedded sand near the surface, on the eastern side, had a flow direction to the east. Flow direction from cross-laminated sand, from the eastern edge, overlying the basal unit, was to the northeast (Fig. 5.3).

The northern exposure at site 6 is strongly deformed, altering most depositional structures (Fig. 4.3). The base is boulder gravel, in which most faults disappear. Although displacement is evident at the upper contact of the boulder gravel, because of a lack of internal stratification, the displacement cannot be traced past the upper contact. There are many cross-beds of gravel and sand, with the sandy cross-beds consistently thinner than the gravel. Paleocurrents from cross-beds of pebbles and sand, near the base and on the west side, had a northeast flow direction. Deformation seems to be focused on four long, high-angle reverse faults. There is large-scale folding across the exposure, near the surface, with the synclinal fold axis parallel to the high-angle reverse faults. Normal faults, seen near the base, have differing angles, increasing towards the high-angle reverse faults. Sand units along the eastern margin, overlying the basal boulder gravel, are contorted with small folds. The basal boulder gravel is seen again in the core of the south exposure (Fig. 5.5). Overlying the boulder core are tabular cross-beds of both cobbles and boulders (Fig. 3.9).

Sites 5, 4, 3, and 1, were abandoned, covered by slumping and vegetation. At these locations deformation was not observed and

paleocurrents were not measured. The basal units, through all the exposures at site 2, were similar (Fig. 5.5) and contained cross-laminated to horizontal laminations of sand and silt in parallel units. Overlying the basal unit at exposure A were low-angle tabular cross-beds, alternating between gravel and sand. The upper unit was another low-angle cross-bed containing boulder gravel with a sandy matrix. Within this boulder gravel were blocks of laminated silt and on the north edge was a large block of cross-laminated, rippled fine sand and silt containing four separate layers of laminated clay. This silt block rests on the basal sand, with small normal faults and folding near the contact (Fig. 3.10). At the surface in the boulder and cobble gravel, there are three "V-shaped" wedges which penetrate down to the contact between the gravel and sand. Large-scale folding occurs in the boulder gravel around the "V-shaped" wedges. Paleocurrents were measured from cross-laminated sand at the southern edge and from an overlying unit of asymmetrical ripples in fine sand. Flow direction of the ripples, from Fig. 5.2, was mainly to the east, whereas the cross-laminations had two layers flowing south, the rest between north and northeast, shown in Fig. 5.3.

Exposure B (Fig. 3.10), contained structures similar to exposure A, with parallel, horizontal beds of sand and a thick, unsorted gravel near the surface. Paleocurrents of low-angle, cross-laminated sand near the center, overlying the basal units, had a north to northeast flow direction. Exposure C (Fig. 5.5), again had similar parallel units, but had a higher percent of fine sand and silt. Within cross-laminations of silt and fine sand, underlying

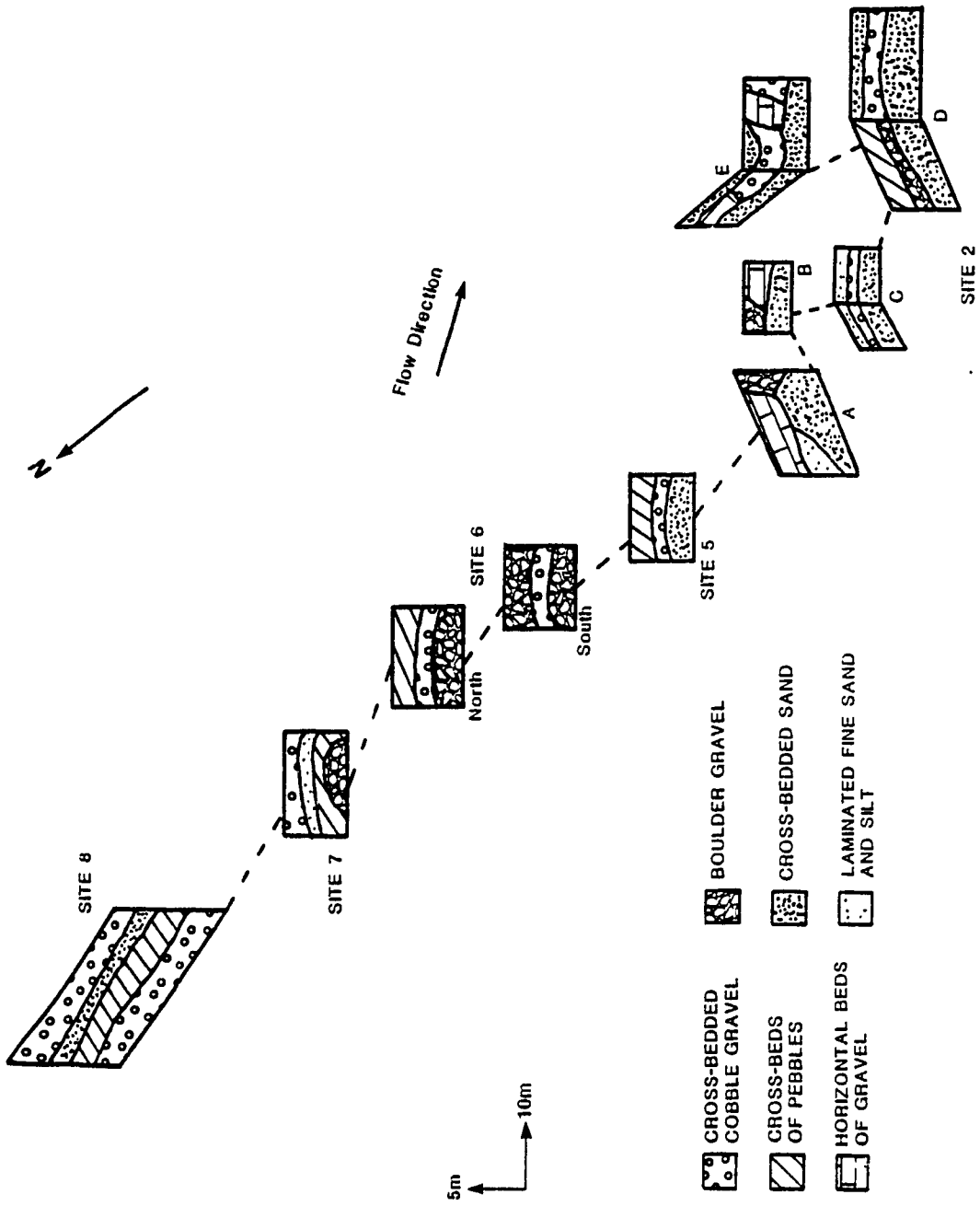


Fig. 5.5 Fence diagram of clean exposures along the length of the Hopeville Esker. Exposures are drawn in their relative location with respect to each other. Within the exposures, the dominant structures are indicated. The horizontal distances are not to scale.

a gravel bed near the surface, were many small, normal faults or fractures with little displacement.

Half of exposure D runs east to west, revealing thinner cross-beds of gravel in the upper half of the section (Fig. 3.10). Cross-laminated sand in the basal unit had several high-angle reverse faults and flame structures near the upper contact with cross-bedded pebbles. The other half of the exposure had a north to south orientation and contained trough cross-beds of pebble gravel in the upper units.

Exposure E (Fig. 3.10) contains: thin cross-beds of sand and gravel, dipping in opposite directions; interfingering between sand and gravel; lenses of silt in the upper gravel beds, similar to exposure A; a continuous unit of laminated clay; and a block of clayey till near the surface. The gravel is not as large as in the other exposures, is better sorted, and some beds are openwork. Deformation is seen in cross-laminated sand at different levels, when in contact with cross-bedded gravel. Within the sand are small, high-angle reverse faults, with little displacement.

The following table (Table 5.4) summarizes the size and sorting values of samples collected from units along the Hopeville Esker. The table is divided between unimodal and multimodal, which indicates subpopulations deposited by differing processes as well as the general depositional environment from till to deltaic.

Table 5.4 Summary statistics from grain size curves created from samples collected from units in the Hopeville Esker.

UNIMODAL						MULTIMODAL					
Site #	Sam. #	M (ϕ)	σ (ϕ)	Sk	K	Site #	Sam. #	M (ϕ)	σ (ϕ)	Sk	K
						9	86_c	-2.9	2.9	0.6	0.9
8	71_F	-4.5	2.1	0.6	1.5	8	70_F	-2.4	3.6	0.8	0.6
7	43_F	-4.0	2.4	0.5	0.9						
7	44_F	-4.4	2.3	0.6	1.3						
						6	40_F	-3.7	2.9	0.6	1.1
						6	33_F	-3.5	3.3	0.8	0.6
						5	34_c	-2.6	3.6	-	-
4	38_F	-3.0	3.0	0.3	0.6	4	35_D	-1.0	2.2	-	-
						4	39_c	-0.8	3.7	-0.3	0.6
2	98_D	2.6	0.4	0.2	1.1	2	99_F	-5.3	1.9	0.8	2.1
2	102_D	-1.4	1.9	-0.3	0.7	2	104_T	0.9	3.0	-	-
2	105_L	2.8	0.6	-0.1	1.2	2	107_F	-2.4	2.2	-0.3	1.5
2	106_L	3.0	0.5	0.1	1.4						
1	36_F	-1.6	2.2	-0.2	0.7						

M = Graphic Mean
σ = Graphic Standard Deviation
Sk = Graphic Skewness
K = Kurtosis
C = Complex assemblage
D = Deltaic deposit
F = Glaciofluvial
L = Glaciolacustrine
T = Till

CHAPTER 6

Interpretation of Structures

6.1 DEPOSITIONAL STRUCTURES

6.1.1 Mount View Esker

The beaded morphology of the Mount View Esker blends into surrounding outwash and occasional till along the flanks. Within the beads, sediment becomes finer to the southeast (Fig. 5.1). The northern end of the beads are composed of a collage of gravel cross-beds, principally tabular cross-beds, indicating a deltaic environment. Moving towards the southeast, units of the boulders and cobbles give way to thinner units of pebbles and granules. Sand and silt units increase in thickness but contain numerous thin beds or laminations, eventually containing clay laminations. The trend of decreasing particle size in the downstream direction can be clearly seen in grain size curves from sites 3 and 2 (Fig. 6.1). This transition of sediment size is typical of a deltaic environment. This sequence repeats itself in each bead, lending support to the interpretation that the Mount View Esker was formed time-transgressively as the ice margin paused and retreated. A second explanation of a subglacial stream draining into a cavity is also possible. The length and width of the deposit and the presence of outwash along the margin makes the second explanation unlikely. As well, with an englacial stream, one would expect to observe more deformation in the sediments.

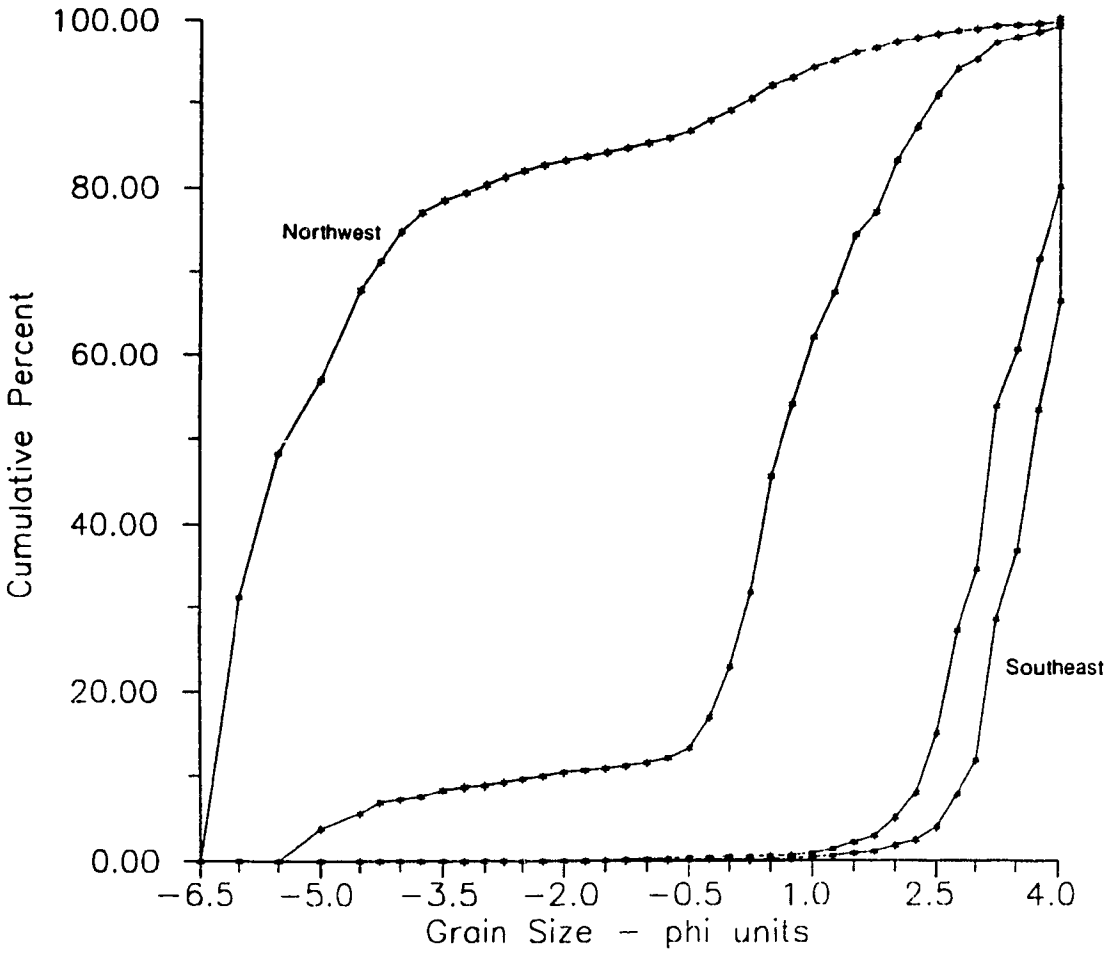


Fig. 6.1 Grain size curves from sites 3 and 2, Mount View Esker, showing the variation in grain sizes in a downstream direction. The coarse, straight line segments indicates decreasing bedload in the downstream direction as the finer-grained suspended load increases. The vertical line of fine samples meeting at 80% mark the slit and clay components.

Paleocurrents from the length of the esker in silt, sand and pebble units generally indicate a south to southeast direction (Figs. 5.2, 5.3). There are notable exceptions at sites 6 and 3. Site 6 contains two exposures, both of which contain many unsorted gravel beds. The west exposure may in fact be a tributary flowing into the core to the east. The north exposure (Fig. 3.1), in the core, has cross-beds dipping in opposite directions, indicating a channel with varying flow conditions and directions. The paleocurrents were sampled from lower sand units, which may be part of a small delta marking the entrance of a tributary or backset bedding. The south exposure at site 3, has a strong northern flow direction, determined from ripples of fine sand and silt. The ripples were identified as regressive, thus explaining the contradictory flow direction.

Till or till-like units were observed at several exposures. Site 4, contains a thin unit of laminated clay containing a few angular stones. The reddish to reddish-brown colour of the clay is typical of several fine-grained units within the esker. The northern exposure at site 3 also has a reddish, silty clay unit in prominent lenses. The largest unit of this type, was observed through the middle sections of site 1 (Fig. 3.3). This reddish brown, silty clay till was sampled and grain size analysis reveals 30% gravel and nearly 50% silt and clay. Subsequent analysis by the O.G.S. supports the previous laboratory results, albeit with the gravel fraction neglected. Correlation of the laboratory results with previously published O.G.S. reports, identifies this reddish brown unit as the Tavistock Till. Till-like units overlying the Tavistock Till were observed at sites 3 and 1. A yellowish brown silt unit containing angular stones and some boulders was

sampled at site 1. Again laboratory results were checked by the O.G.S. and the results correlated with previous reports, identifying this yellowish silt till as the Elma Till.

6.1.2 Egerton Esker

The continuous, narrow ridge of the Egerton Esker, which widens at the northern end, is surrounded by till. The core of the ridge is an extremely unsorted boulder gravel supported by a coarse sand matrix with a horizontal upper contact (Fig. 5.4). Overlying the core are tabular cross-beds of cobble gravel with individual beds poorly sorted, dipping in opposite directions, appearing as convex bedding. Units of granules and sand appear occasionally in the core but more frequently along the eastern flank. Particle size within the units remains constant through the length of the esker, as is shown in Fig. 6.2 for boulder gravel and Fig. 6.4 for the overlying cross-beds. The curves in Fig. 6.2 indicate that 65% to 80% of the boulder gravel is comprised of boulders (> -4.50ϕ) with the remainder accounted for by sand. These curves (Fig. 6.2) also indicate that the boulder gravel is fairly well sorted even though visually the units appeared unsorted. This can be accounted for by the fact that one or two boulders can skew the curve towards the coarse end, affecting the overall distribution. This is also the case for the overlying cross-bed (Fig. 6.4) at site 6. The cobble cross-beds are poorly sorted and appear either bimodal (site 6) or multimodal (site 1). Grain sizes from samples collected from abandoned sites (Fig. 6.3), were also coarse, similar to the boulder gravel in Fig. 6.2. The bimodal nature of the curves (Fig. 6.3) from the abandoned structures may be

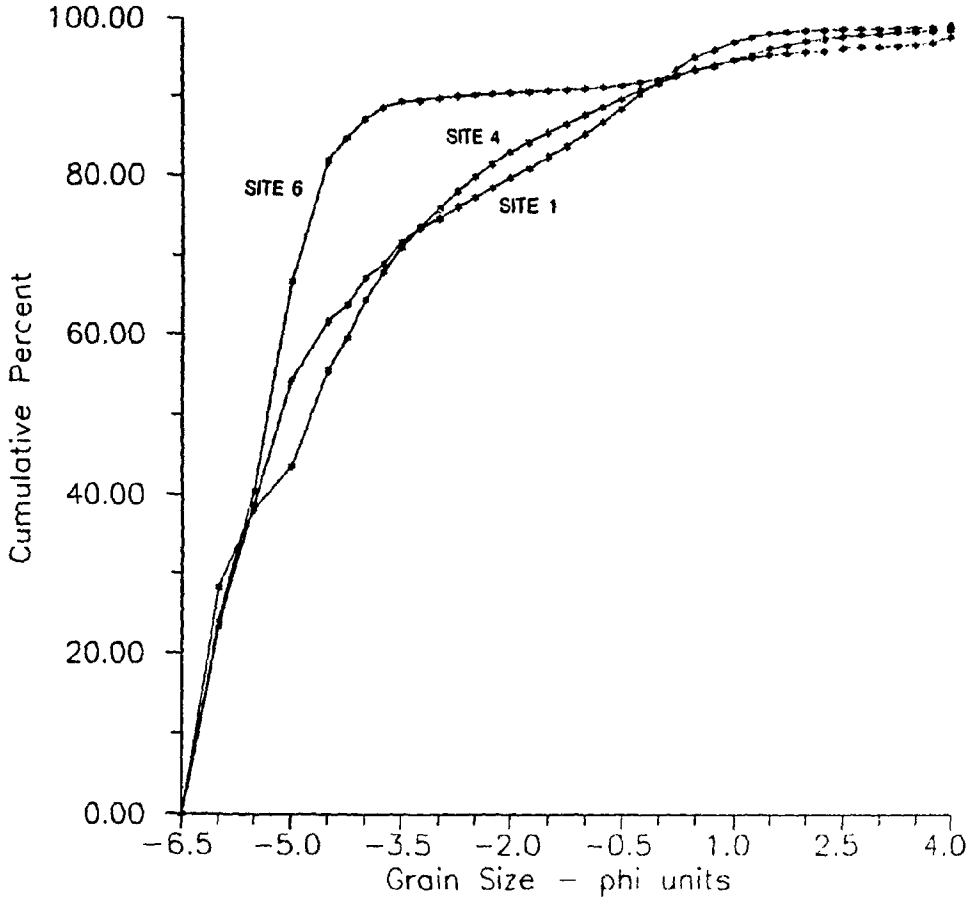


Fig. 6.2 Grain size curves of boulder gravel from sites 6, 4, and 1, Egerton Esker. Nearly 80% of the samples is coarser than -3.5ϕ with variation above this point accounted for by the amount of matrix material supporting the boulders.

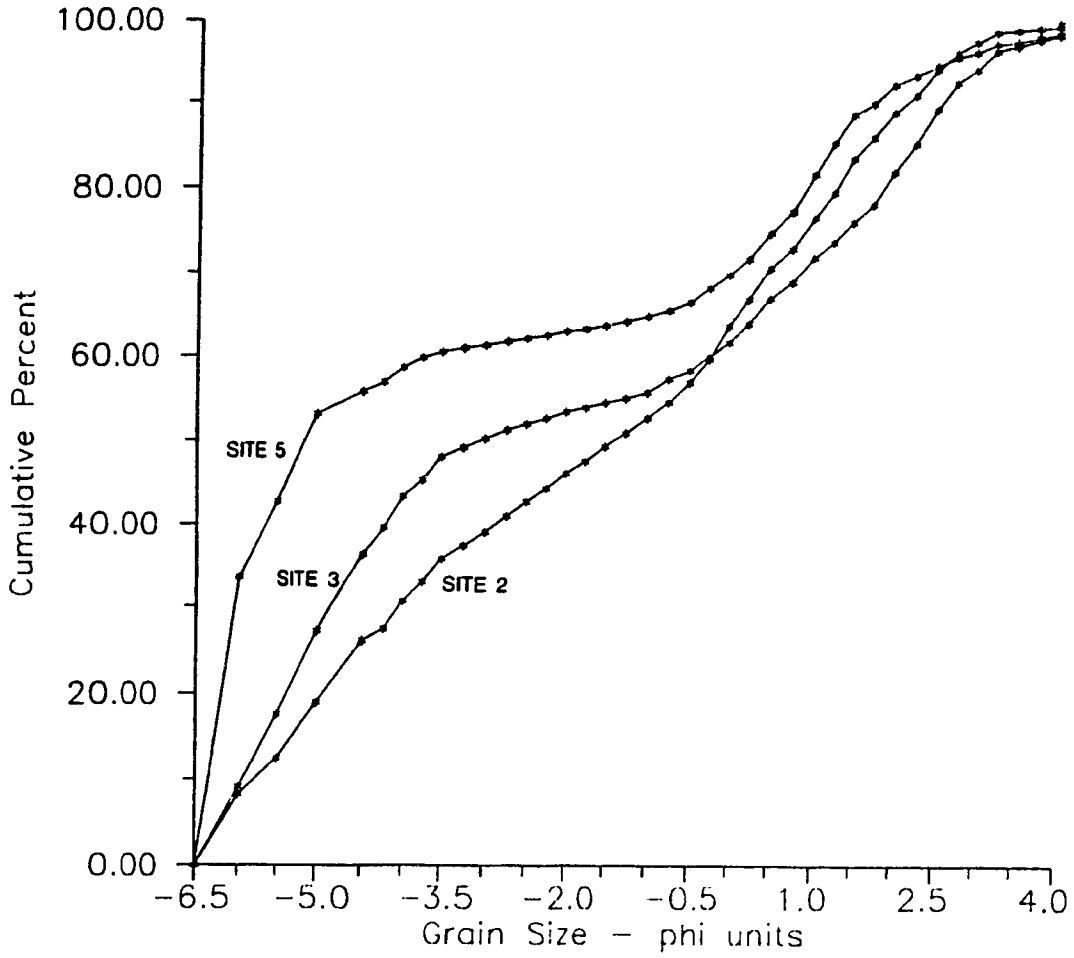


Fig. 6.3 Grain size curves of channel samples from abandoned sites 5, 3, and 2, Egerton Esker. The curves are similar with a saddle in the middle sizes indicating a deficiency in the amount of these particles. There are marked differences at the coarser end (above -5.0ϕ) showing site 5, much coarser, but one clast at these size ranges can affect the overall distributions.

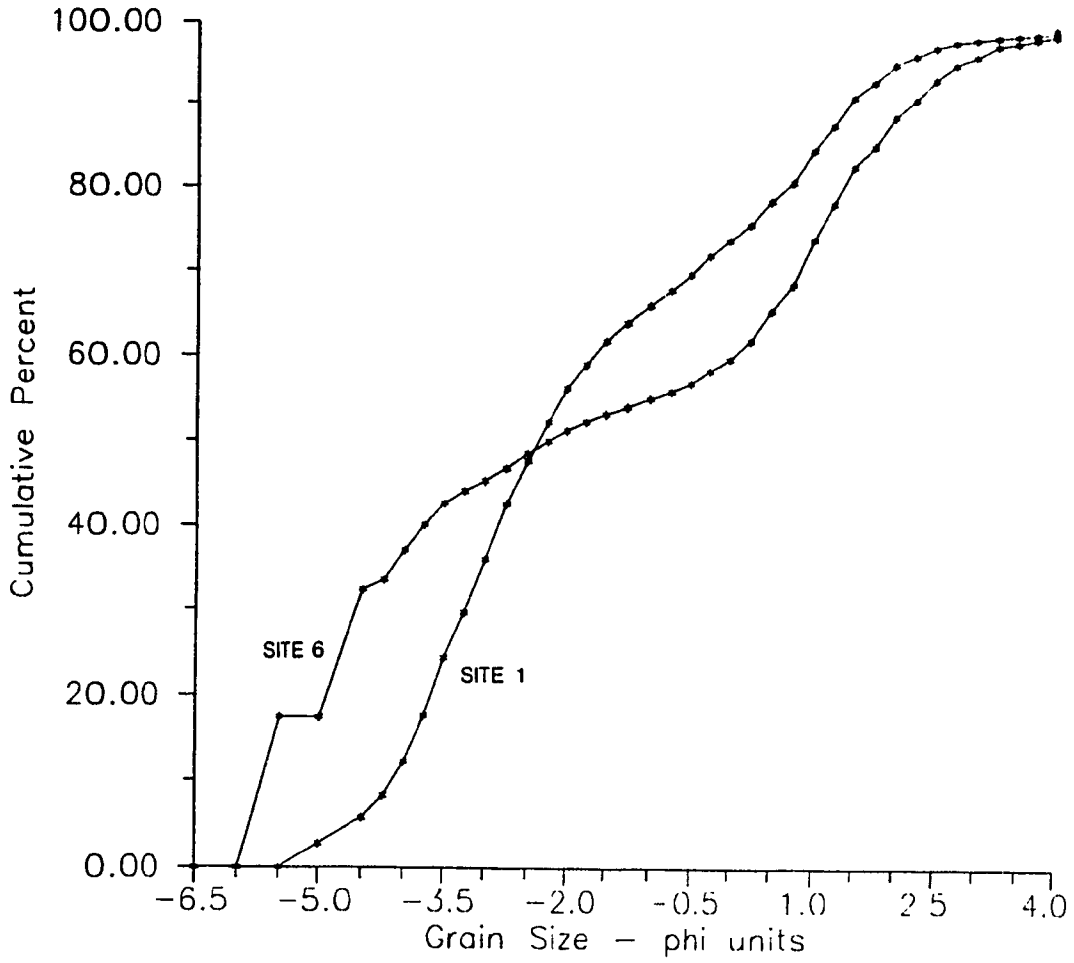


Fig. 6.4 Grain size curves of tabular cross-bedded cobble gravel overlying the boulder core from sites 6, and 1, Egerton Esker. The overall size distributions are similar with site 1 being poorly sorted and site 6 almost bimodal through the cobble sizes as well as through the coarse sand fraction.

attributed more to contamination from slumping rather than to depositional processes. The consistent grain sizes in the esker indicates a steady supply from several sources of sediment through the length of the esker.

Boulder gravel in the core, being highly unsorted, thick and having a horizontal upper contact, resembles a slurry or a sliding-bed deposit described by Saunderson (1977a). As flow velocities decreased in the subglacial tunnel, tabular cross-beds were deposited in depressions as the channel migrated across the core, resulting in the various dip directions. At site 4, a sandy deposit was observed against the core and was formed through low flows or spilling from the core.

Paleocurrents from site 6 (Figs. 5.2, 5.3), which are highly variable, may indicate the entrance of a tributary flowing into the core to the northeast, which may also explain the increased width of site 6. At this site the exposure to the west was long but not very deep and paleocurrents from cross-beds have a northeast flow direction, towards the core. Paleocurrents from cross-laminated sand and silt along the east exposure appeared to be dipping west, into the core, but the vector mean from variable ripples was to the east. The central exposure did contain flow directions dipping southwest to southeast in sandy cross-beds through the middle of the section. The distribution shown in Fig. 5.3 is distorted by the large number of observations from the western exposure.

Site 4 has a strong east-northeast flow direction indicating that the cross-bedded and cross-laminated sand on the eastern flank was deposited from water flowing away from the core. The paleocurrents from site 1, although few, reveal an interesting trend of the cross-beds. In the core, flow direction was south to southeast or parallel to the trend of the esker.

Cross-beds on the western edge of the core, which were dipping out of the section, had a western flow direction, indicating a wash or spill from the center of the core.

6.1.3 Hopeville Esker

The Hopeville Esker, a continuous ridge, appears to have had two phases of formation. From the north end to Hopeville the height of the ridge steadily increases. From site 7 the height of the ridge increases towards the south and structures and sediment in the basal core are consistent throughout the length of the ridge, similar to the Egerton Esker (Fig. 5.5). An unsorted boulder gravel, similar to a sliding-bed facies occurs in the base of the core. The thickness of the boulder gravel varies from 1m to 4m but is not proportional to the height of the ridge. Overlying the core are tabular cross-beds of cobble gravel to sand and in the narrower and lower portions the bedding appears convex. Although the boulder gravel sizes remain consistent through the length (Fig. 6.5), the overlying cross-beds show more variability in particle sizes (Fig. 6.6). The shape of the curves from the boulder gravel are similar to the boulder gravel in the Egerton Esker (Fig. 6.2). The coarse tails are coarser than the Egerton Esker, with each sample containing approximately 60% of -5.00ϕ sizes or larger. There are also more pebbles in the samples indicating a coarser matrix. The curves from the overlying deposits (Fig. 6.6) reveal a wide range of depositional conditions. The cross-bed at site 5 is comprised of 70% bedload and a bimodal distribution with the remaining 30% being fine sand, deposited out of suspension. Site 2 also is composed mostly of bedload although much more unsorted. The cross-bed from site 7 is probably

multimodal with a small saddle in the granule to coarse sand range, indicating an absence of these particles during deposition. The surrounding material fluctuates from till around the lower portions of the ridge to a greater percent of outwash where the ridge is higher.

The continuous boulder gravel indicates a simultaneous deposit from a thinning, stagnant ice mass, similar to the Egerton Esker. The sections where the esker ridge thickens are best explained through damming of the channel from ice. This blocking of the drainage would allow increased deposition in front of the dam and would deprive areas downstream of sediment. There is no evidence of a sudden outburst flood around sites 7 or 6 although site 6 contains extensive deformation, suggesting the presence of ice. To the south, where the height of the sediment increases there is evidence of flooding. The flood deposits of boulder to cobble gravel overlying sand, indicate a high flow velocity. The flood deposits also contain silt lenses, behaving as boulders, a large silt block and a till erratic (identified as the Tavistock Till) all of which were rounded like boulders and which likely were frozen during transport.

Paleocurrent measurements were only taken at three sites, two of which were from the eastern flank where the esker ridge was high. Flow directions vary from northeast to east which indicates that the flow was away from the core due to ice damming and sedimentation was not allowed to continue to the south.

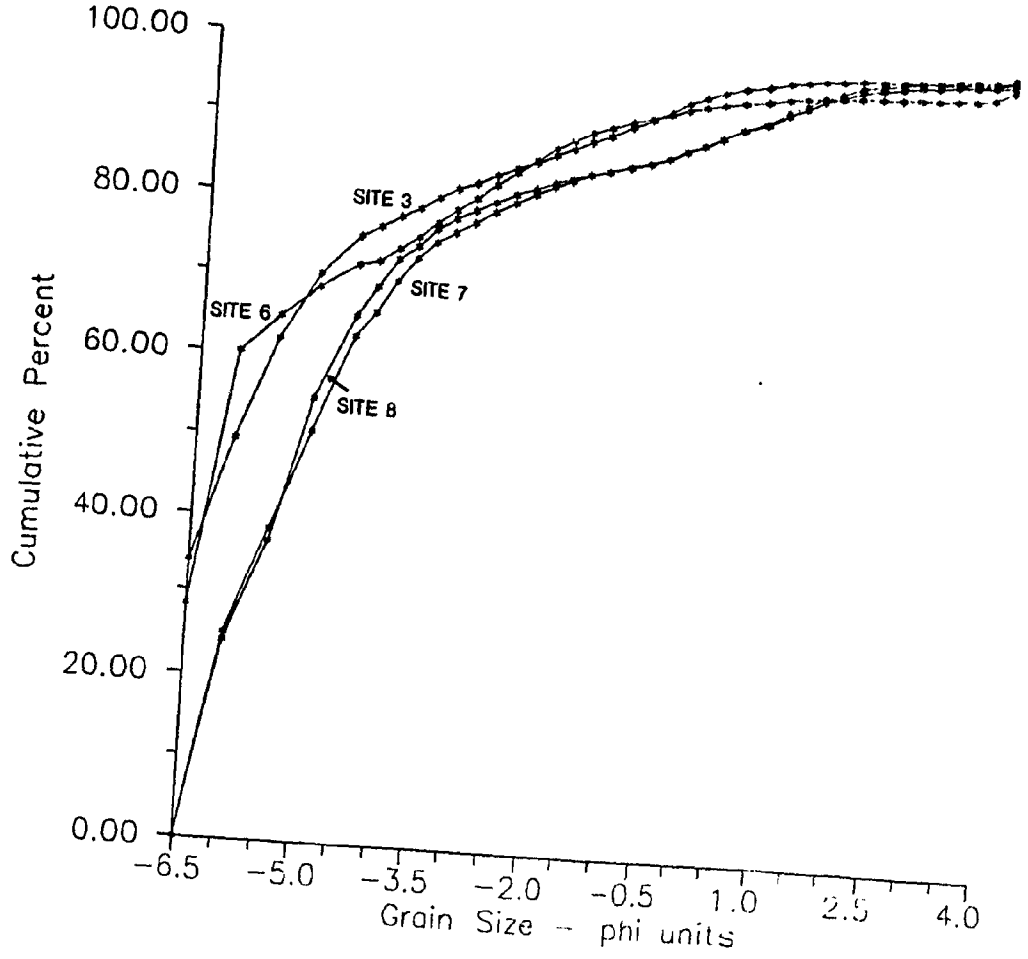


Fig. 6.5 Grain size curves of basal boulder gravel samples collected from sites along the length of the Hopeville Esker. The main variation in the curves is between sites 8 and 7, which are similar, and sites 3 and 6. The samples from sites 3 and 6 are consistently coarser through the distributions.

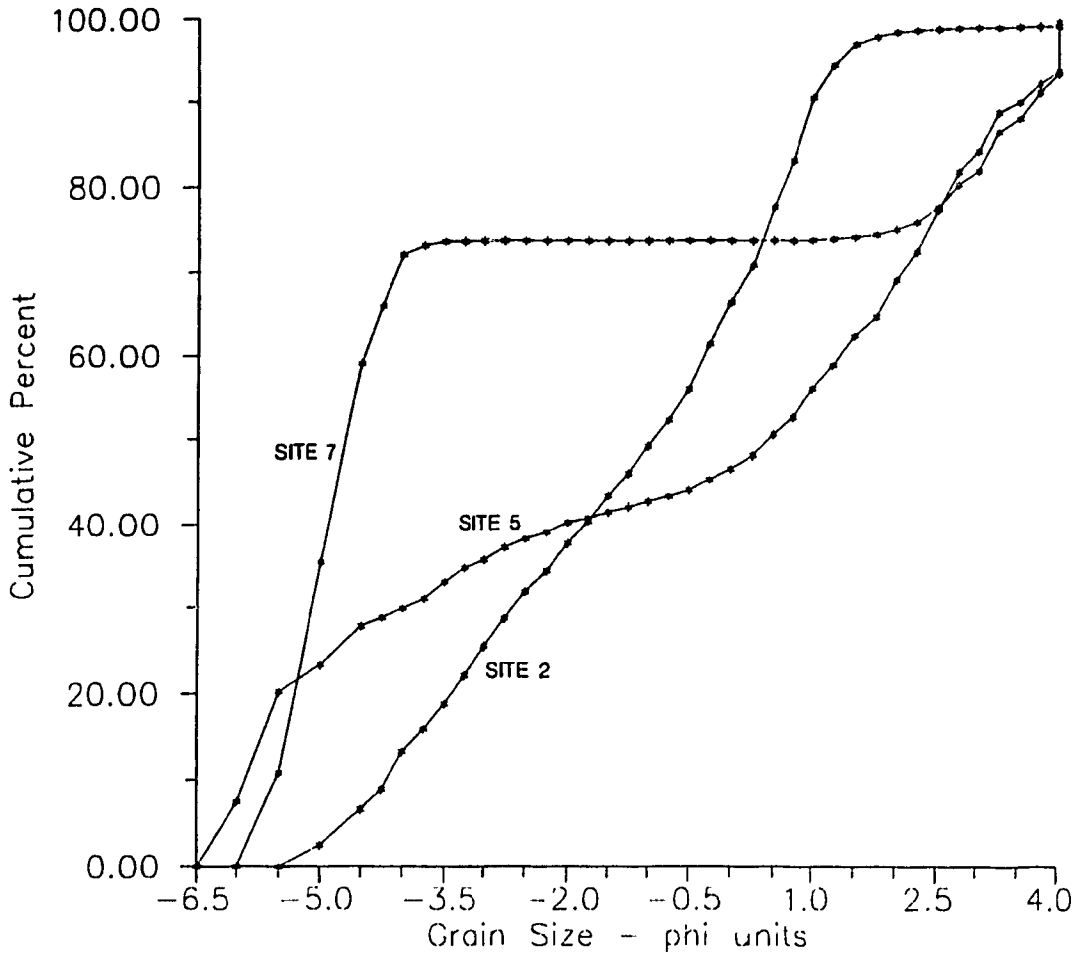


Fig. 6.6 Grain size curves from various overlying gravel cross-beds from sites 2, 5, and 7, Hopeville Esker. Sites 5 and 7 exhibit two straight line segments at the coarse end and in the sand sizes. Site 2, is a normal distribution from cobbles to coarse sand.

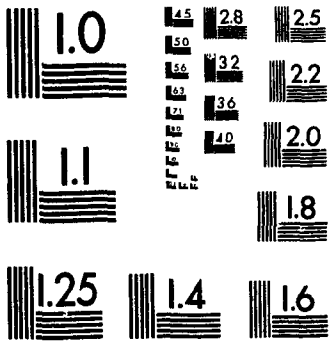
6.2 DEFORMATIONAL STRUCTURES

6.2.1 Mount View Esker

The deformation observed in the northern exposures of the Mount View Esker were small-scale structures in sandy units (Fig. 6.7). At site 6, small folds and normal faults were observed in cross-bedded sand. The folding can be attributed to dewatering from excessive pore pressure created by the overlying units. The faults, with little displacement, were likely created from shifting and settling of the underlying gravel bed. The folding in sand at site 4, can be correlated to a neighbouring lacustrine or till-like clay unit. The water expelled from the clay probably saturated the sand close to the contact, creating the folds and contortions.

Site 3 contained several larger-scale deformational structures including "V-shaped" wedges (Fig. 6.7). Along the eastern axis of the wedges are high-angle reverse faults, formed from a loss of ice support at the flanks. In a periglacial post-depositional environment, ice wedge formation is possible, especially in better drained ridges provided by the eskers. The esker ridge contains zones of weakness, provided by the high-angle reverse faults, permits the formation of frost cracks and eventually ice wedges. The gradual growth of the ice wedge causes the surrounding sediments to fold and buckle, accounting for the large-scale folding around the "V-shaped" wedge. The material presently in the wedge contains some clay, but is mainly sand or loam with no stratification, a condition associated with melting ice (Fig. 3.2).

The distal exposure at site 1 contained both large- and small-scale deformation, the most striking of which are large high-angle reverse faults



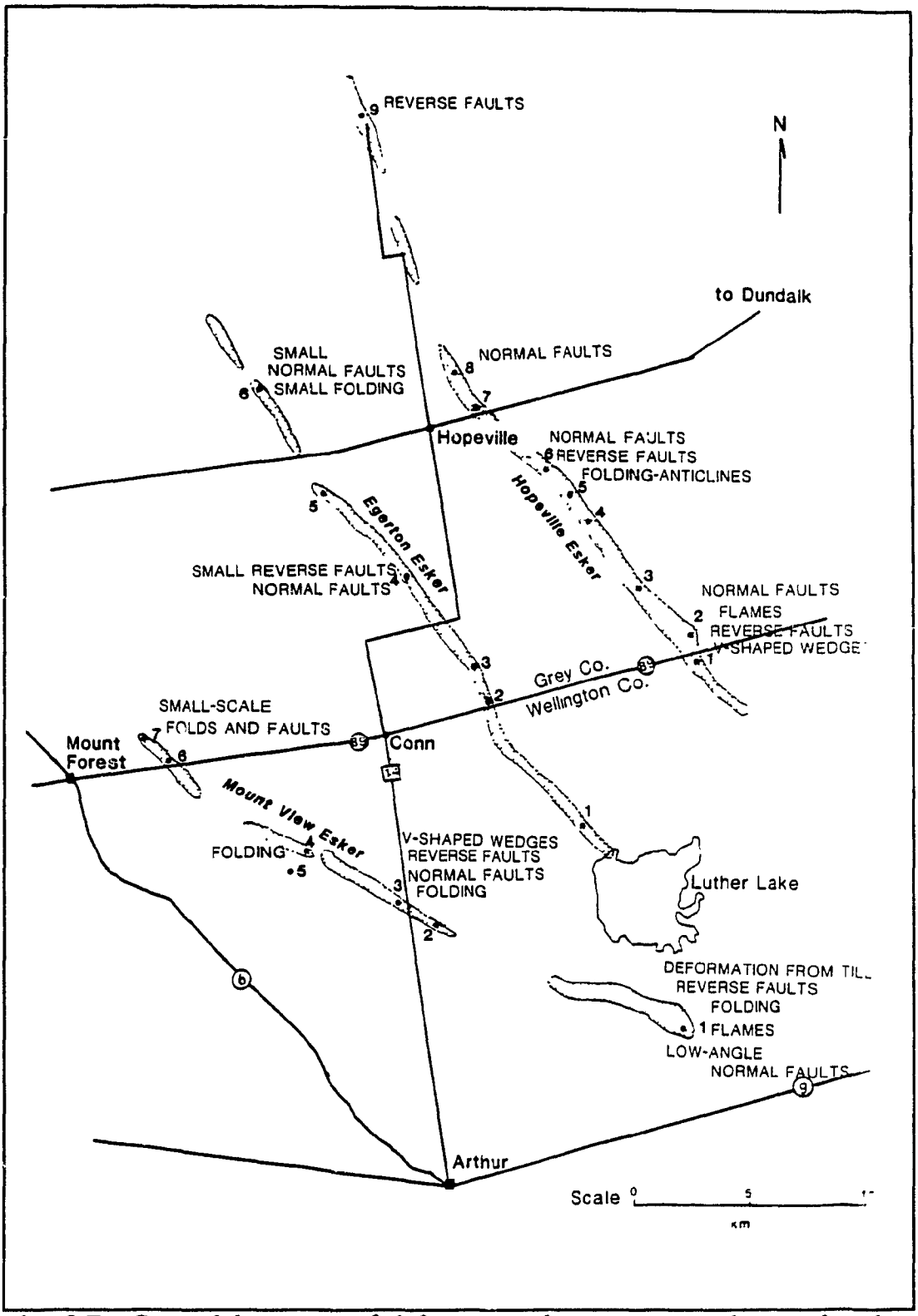


Fig. 6.7 General locations of deformational structures within each ridge.

extending out from a basal, structureless mass of unsorted boulders (Fig. 3.3). The blocky shape, irregular contacts and lack of stratification indicate that there was a buried ice mass, which melted, creating the high-angle reverse faults. Of the several clay units, either lacustrine or till, one appears to have been injected into and to have deformed a cross-bedded sand unit. Although the upper and lower contacts of the clay unit are slightly irregular, no deformation or disturbance was visible in the clay, making the possibility of an injection process unlikely. More plausible is the deposition and rapid burial of a saturated clay. The expulsion of water would then create the convoluted structures in the sand. The flame structures and folding visible in sandy units near the base along the flanks were probably created during the deposition of the overlying gravel beds. The shear stress from the flow and increased weight overlying the sand are the processes responsible for this deformation.

6.2.2 Egerton Esker

The Egerton Esker contained relatively little deformation which could partially be explained by the size of the esker and by continuous, consistent deposition. Most of the esker ridge is narrow and not very high in a stable semi-circular shape. The flanks have a gradual slope, thus in the event of loss of ice support, the effects of deformation would have been diminished by the minimal relief and gradual slope. The constant deposition of the boulder gravel core followed by cobble gravel cross-beds precluded finer-grained deposits and eliminated, to a great extent, small-scale deformation. As well, a steady flow would have prevented the accumulation of ice from the sides and would have reduced the possibility of ice masses

damming the channel or being buried. All of these factors decrease the potential for large-scale deformation.

The deformation observed was small-scale and occurred in sandy units. Site 6 (Fig. 6.7) had several normal faults in cross-bedded sand in the core which was probably the result of differential compaction of the underlying gravel and sand cross-beds. Folding seen in the western flank in cross-laminated sand, surrounded by laminations of silt and clay, is again the result of dewatering.

High-angle reverse faults and normal faults were visible in cross-bedded sand along the eastern flank of site 4 (Fig. 3.8). The succession of high-angle reverse faults occurred where the sandy flank began to override the gravel core. The angle and displacement of the faults increased towards the core. The sand at this location is thin and any shifting or disturbance in the underlying gravel would result in the faulting. The normal faults observed when digging into the center of the flank (Fig. 4.2), dipped eastward, away from the core. These slip surfaces of the normal faults likely resulted from continued shifting and adjustment of each new layer, away from the core as the subglacial tunnel was expanding.

6.2.3 Hopeville Esker

Faulting observed at sites 8 and 9 (Fig. 6.7) were small and occurred in cross-stratified sand with little displacement. The high-angle reverse faults at site 9 were located near the base with lower units covered, thus restricting the interpretation. With the surrounding units also fine-grained, the faulting was probably a result of underlying, buried gravel beds shifting, and creating a minor loss of support. The normal faults at site 8 occurred

high in the exposure in the upper portions of a thick unit of sand. Although closer inspection was not possible, the rest of the exposure reveals no other deformation or potential causes of deformation. In this thick sand unit, in which the deformation is restricted, the responsible process is probably due to shifting and compaction of the lower sand beds within the unit. A second, less plausible explanation, may be due to excessive weight of the overlying gravels causing the sand to slip.

The northern exposure at site 6, provides a real challenge to interpret the deformation where an entire study could be devoted to reconstructing the section. The exposure contained several large high-angle reverse faults, normal faults, anticlinal folds and many smaller folds and fractures (Fig. 4.3). A combination of processes initially deformed the deposit followed by a series of secondary processes of readjustment. A possible explanation centers on the large high-angle reverse faults which were observed across the exposure. The general angle of the high-angle reverse faults indicates successive loss of ice support from the eastern flank. Angle of normal faults near the base, increased towards the high-angle reverse faults indicating an adjustment in the sediments caused by the displacement of the high-angle reverse faults. This occurrence of increasing angle of normal faults is repeated with two other high-angle reverse faults. The anticlinal folds in the core were created as cross-beds were downthrown from faulting. The small-scale folding and fractures are the secondary results of the strong deformation, created either during the initial deformation or through a later stabilizing process.

A variety of deformational structures were present in the exposures at site 2 (Fig. 6.7). Exposure A (Fig. 3.10), contained two "V-shaped"

wedges, although not as large as those in site 3 of the Mount View Esker. High-angle faults were not present, but frost cracks still developed into ice wedges. Therefore folding of the surrounding beds is responsible for creating the "V-shaped" wedge. Small normal faults were visible in sand underlying the large silt block, which appears to have been rafted into place. The weight of the silt block and the force of impact created the faults.

Flame structures and folding observed near the base in sand cross-beds at exposure D (Fig. 3.10) are attributed to the deposition of the overlying gravel cross-beds. The shear stress applied to the underlying sand was sufficient to pull material up into the gravel. High-angle reverse faults observed in cross-bedded sand at exposure E (Fig. 3.10), were small with little displacement. The sand beds were trapped between overlying and underlying gravel cross-beds and the deformation was likely due to a combination of the weight of the gravel above and to differential compaction or shifting of the gravel below. This particular deformation, which has little vertical displacement, may have more transcurrent displacement along the fault plane.

6.3 ESKER OR MORAINE?

This question arose after preliminary field work revealed unusual depositional structures such as thick, horizontal beds which had been reworked very little, extensive deformational structures and till units within several sections which indicate the presence of ice. If the deposits are moraine, they would be of interlobate origin accounting for the stratification

and depositional structures. Evidence which would support the interlobate moraine theory would be a paleocurrent flow direction to the center from either side and towards a downstream direction. Evidence would also have to be gathered to reconstruct the location of the ice lobes responsible for the interlobate moraine.

The deposits contain features which indicate contact or close proximity of ice. Exposures such as site 6, Hopeville Esker and site 3, Mount View Esker, contained high-angle reverse faults, formed as a result of a loss of ice support along the flank (Figs. 3.2, 4.3). Deformation associated with melting of buried ice masses was seen in site 1, Mount View Esker, and site 6, Hopeville Esker. Several sedimentary units contain very poorly sorted material and angular cobbles and pebbles, suggesting that the material had been reworked very little before deposition. From these units as well as several sand units, faceted stones were present, again indicating the presence of ice. This is further supported by striations on several boulders and cobbles, mainly from the northern end of the Hopeville Esker and the southern end of the Mount View Esker. The Tavistock Till in site 1 (Mount View Esker), confirms the immediate presence of ice at this location (Fig. 3.3).

The Tavistock Till was probably deposited in site 1, Mount View Esker, as the subglacial tunnel was gradually melting upwards. The period of time for deposition is difficult to determine, but the thickness of the till is fairly consistent, except for a thick portion near the center (Fig. 3.3). Here, the till is interfingered with laminated silt, indicating a larger cavity downstream being filled contemporaneously with fine sediment. The continuous, fine-grained till with a sharp upper contact indicates deposition

from a dynamic ice mass, all of which are characteristics of lodgement till (Ashley et al., 1985). Sediment is released gradually through frictional melting, caused by ice movement. This movement is responsible for erosion of subglacial material creating the sharp upper contact (Ashley et al., 1985). The discontinuous till units or till erratics observed in site 1, Mount View Esker (Elma Till), sites 3 and 4, Mount View Esker (Tavistock Till), and site 2, Hopeville Esker (Tavistock Till), are probably melt-out tills, similar to a lodgement till but deposited from a stagnant ice mass. The till erratic in the Hopeville Esker was probably entrained upstream as a frozen mass and transported and deposited like a boulder in bedload. The discontinuous units in the Mount View Esker are for the most part thinner, suggesting that direct deposition from the melting of the ice may have occurred, but only intermittently. The Elma Till is thicker, and may have melted out of a small, local ice mass.

The interlobate moraine theory fails when comparing paleocurrent directions with deformation structures. Cross-beds from the Hopeville Esker and Egerton Esker have a northeast flow direction, but the deformation, most of which is seen in the eastern flanks, indicates the loss of ice contact and refutes the potential for interlobate moraines. An interlobate moraine would have an expected paleocurrent flow direction away from the ice, not into it. Evidence of the direction of ice movement, which would enhance the interlobate theory, would come from till fabrics. From this region though, the only data on fabrics is for the Catfish Creek Till (Cowan, 1976) which if present is buried, and a surficial till in the Dundalk area (Gwyn, 1972). Results from the surficial till are inconclusive as the orientation of the long axis of the pebbles is too variable to reveal any

distinct flow directions. The interlobate moraine theory also fails for the Mount View Esker which has an west-northwest to southeast orientation which is perpendicular to the recessional Maple Lane Moraine in southern Grey County.

There are four significant observations from the deposits which suggest that they are eskers. First, from Figs. 5.4 and 5.5, the core of the Egerton Esker and Hopeville Esker is composed of unsorted boulder gravel. Closer inspection of the contacts and sediment in the boulder gravel indicates a slurry or sliding-bed deposit, created in a tunnel at full flow (Saunderson, 1977a). Second, overlying the boulder gravel are tabular cross-beds in a convex shape, again formed in a subglacial tunnel and indicative of eskers (Banerjee and McDonald, 1975). Third, the repeated sequence of downstream fining and tabular cross-beds within beads of the Mount View Esker, indicate a recessive deltaic environment. Fourth, the paleocurrents from the core of the deposits are to the southeast, or downstream, supporting the theory of the formation of eskers.

6.4 STRATIGRAPHY

A better understanding of the depositional processes responsible for esker formation and the presence and identification of two tills permits revision of the local stratigraphic record. Cowan (1976, 1979) was partially right by placing the formation of the eskers during the retreat of the Georgian Bay ice lobe after depositing the Tavistock Till in the early part of the middle Port Bruce Stadial. Identification of the Tavistock Till in the

Mount View Esker and in the southern portion of the Hopeville Esker supports Cowan's hypothesis. Evidence has been collected though, to indicate that the Mount View Esker was formed separately, later than the other two eskers.

The parallel trend of the Egerton Esker and Hopeville Esker, as well as similar depositional structures in both eskers, indicate that these eskers were likely formed contemporaneously. A scenario of an ice mass thinning and retreating to the northeast is acceptable for the formation of these two eskers, albeit the Hopeville Esker drainage was temporarily blocked by ice. The Mount View Esker, does not fit into this picture with its eastward orientation, its beaded morphology and depositional structures indicating a pause-retreat environment. Pockets of the Elma Till have been identified at site 1 Mount View Esker, a new easternmost location for this till. In the period between the retreat of the Tavistock ice and the advance depositing the Elma Till, there were small, local fluctuations of the ice margin creating minor tills and small glacial lakes (Cowan, 1976) accounting for the other till-like units and lacustrine units observed in the Mount View Esker. This evidence indicates that the Mount View Esker was deposited during this period between the Tavistock ice and the Elma ice during the mid-Port Bruce Stadial. The Elma ice probably entered into Grey and Wellington Counties with a more east to west orientation and did not reach far enough east to affect the other two eskers.

Chapter 7

Conclusions

7.1 SUMMARY

Field observations and laboratory techniques were applied in an attempt to answer questions concerning the depositional processes and environment of three ridges on the Dundalk Till Plain. The initial question as to whether the deposits are eskers or moraine was brought closer to solution. The stratified deposits and presence of tills and other features associated with ice-contact suggests an interlobate moraine. This theory though was refuted based on paleocurrent directions flowing away from the center of the deposit, the shape of units indicating deposition in an subglacial tunnel and time-transgressive deposits in the Mount View Esker. The sedimentological analysis of the three esker ridges resulted in several significant observations which are summarized as follows:

1. Depositional Processes —structures within the beads of the Mount View Esker revealed a distinct deltaic environment. Fining in the sediments was observed in the downstream direction within each bead. Egerton Esker and Hopeville Esker were formed similarly from a stagnant, thinning ice mass. Both eskers contain a basal

boulder gravel core, interpreted as a sliding-bed deposit. The Hopeville Esker had two areas of increased, vertical sedimentation, believed to have been caused by a blockage of the drainage by ice.

2. Paleocurrents —measurements taken from the length of all three eskers revealed conflicting flow directions. Closer inspection of the location of measurements showed a wide range of flow directions along the flanks, either flowing into the core, or away from the core. Portions of the distal fine-grained sediments in the Mount View Esker contained regressive forms, resulting in opposite flow directions to the overall trend of the esker.
3. Deformational Processes —"V-shaped" wedges were observed in exposures of the Mount View Esker and Hopeville Esker and were associated with a periglacial environment, where frost cracks developed into ice wedges causing the surrounding sediment to buckle and fold. Site 6 of the Hopeville Esker was extensively deformed, due largely to the presence of ice. At this location, normal faults appeared related to larger high-angle reverse faults, probably as a secondary process of stabilizing the sediments from the initial displacement.
4. Stratigraphy —revision to the local stratigraphic record was made by placing the formation of the Mount View Esker after the deposition of the Tavistock Till and before

deposition of the Elma Till, during the Port Bruce Stadial. Identification of the Elma Till, near Luther Marsh in site 1, Mount View Esker, is a new easternmost location for this till.

7.2 METHODS

Methods employed in field work and laboratory work are well established. For grain size analysis, deviations to the standard methods were applied with mixed success. Samples drawn off during the pipette technique were smaller than the recommended amount, but the results remained accurate. A problem arose in attempting to disaggregate hard till samples. The sample contained coarse material and therefore needed to be sieved before a hydrometer or pipette analysis could begin. Using a mortar and pestle on the original sample may damage some the larger particles thus altering the sample. Soaking the sample in sodium metaphosphate before using the mortar and pestle was successful in breaking down the sample and large particles were removed without damage. Unfortunately the finer particles remained aggregated, resulting in a higher percent of sand. This was confirmed in the pipette analysis at +4.00ϕ and by checks with a microscope. Variation in sieving of the gravel and sand samples was made by using the entire sample, rather than 50grams, as suggested by Folk (1968). Using the entire sample, which frequently exceeded several kilograms, made the results more representative and sieves were seldom clogged. In the event of a clogged sieve, multiple runs were performed until the entire sample was sieved.

Correlating grain size results of tills with OGS published results

proved frustrating. The OGS classifies tills based on percent sand, silt, and clay, excluding the gravel fraction. The gravel fraction can exceed 30% for some tills, especially coarser tills such as the Catfish Creek Till and Elma Till. Three till samples were delivered to the OGS for correlation and check of the grain size analysis already performed. The results from the OGS were missing the gravel fraction and correlation of the results meant subtracting the gravel content and recalculating the percents of sand, silt, and clay. The recalculations indicated that the results matched fairly well.

7.3 FUTURE RESEARCH

This sedimentological analysis encompassed a wide area, and although trends became apparent in the eskers and the stratigraphy was revised, a more detailed analysis of several of the exposures would be beneficial. The deformation at site 6, Hopeville Esker, was severe and more detailed observations and measurements would improve the reconstruction of the exposure and probably reveal more about the process of deformation. Unfortunately, most of this exposure has been excavated, but still there is a need to understand the deformational forces within glaciofluvial sediments. Is there any relationship between normal faults, or the angle of normal faults with a large, high-angle reverse fault as observed at site 6? How frequently and to what degree is there transcurrent displacement? Are "V-shaped" wedges associated with a periglacial environment and have they been observed in glaciofluvial sediments at similar latitudes, as a search of the current literature did not answer this question. Solving these

questions would add to, and improve, the current understanding of deformation in glaciofluvial deposits.

The wide exposure of site 1, Mount View Esker, could also be studied in more detail. This site revealed deposits from several different environmental conditions, ranging from low energy lacustrine deposits to high energy cobble and boulder gravel deposits, till sheets and a dead-ice deposit. Reconstructing this section in detail to determine the order and relationships between each unit may reveal unusual conditions and processes in an esker.

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Appendix A

GRAIN SIZE DATA

Sample 01 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.1	505.1	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.9	567.9	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	606.9	606.9	0.00	0.00	0.00	0.00
-4.00	567.8	567.8	0.00	0.00	0.00	0.00
-3.75	576.1	576.1	0.00	0.00	0.00	0.00
-3.50	513.9	513.9	0.00	0.00	0.00	0.00
-3.25	501.6	503.6	2.0	2.0	0.23411	0.235163
-3.00	524.4	524.4	0.0	2.0	0.0	0.235163
-2.75	465.1	465.9	0.8	2.8	0.0936439	0.328807
-2.50	474.6	475.9	1.3	4.1	0.152171	0.480978
-2.25	454.5	456.6	2.1	6.2	0.245815	0.726793
-2.00	454.0	456.4	2.4	8.6	0.280932	1.00773
-1.75	443.8	446.7	2.9	11.5	0.339459	1.34718
-1.50	468.6	477.3	8.7	20.2	1.01838	2.36556
-1.25	409.4	424.3	14.9	35.1	1.74412	4.10968
-1.00	473.8	499.4	25.6	60.7	2.99661	7.10629
-0.75	453.0	484.1	31.1	91.8	3.64041	10.7467
-0.50	365.3	405.2	39.9	131.7	4.67049	15.4172
-0.25	453.0	509.3	56.3	188.0	6.59019	22.0074
+0.00	342.8	388.4	45.6	233.6	5.3377	27.3451
+0.25	429.8	474.3	44.5	278.1	5.20894	32.554
+0.50	413.2	464.1	50.9	329.0	5.95809	38.5121
+0.75	414.9	449.3	34.4	363.4	4.02669	42.5388
+1.00	398.6	449.5	50.9	414.3	5.95809	48.4969
+1.25	308.0	349.6	41.6	455.9	4.86948	53.3664
+1.50	339.6	385.4	45.8	501.7	5.36111	58.7275
+1.75	379.9	407.4	27.5	529.2	3.21901	61.9465
+2.00	324.8	362.9	38.1	567.3	4.45979	66.4063
+2.25	360.4	386.9	26.5	593.8	3.10195	69.5082
+2.50	309.3	338.8	29.5	623.3	3.45312	72.9614
+2.75	353.6	353.6	0.0	623.3	0.0	72.9614
+3.00	317.1	317.1	0.0	623.3	0.0	72.9614
+3.25	255.4	255.4	0.0	623.3	0.0	72.9614
+3.50	329.9	329.9	0.0	623.3	0.0	72.9614
+3.75	338.9	338.9	0.0	623.3	0.0	72.9614
+4.00	288.4	288.4	0.0	623.3	0.0	72.9614
>4.00	297.5	528.5	231.0	854.3	27.0397	100.00
			854.3		0	100.00

Initial Weight = 860.9g Percent Loss = 0.76

Summary Statistics: Were not performed as over 25% of the sample is finer than +4.00ϕ

Sample 02 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.8	548.8	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.00	0.00	0.00	0.00
-5.50	557.1	557.1	0.00	0.00	0.00	0.00
-5.00	568.1	645.1	77.0	77.0	6.18872	6.18896
-4.50	498.8	498.8	0.0	77.0	0.0	6.18896
-4.25	607.5	607.5	0.0	77.0	0.0	6.18896
-4.00	568.0	583.2	15.2	92.2	1.22167	7.41063
-3.75	576.4	591.9	15.5	107.7	1.24578	8.65641
-3.50	514.3	519.5	5.2	112.9	0.417939	9.07435
-3.25	502.0	507.6	5.6	118.5	0.450088	9.52444
-3.00	524.7	530.8	6.1	124.6	0.490275	10.0147
-2.75	465.1	474.1	9.0	133.6	0.723356	10.7381
-2.50	474.3	480.6	6.3	139.9	0.506349	11.2444
-2.25	454.8	463.7	8.9	148.8	0.715319	11.9597
-2.00	454.1	469.3	15.2	164.0	1.22167	13.1814
-1.75	443.8	459.5	15.7	179.7	1.26186	14.4433
-1.50	468.5	491.7	23.2	202.9	1.86465	16.3079
-1.25	409.0	441.2	32.2	235.1	2.58801	18.8959
-1.00	473.9	524.8	50.9	286.0	4.09098	22.9869
-0.75	453.0	510.1	57.1	343.1	4.58929	27.5762
-0.50	365.4	432.9	67.5	410.6	5.42517	33.0014
-0.25	452.7	534.1	81.4	492.0	6.54236	39.5437
+0.00	342.7	399.2	56.5	548.5	4.54107	44.0848
+0.25	429.7	479.4	49.7	598.2	3.99453	48.0793
+0.50	413.0	466.0	53.0	651.2	4.25977	52.3391
+0.75	414.8	450.6	35.8	687.0	2.87735	55.2164
+1.00	398.3	449.3	51.0	738.0	4.09902	59.3155
+1.25	307.7	347.7	40.0	778.0	3.21492	62.5304
+1.50	339.4	381.5	42.1	820.1	3.3837	65.9141
+1.75	379.7	400.7	21.0	841.1	1.68783	67.6019
+2.00	324.6	357.8	33.2	874.3	2.66838	70.2703
+2.25	360.4	397.7	37.3	911.6	2.99791	73.2682
+2.50	309.3	358.2	48.9	960.5	3.93024	77.1984
+2.75	353.6	384.0	30.4	990.9	2.44334	79.6418
+3.00	317.2	318.6	1.4	992.3	0.112522	79.7543
+3.25	255.6	269.2	13.6	1005.9	1.09307	80.8474
+3.50	330.0	348.8	18.8	1024.7	1.51101	82.3584
+3.75	339.3	376.1	36.8	1061.5	2.95772	85.3161
+4.00	288.5	375.1	86.6	1148.1	6.9603	92.2764
>4.00	297.3	393.4	96.1	1244.2	7.72384	100
			1244.2		0	100

Initial Weight = 1247.1g Percent Loss = 0.23

Summary Statistics: Graphic Mean (M_z) = 0.73ϕ
Inclusive Graphic Standard Deviation (σ_I) = 2.71ϕ
Inclusive Graphic Skewness (Sk_I) = 0.084
Graphic Kurtois (G_K) = 1.089

Sample 04 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.3	1603.2	1097.9	1097.9	13.0754	13.0754
-5.50	557.6	1971.1	1413.5	2511.4	16.834	29.9094
-5.00	568.2	867.5	299.3	2810.7	3.5645	33.4739
-4.50	498.7	1009.0	510.3	3321.0	6.07739	39.5513
-4.25	607.2	811.4	204.2	3525.2	2.43191	41.9832
-4.00	568.4	915.0	346.6	3871.8	4.12781	46.111
-3.75	576.5	785.5	209.0	4080.8	2.48907	48.6001
-3.50	514.3	771.5	257.2	4338.0	3.06311	51.6632
-3.25	501.7	683.4	181.7	4519.7	2.16395	53.8272
-3.00	524.6	690.5	165.9	4685.6	1.97578	55.8029
-2.75	464.9	668.5	203.6	4889.2	2.42476	58.2277
-2.50	474.3	659.3	185.0	5074.2	2.20325	60.4309
-2.25	454.6	629.0	174.4	5248.6	2.07701	62.508
-2.00	453.9	668.9	215.0	5463.6	2.56053	65.0685
-1.75	440.0	652.8	212.8	5676.4	2.53433	67.6028
-1.50	468.9	697.5	228.6	5905.0	2.7225	70.3253
-1.25	408.9	643.4	234.5	6139.5	2.79276	73.1181
-1.00	474.0	756.2	282.2	6421.7	3.36084	76.4789
-0.75	452.9	719.3	266.4	6688.1	3.17267	79.6516
-0.50	365.4	684.0	318.6	7006.7	3.79435	83.4459
-0.25	453.5	777.0	323.5	7330.2	3.8527	87.2986
+0.00	343.1	568.2	225.1	7555.3	2.68082	89.9795
+0.25	430.8	616.5	185.7	7741.0	2.21158	92.191
+0.50	413.8	571.2	157.4	7898.4	1.87455	94.0656
+0.75	415.4	506.7	91.3	7989.7	1.08733	95.1529
+1.00	398.9	499.7	100.8	8090.5	1.20047	96.3534
+1.25	308.2	365.1	56.9	8147.4	0.677647	97.031
+1.50	340.3	394.5	54.2	8201.6	0.645492	97.6765
+1.75	380.1	399.3	19.2	8220.8	0.228661	97.9052
+2.00	325.2	352.0	26.8	8247.6	0.319173	98.2244
+2.25	360.7	372.4	11.7	8259.3	0.13934	98.3637
+2.50	309.3	324.4	15.1	8274.4	0.179833	98.5435
+2.75	354.0	368.2	14.2	8288.6	0.169114	98.7126
+3.00	317.4	325.8	8.4	8297	0.100039	98.8127
+3.25	343.8	358.2	14.4	8311.4	0.171496	98.9842
+3.50	298.2	306.0	7.8	8319.2	0.0928936	99.0771
+3.75	339.1	349.9	10.8	8330.0	0.128622	99.2057
+4.00	288.6	305.6	17.0	8347.0	0.20246	99.4082
>4.00	297.9	347.6	49.7	8396.7	0.591899	100
			8396.7		0	100

Initial Weight = 8408.8g

Percent Loss = 0.14

Summary Statistics: M_z = -3.36ϕ σ_I = 2.39ϕ

Sk_I = 0.21 K_G = 0.63

Sample 07 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1669.2	1163.8	1163.8	10.298	10.298
-5.50	557.6	2597.9	2040.3	3204.1	18.0538	28.35 8
-5.00	568.3	1982.1	1413.8	4617.9	12.5102	40.862
-4.50	498.9	1459.3	960.4	5578.3	8.49821	49.3602
-4.25	607.3	825.0	217.7	5796.0	1.92634	51.2866
-4.00	568.4	873.8	305.4	6101.4	2.70237	53.9889
-3.75	576.7	816.9	240.2	6341.6	2.12544	56.1144
-3.50	514.5	766.8	252.3	6593.9	2.23251	58.3469
-3.25	501.8	720.7	218.9	6812.8	1.93696	60.2838
-3.00	524.8	753.4	228.6	7041.4	2.02279	62.3066
-2.75	465.1	722.9	257.8	7299.2	2.28117	64.5878
-2.50	474.5	710.3	235.8	7535.0	2.0865	66.6743
-2.25	454.8	693.5	238.7	7773.7	2.11217	68.7865
-2.00	454.1	729.8	275.7	8049.4	2.43956	71.226
-1.75	444.1	700.6	256.5	8305.9	2.26967	73.4957
-1.50	468.8	766.3	297.5	8603.4	2.63246	76.1282
-1.25	409.1	664.0	254.9	8858.3	2.25551	78.3837
-1.00	474.0	743.9	269.9	9128.2	2.38824	80.7719
-0.75	453.0	672.8	219.8	9348.0	1.94493	82.7168
-0.50	365.6	631.8	266.2	9614.2	2.3555	85.0723
-0.25	453.2	749.6	296.4	9910.6	2.62273	87.6951
+0.00	343.2	538.5	195.3	10105.9	1.72814	89.4232
+0.25	430.5	618.6	188.1	10294.0	1.66443	91.0876
+0.50	413.9	602.9	189.0	10483.0	1.67239	92.76
+0.75	415.3	515.2	99.9	10582.9	0.883977	93.644
+1.00	399.1	530.5	131.4	10714.3	1.16271	94.8067
+1.25	308.5	403.4	94.9	10809.2	0.839734	95.6464
+1.50	340.0	434.9	94.9	10904.1	0.839734	96.4862
+1.75	380.1	429.1	49.0	10953.1	0.433582	96.9198
+2.00	325.0	381.2	56.2	11009.3	0.497292	97.4171
+2.25	360.7	392.8	32.1	11041.4	0.284041	97.7011
+2.50	309.6	348.4	38.8	11080.2	0.343326	98.0444
+2.75	354.0	377.4	23.4	11103.6	0.207058	98.2515
+3.00	317.5	334.2	16.7	11120.3	0.147772	98.3993
+3.25	343.9	392.2	48.3	11168.6	0.427388	98.8266
+3.50	298.4	317.3	18.9	11187.5	0.167239	98.9939
+3.75	339.2	366.5	27.3	11214.8	0.241567	99.2354
+4.00	288.8	324.8	36.0	11250.8	0.31855	99.554
>4.00	298.1	348.5	50.4	11301.2	0.44597	100
			11301.2		0	100

Initial Weight = 11330.1g Percent Loss = 0.25

Summary Statistics: M_z = -3.73ϕ σ_I = 2.34ϕ

Sk_I = 0.52 K_G = 0.78

Sample 08 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.00	0.00	0.00	0.00
-5.50	557.2	557.2	0.00	0.00	0.00	0.00
-5.00	567.9	567.9	0.00	0.00	0.00	0.00
-4.50	498.2	575.5	77.3	77.3	4.72754	4.72778
-4.25	607.3	646.2	38.9	116.2	2.37906	7.10684
-4.00	567.4	577.8	10.4	126.6	0.636047	7.74289
-3.75	576.0	582.3	6.3	132.9	0.385298	8.12819
-3.50	513.6	522.0	8.4	141.3	0.51373	8.64192
-3.25	501.2	516.7	15.5	156.8	0.947954	9.58987
-3.00	523.9	533.8	9.9	166.7	0.605468	10.1953
-2.75	464.6	472.7	8.1	174.8	0.495383	10.6907
-2.50	473.9	482.9	9.0	183.8	0.550425	11.2411
-2.25	454.2	460.2	6.0	189.8	0.36695	11.6081
-2.00	453.5	464.3	10.8	200.6	0.66051	12.2686
-1.75	443.5	455.4	11.9	212.5	0.727784	12.9964
-1.50	468.3	489.7	21.4	233.9	1.30879	14.3052
-1.25	408.6	439.0	30.4	264.3	1.85921	16.1644
-1.00	473.3	528.8	55.5	319.8	3.39429	19.5587
-0.75	452.3	519.1	66.8	386.6	4.08538	23.6441
-0.50	364.7	445.0	80.3	466.9	4.91101	28.5551
-0.25	452.3	554.9	102.6	569.5	6.27485	34.8299
+0.00	342.4	414.6	72.2	641.7	4.41563	39.2456
+0.25	429.1	500.2	71.1	712.8	4.34836	43.5939
+0.50	412.7	488.5	75.8	788.6	4.6358	48.2297
+0.75	414.4	465.7	51.3	839.9	3.13742	51.3671
+1.00	398.0	472.9	74.9	914.8	4.58076	55.9479
+1.25	307.5	366.1	58.6	973.4	3.58388	59.5318
+1.50	339.0	412.0	73.0	1046.4	4.46456	63.9963
+1.75	379.5	407.5	28.0	1074.4	1.71243	65.7088
+2.00	324.5	377.9	53.4	1127.8	3.26586	68.9746
+2.25	360.0	414.9	54.9	1182.7	3.35759	72.3322
+2.50	309.1	356.1	47.0	1229.7	2.87444	75.2067
+2.75	353.4	378.3	24.9	1254.6	1.52284	76.7295
+3.00	317.0	350.8	33.8	1288.4	2.06715	78.7966
+3.25	255.4	336.0	80.6	1369.0	4.92936	83.726
+3.50	330.1	357.9	27.8	1396.8	1.7002	85.4262
+3.75	339.0	401.8	62.8	1459.6	3.84074	89.2669
+4.00	288.4	334.3	45.9	1505.5	2.80717	92.0741
>4.00	296.8	426.4	129.6	1635.1	7.92612	100
			1635.1		0	100

Initial Weight = 1641.2g Percent Loss = 0.37

Summary Statistics: Inman's Graphic Mean (M_I) = 0.90ϕ
Inman's Graphic Standard Deviation (σ_I) = 2.20ϕ

Sample 09 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.3	2191.2	1685.9	1685.9	38.1063	38.1063
-5.50	557.5	1730.5	1173	2858.9	26.5133	64.6196
-5.00	568.2	750.9	182.7	3041.6	4.12956	68.7492
-4.50	498.7	849.8	351.1	3392.7	7.9359	76.6851
-4.25	607.2	641.1	33.9	3426.6	0.76624	77.4513
-4.00	568.3	598.8	30.5	3457.1	0.68939	78.1407
-3.75	576.8	621.5	44.7	3501.8	1.01035	79.1511
-3.50	514.2	593.3	79.1	3580.9	1.78789	80.939
-3.25	501.7	528.7	27.0	3607.9	0.61028	81.5492
-3.00	524.6	550.7	26.1	3634.0	0.589937	82.1392
-2.75	464.9	498.3	33.4	3667.4	0.754939	82.8941
-2.50	474.3	497.5	23.2	3690.6	0.524389	83.4185
-2.25	454.6	473.0	18.4	3709.0	0.415894	83.8344
-2.00	453.9	472.5	18.6	3727.6	0.420415	84.2548
-1.75	443.9	458.7	14.8	3742.4	0.334524	84.5893
-1.50	469.5	486.3	16.8	3759.2	0.37973	84.9691
-1.25	409.2	420.1	10.9	3770.1	0.246372	85.2154
-1.00	474.7	488.1	13.4	3783.5	0.30288	85.5183
-0.75	453.3	463.0	9.7	3793.2	0.219249	85.7376
-0.50	365.6	375.4	9.8	3803.0	0.221509	85.9591
-0.25	453.5	465.1	11.6	3814.6	0.262194	86.2213
+0.00	343.1	350.2	7.1	3821.7	0.160481	86.3817
+0.25	430.8	439.2	8.4	3830.1	0.189865	86.5716
+0.50	413.8	421.7	7.9	3838.0	0.178563	86.7502
+0.75	415.4	422.2	6.8	3844.8	0.1537	86.9039
+1.00	398.8	408.2	9.4	3854.2	0.212468	87.1163
+1.25	308.2	317.5	9.3	3863.5	0.210207	87.3265
+1.50	339.8	360.8	21.0	3884.5	0.474662	87.8012
+1.75	380.2	391.4	11.2	3895.7	0.253153	88.0544
+2.00	324.8	357.8	33.0	3928.7	0.745898	88.8003
+2.25	360.6	382.9	22.3	3951.0	0.504046	89.3043
+2.50	309.2	336.2	27.0	3978.0	0.61028	89.9146
+2.75	353.9	399.3	45.4	4023.4	1.02617	90.9408
+3.00	317.3	362.5	45.2	4068.6	1.02165	91.9624
+3.25	343.8	416.4	72.6	4141.2	1.64097	93.6034
+3.50	298.2	349.9	51.7	4192.9	1.16857	94.7719
+3.75	339.1	430.6	91.5	4284.4	2.06817	96.8401
+4.00	288.6	337.9	49.3	4333.7	1.11433	97.9544
>4.00	298.0	388.5	90.5	4424.2	2.04557	100
			4424.2		0	100

Initial Weight = 4429.6g

Percent Loss = 0.12

Summary Statistics: M_z = -4.90ϕ σ_I = 2.42ϕ

Sk_I = 0.80 K_G = 2.73

Sample 10 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.001	0.001	0.00	0.00
-5.50	557.5	1417.2	859.7	859.7	20.0275	20.0275
-5.00	568.1	1087.5	519.4	1379.1	12.0999	32.1274
-4.50	498.7	1103.9	605.2	1984.3	14.0987	46.2261
-4.25	607.2	829.1	221.9	2206.2	5.16936	51.3955
-4.00	568.4	771.3	202.9	2409.1	4.72674	56.1222
-3.75	576.5	696.7	120.2	2529.3	2.80017	58.9224
-3.50	514.3	668.1	153.8	2683.1	3.58291	62.5053
-3.25	501.7	620.6	118.9	2802.0	2.76988	65.2752
-3.00	524.6	586.6	62.0	2864.0	1.44435	66.7196
-2.75	464.9	524.8	59.9	2923.9	1.39542	68.115
-2.50	474.4	524.0	49.6	2973.5	1.15548	69.2705
-2.25	454.7	500.3	45.6	3019.1	1.06229	70.3327
-2.00	454.0	497.9	43.9	3063.0	1.02269	71.3554
-1.75	444.4	475.4	31.0	3094.0	0.722173	72.0776
-1.50	468.8	502.3	33.5	3127.5	0.780413	72.858
-1.25	408.9	427.8	18.9	3146.4	0.440293	73.2983
-1.00	473.9	497.2	23.3	3169.7	0.542795	73.8411
-0.75	453.0	473.3	20.3	3190.0	0.472907	74.314
-0.50	365.6	388.9	23.3	3213.3	0.542795	74.8568
-0.25	453.1	486.5	33.4	3246.7	0.778083	75.6349
+0.00	343.0	371.9	28.9	3275.6	0.673252	76.3081
+0.25	430.8	464.8	34.0	3309.6	0.792061	77.1002
+0.50	413.7	463.1	49.4	3359.0	1.15082	78.251
+0.75	415.3	437.5	22.2	3381.2	0.517169	78.7682
+1.00	398.9	434.9	36.0	3417.2	0.838653	79.6069
+1.25	308.2	336.6	28.4	3445.6	0.661604	80.2685
+1.50	340.1	375.2	35.1	3480.7	0.817686	81.0861
+1.75	380.1	403.9	23.8	3504.5	0.554443	81.6406
+2.00	325.4	361.4	36.0	3540.5	0.838653	82.4792
+2.25	360.7	392.6	31.9	3572.4	0.743139	83.2224
+2.50	309.8	335.2	25.4	3597.8	0.591716	83.8141
+2.75	353.9	463.2	109.3	3707.1	2.54624	86.3603
+3.00	317.4	343.3	25.9	3733.0	0.603364	86.9637
+3.25	344.0	450.9	106.9	3839.9	2.49033	89.454
+3.50	298.4	377.7	79.3	3919.2	1.84737	91.3014
+3.75	339.1	497.7	158.6	4077.8	3.69473	94.9961
+4.00	289.2	392.1	102.9	4180.7	2.39715	97.3933
>4.00	297.8	409.7	111.9	4292.6	2.60681	100
			4292.6		0	100

Initial Weight = 4302.5g

Percent Loss = 0.23

Summary Statistics: M_z = -2.56ϕ

σ_i = 3.30ϕ

Sk_i = 0.56

K_G = 0.87

Sample 11 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1489.2	983.8	983.8	10.3395	10.3395
-5.50	557.6	1695.0	1137.4	2121.2	11.9538	22.2933
-5.00	568.3	2325.2	1756.9	3878.1	18.4645	40.7578
-4.50	498.8	1544.9	1046.1	4924.2	10.9942	51.752
-4.25	607.3	971.8	364.5	5288.7	3.83079	55.5828
-4.00	568.4	1043.0	474.6	5763.3	4.98791	60.5707
-3.75	576.7	915.3	338.6	6101.9	3.55859	64.1293
-3.50	514.4	852.9	338.5	6440.4	3.55754	67.6868
-3.25	501.9	756.3	254.4	6694.8	2.67367	70.3605
-3.00	524.8	731.0	206.2	6901.0	2.1671	72.5276
-2.75	465.1	671.6	206.5	7107.5	2.17026	74.6979
-2.50	474.5	665.7	191.2	7298.7	2.00946	76.7073
-2.25	454.8	610.0	155.2	7453.9	1.63111	78.3384
-2.00	454.1	507.2	53.1	7507.0	0.558066	78.8965
-1.75	444.2	549.6	105.4	7612.4	1.10772	80.0042
-1.50	468.8	576.5	107.7	7720.1	1.1319	81.1361
-1.25	409.1	480.8	71.7	7791.8	0.753547	81.8897
-1.00	474.1	547.1	73.0	7864.8	0.76721	82.6569
-0.75	453.1	511.6	58.5	7923.3	0.614819	83.2717
-0.50	365.5	426.6	61.1	7984.4	0.642144	83.9138
-0.25	453.2	536.5	83.3	8067.7	0.87546	84.7893
+0.00	343.2	414.1	70.9	8138.6	0.745139	85.5344
+0.25	430.4	511.8	81.4	8220.0	0.855491	86.3899
+0.50	413.8	533.6	119.8	8339.8	1.25906	87.649
+0.75	415.3	494.4	79.1	8418.9	0.831319	88.4803
+1.00	399.1	573.0	173.9	8592.8	1.82764	90.308
+1.25	308.5	466.2	157.7	8750.5	1.65738	91.9653
+1.50	340.0	551.9	211.9	8962.4	2.22701	94.1923
+1.75	380.1	477.6	97.5	9059.9	1.0247	95.217
+2.00	325.0	448.9	123.9	9183.8	1.30215	96.5192
+2.25	360.7	406.6	45.9	9229.7	0.482396	97.0016
+2.50	309.6	360.5	50.9	9280.6	0.534945	97.5365
+2.75	354.0	404.1	50.1	9330.7	0.526537	98.0631
+3.00	317.5	346.6	29.1	9359.8	0.305833	98.3689
+3.25	343.9	379.5	35.6	9395.4	0.374146	98.7431
+3.50	298.4	315.2	16.8	9412.2	0.176563	98.9196
+3.75	339.2	362.3	23.1	9435.3	0.242775	99.1624
+4.00	288.8	312.7	23.9	9459.2	0.251182	99.4136
>4.00	298.1	353.9	55.8	9515.0	0.586442	100
			9515		0	100

Initial Weight = 9612.8g Percent Loss = 1.01

Summary Statistics: M_z = -3.76ϕ σ_i = 2.36ϕ

Sk_i = 0.55 K_G = 1.23

Sample 12 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.2	505.2	0.001	0.00	0.00	0.00
-5.50	557.4	700.9	143.5	143.5	3.25914	3.25919
-5.00	568.1	1541.8	973.7	1117.2	22.1145	25.3737
-4.50	498.7	1640.2	1141.5	2258.7	25.9255	51.2992
-4.25	607.2	1022.1	414.9	2673.6	9.42312	60.7223
-4.00	568.3	1030.8	462.5	3136.1	10.5042	71.2265
-3.75	576.5	941.5	365.0	3501.1	8.2898	79.5163
-3.50	514.2	839.8	325.6	3826.7	7.39496	86.9113
-3.25	501.7	696.7	195.0	4021.7	4.4288	91.3401
-3.00	524.5	631.5	107.0	4128.7	2.43016	93.7702
-2.75	464.9	523.2	58.3	4187.0	1.3241	95.0943
-2.50	474.3	495.7	21.4	4208.4	0.486032	95.5804
-2.25	454.6	462.5	7.9	4216.3	0.179423	95.7598
-2.00	453.9	459.0	5.1	4221.4	0.11583	95.8756
-1.75	444.1	447.5	3.4	4224.8	0.0772201	95.9528
-1.50	468.6	474.8	6.2	4231	0.140813	96.0936
-1.25	409.0	414.8	5.8	4236.8	0.131728	96.2254
-1.00	473.9	481.4	7.5	4244.3	0.170338	96.3957
-0.75	452.9	459.7	6.8	4251.1	0.15444	96.5501
-0.50	365.4	373.5	8.1	4259.2	0.183965	96.7341
-0.25	453.1	463.6	10.5	4269.7	0.238474	96.9726
+0.00	343.0	349.9	6.9	4276.6	0.156711	97.1293
+0.25	430.5	438.3	7.8	4284.4	0.177152	97.3065
+0.50	413.7	422.2	8.5	4292.9	0.19305	97.4995
+0.75	415.3	420.9	5.6	4298.5	0.127186	97.6267
+1.00	398.8	406.8	8.0	4306.5	0.181694	97.8084
+1.25	308.2	314.4	6.2	4312.7	0.140813	97.9492
+1.50	339.9	347.5	7.6	4320.3	0.17261	98.1218
+1.75	380.1	384.5	4.4	4324.7	0.0999319	98.2217
+2.00	324.9	330.7	5.8	4330.5	0.131728	98.3535
+2.25	360.7	364.1	3.4	4333.9	0.0772201	98.4307
+2.50	309.3	312.7	3.4	4337.3	0.0772201	98.5079
+2.75	353.8	357.2	3.4	4340.7	0.0772201	98.5851
+3.00	317.3	320.1	2.8	4343.5	0.063593	98.6487
+3.25	343.8	362.4	18.6	4362.1	0.422439	99.0712
+3.50	298.3	307.0	8.7	4370.8	0.197593	99.2687
+3.75	339.1	352.4	13.3	4384.1	0.302067	99.5708
+4.00	288.7	294.7	6.0	4390.1	0.136271	99.7071
>4.00	297.8	310.7	12.9	4403.0	0.292982	100
			4403		0	100

Initial Weight = 4405.9g

Percent Loss = 0.066

Summary Statistics: M_z = -4.40ϕ σ_i = 0.89ϕ

Sk_i = 0.30 K_G = 0.67

Sample 13 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	2695.9	2190.6	2190.6	23.4683	23.4683
-5.50	557.5	1865.8	1308.3	3498.9	14.016	37.4843
-5.00	568.1	1986.2	1418.1	4917.0	15.1924	52.6767
-4.50	498.8	1445.7	946.9	5863.9	10.1443	62.821
-4.25	607.2	881.0	273.8	6137.7	2.93327	65.7543
-4.00	568.2	907.0	338.8	6476.5	3.62962	69.3839
-3.75	576.5	709.6	133.1	6609.6	1.42592	70.8098
-3.50	514.3	770.8	256.5	6866.1	2.74793	73.5578
-3.25	501.7	686.7	185.0	7051.1	1.98194	75.5397
-3.00	524.6	705.0	180.4	7231.5	1.93266	77.4724
-2.75	465.1	633.7	168.6	7400.1	1.80624	79.2786
-2.50	474.5	598.2	123.7	7523.8	1.32522	80.6038
-2.25	454.6	576.7	122.1	7645.9	1.30808	81.9119
-2.00	453.8	550.1	96.3	7742.2	1.03168	82.9436
-1.75	444.0	511.6	67.6	7809.8	0.724211	83.6678
-1.50	468.7	534.1	65.4	7875.2	0.700642	84.3684
-1.25	409.0	462.0	53.0	7928.2	0.567798	84.9362
-1.00	473.9	526.4	52.5	7980.7	0.562442	85.4987
-0.75	452.8	498.5	45.7	8026.4	0.489592	85.9883
-0.50	365.4	415.3	49.9	8076.3	0.534587	86.5228
-0.25	452.9	521.8	68.9	8145.2	0.738138	87.261
+0.00	342.8	401.3	58.5	8203.7	0.626721	87.8877
+0.25	430.1	508.4	78.3	8282.0	0.838842	88.7265
+0.50	413.5	520.6	107.1	8389.1	1.14738	89.8739
+0.75	415.2	502.1	86.9	8476.0	0.930975	90.8049
+1.00	398.7	557.0	158.3	8634.3	1.6959	92.5008
+1.25	308.2	409.6	101.4	8735.7	1.08632	93.5871
+1.50	339.8	475.8	136.0	8871.7	1.45699	95.0441
+1.75	380.0	452.3	72.3	8944.0	0.774563	95.8187
+2.00	324.9	410.0	85.1	9029.1	0.911691	96.7304
+2.25	360.6	405.6	45.0	9074.1	0.482093	97.2125
+2.50	309.5	355.1	45.6	9119.7	0.488521	97.701
+2.75	353.8	390.9	37.1	9156.8	0.397459	98.0984
+3.00	317.3	337.1	19.8	9176.6	0.212121	98.3106
+3.25	255.6	292.8	37.2	9213.8	0.39853	98.7091
+3.50	330.1	343.3	13.2	9227.0	0.141414	98.8505
+3.75	339.1	365.7	26.6	9253.6	0.28497	99.1355
+4.00	288.6	314.6	26.0	9279.6	0.278543	99.414
>4.00	297.2	351.9	54.7	9334.3	0.586011	100
			9334.3		0	100

Initial Weight = 9336.5g

Percent Loss = 0.023

Summary Statistics: M_z = -4.46ϕ

σ_I = 2.19ϕ

Sk_I = 0.56

K_G = 1.21

Sample 14 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	599.1	31.6	31.6	1.48629	1.48643
-4.50	498.3	540.3	42.0	73.6	1.97545	3.46188
-4.25	606.8	672.1	65.3	138.9	3.07135	6.53323
-4.00	567.5	589.8	22.3	161.2	1.04887	7.5821
-3.75	576.0	581.5	5.5	166.7	0.25869	7.84079
-3.50	513.7	544.6	30.9	197.6	1.45337	9.29416
-3.25	501.3	527.5	26.2	223.8	1.2323	10.5265
-3.00	524.1	542.6	18.5	242.3	0.870138	11.3966
-2.75	464.6	493.4	28.8	271.1	1.35459	12.7512
-2.50	474.1	511.2	37.1	308.2	1.74498	14.4962
-2.25	454.2	487.7	33.5	341.7	1.57565	16.0718
-2.00	453.4	489.6	36.2	377.9	1.70265	17.7745
-1.75	443.7	482.1	38.4	416.3	1.80612	19.5806
-1.50	468.3	516.1	47.8	464.1	2.24825	21.8288
-1.25	408.5	455.6	47.1	511.2	2.21532	24.0442
-1.00	473.3	530.4	57.1	568.3	2.68567	26.7298
-0.75	452.4	506.0	53.6	621.9	2.52105	29.2509
-0.50	365.0	424.6	59.6	681.5	2.80325	32.0541
-0.25	452.6	516.4	63.8	745.3	3.0008	35.0549
+0.00	342.5	391.5	49.0	794.3	2.30469	37.3596
+0.25	429.4	486.4	57.0	851.3	2.68097	40.0406
+0.50	413.0	473.8	60.8	912.1	2.8597	42.9003
+0.75	414.8	457.1	42.3	954.4	1.98956	44.8898
+1.00	398.2	468.5	70.3	1024.7	3.30652	48.1964
+1.25	307.8	369.6	61.8	1086.5	2.90673	51.1031
+1.50	339.5	372.7	33.2	1119.7	1.56154	52.6646
+1.75	379.7	427.8	48.1	1167.8	2.26236	54.927
+2.00	324.6	401.4	76.8	1244.6	3.61225	58.5392
+2.25	360.3	446.2	85.9	1330.5	4.04026	62.5795
+2.50	309.1	374.1	65.0	1395.5	3.05724	65.6367
+2.75	353.5	356.3	2.8	1398.3	0.131697	65.7684
+3.00	317.1	359.3	42.2	1440.5	1.98485	67.7533
+3.25	255.2	270.6	15.4	1455.9	0.724331	68.4776
+3.50	329.8	348.6	18.8	1474.7	0.884248	69.3619
+3.75	338.8	378.2	39.4	1514.1	1.85316	71.215
+4.00	288.3	401.6	113.3	1627.4	5.32901	76.544
>4.00	296.7	795.4	498.7	2126.1	23.4561	100
			2126.1		0	100

Initial Weight = 2150.5g Percent Loss = 1.13

Summary Statistics: Were not performed as over 20% of the sample is finer than +4.00ϕ

Sample 15 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.5	505.5	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	568.3	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	607.4	623.3	15.9	15.9	0.326321	0.326424
-4.00	568.4	620.8	52.4	68.3	1.07542	1.40184
-3.75	576.6	634.6	58.0	126.3	1.19035	2.59219
-3.50	514.4	596.0	81.6	207.9	1.6747	4.26689
-3.25	501.8	647.8	146.0	353.9	2.99641	7.2633
-3.00	524.8	646.1	121.3	475.2	2.48948	9.75278
-2.75	465.1	624.2	159.1	634.3	3.26526	13.018
-2.50	474.5	655.8	181.3	815.6	3.72088	16.7389
-2.25	454.8	641.7	186.9	1002.5	3.83581	20.5747
-2.00	454.1	665.6	211.5	1214.0	4.34069	24.9154
-1.75	444.1	630.9	186.8	1400.8	3.83376	28.7492
-1.50	468.9	682.1	213.2	1614.0	4.37558	33.1248
-1.25	409.1	589.1	180.0	1794.0	3.6942	36.819
-1.00	474.0	695.8	221.8	2015.8	4.55208	41.371
-0.75	453.0	698.6	245.6	2261.4	5.04053	46.4116
-0.50	365.5	696.5	331.0	2592.4	6.79323	53.2048
-0.25	453.2	877.4	424.2	3016.6	8.706	61.9108
+0.00	343.1	603.7	260.6	3277.2	5.34838	67.2592
+0.25	430.3	755.0	324.7	3601.9	6.66393	73.9231
+0.50	413.8	706.1	292.3	3894.2	5.99897	79.9221
+0.75	415.3	552.3	137.0	4031.2	2.8117	82.7338
+1.00	399.1	550.3	151.2	4182.4	3.10313	85.8369
+1.25	308.5	389.9	81.4	4263.8	1.6706	87.5075
+1.50	340.0	421.2	81.2	4345.0	1.6665	89.174
+1.75	380.1	418.8	38.7	4383.7	0.794253	89.9683
+2.00	324.9	389.2	64.3	4448.0	1.31965	91.2879
+2.25	360.6	402.6	42.0	4490.0	0.861981	92.1499
+2.50	309.6	364.6	55.0	4545.0	1.12878	93.2787
+2.75	354.0	410.6	56.6	4601.6	1.16162	94.4403
+3.00	317.5	353.3	35.8	4637.4	0.734736	95.175
+3.25	343.9	399.0	55.1	4692.5	1.13084	96.3059
+3.50	298.4	326.9	28.5	4721.0	0.584915	96.8908
+3.75	339.2	382.0	42.8	4763.8	0.878399	97.7692
+4.00	288.9	321.7	32.8	4796.6	0.673166	98.4424
>4.00	298.0	373.9	75.9	4872.5	1.55772	100
			4872.5		0	100

Initial Weight = 4877.1g

Percent Loss = 0.094

Summary Statistics: M_z = -0.86ϕ

σ_I = 1.75ϕ

Sk_I = -0.018

K_G = 1.09

Sample 16 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	513.9	513.9	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.6	464.6	0.00	0.00	0.00	0.00
-2.50	473.9	474.9	1.0	1.0	0.26976	0272997
-2.25	454.5	456.1	1.6	2.6	0.431616	0704613
-2.00	453.5	455.2	1.7	4.3	0.458592	1.16321
-1.75	443.6	445.5	1.9	6.2	0.512544	1.67575
-1.50	468.3	472.6	4.3	10.5	1.15997	2.83572
-1.25	408.9	413.2	4.3	14.8	1.15997	3.99569
-1.00	473.7	478.3	4.6	19.4	1.2409	5.23659
-0.75	452.3	456.0	3.7	23.1	0.998112	6.2347
-0.50	364.7	368.2	3.5	26.6	0.94416	7.17886
-0.25	452.3	455.8	3.5	30.1	0.94416	8.12302
+0.00	342.5	344.5	2.0	32.1	0.53952	8.66254
+0.25	429.2	431.4	2.2	34.3	0.593472	9.25601
+0.50	412.5	415.4	2.9	37.2	0.782304	10.0383
+0.75	414.1	416.8	2.7	39.9	0.728352	10.7667
+1.00	397.8	403.0	5.2	45.1	1.40275	12.1694
+1.25	307.4	312.3	4.9	50.0	1.32182	13.4912
+1.50	339.2	348.3	9.1	59.1	2.45482	15.9461
+1.75	379.3	389.1	9.8	68.9	2.64365	18.5897
+2.00	324.5	346.5	22.0	90.9	5.93472	24.5244
+2.25	360.1	383.7	23.6	114.5	6.36633	30.8908
+2.50	309.2	348.3	39.1	153.6	10.5476	41.4384
+2.75	353.1	401.4	48.3	201.9	13.0294	54.4678
+3.00	316.7	345.2	28.5	230.4	7.68816	62.1559
+3.25	255.3	305.3	50.0	280.4	13.488	75.6439
+3.50	329.6	345.7	16.1	296.5	4.34313	79.987
+3.75	338.7	361.9	23.2	319.7	6.25843	86.2455
+4.00	288.2	306.1	17.9	337.6	4.8287	91.0742
>4.00	296.5	329.6	33.1	370.7	8.92905	100.00
			370.7		0	100.00

Initial Weight = 371.1g Percent Loss = 0.11

Summary Statistics: M_i = 2.55ϕ σ_i = 1.05ϕ

Sample 17 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.3	548.3	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.4	498.4	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.6	567.6	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.1	514.1	0.00	0.00	0.00	0.00
-3.25	501.2	501.2	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.8	464.8	0.00	0.00	0.00	0.00
-2.50	474.1	474.1	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.7	453.7	0.00	0.00	0.00	0.00
-1.75	443.3	443.9	0.6	0.6	0.295858	0.303254
-1.50	468.0	468.5	0.5	1.1	0.246548	0.549802
-1.25	408.5	409.2	0.7	1.8	0.345168	0.89497
-1.00	473.4	474.0	0.6	2.4	0.295858	1.19083
-0.75	452.1	452.7	0.6	3.0	0.295858	1.48669
-0.50	364.6	365.2	0.6	3.6	0.295858	1.78254
-0.25	452.1	452.7	0.6	4.2	0.295858	2.0784
+0.00	342.1	342.2	0.1	4.3	0.0493097	2.12771
+0.25	429.1	429.3	0.2	4.5	0.0986193	2.22633
+0.50	412.6	412.8	0.2	4.7	0.0986193	2.32495
+0.75	414.2	414.2	0.0	4.7	0.0	2.32495
+1.00	397.9	398.5	0.6	5.3	0.295858	2.62081
+1.25	307.6	308.2	0.6	5.9	0.295858	2.91667
+1.50	339.0	341.0	2.0	7.9	0.986193	3.90286
+1.75	379.4	382.0	2.6	10.5	1.28205	5.18491
+2.00	324.4	331.9	7.5	18.0	3.69822	8.88313
+2.25	360.2	369.1	8.9	26.9	4.38856	13.2717
+2.50	309.1	326.2	17.1	44.0	8.43195	21.7036
+2.75	353.1	379.1	26.0	70.0	12.8205	34.5241
+3.00	316.7	334.3	17.6	87.6	8.6785	43.2026
+3.25	255.3	290.1	34.8	122.4	17.1598	60.3624
+3.50	329.8	342.1	12.3	134.7	6.06509	66.4275
+3.75	338.8	358.9	20.1	154.8	9.91124	76.3388
+4.00	288.3	303.5	15.2	170.0	7.49507	83.8338
>4.00	296.5	329.3	32.8	202.8	16.1736	100.00
			202.8		0	100.00

Initial Weight = 199.2g Percent Loss = +1.81

Summary Statistics: M_i = 3.10ϕ σ_i = 0.80ϕ

Sample 18 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	513.9	513.9	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.6	464.6	0.00	0.00	0.00	0.00
-2.50	474.1	474.1	0.00	0.00	0.00	0.00
-2.25	454.2	454.2	0.00	0.00	0.00	0.00
-2.00	453.1	453.2	0.1	0.1	0.0106838	0.0121795
-1.75	443.4	443.4	0.0	0.1	0.0	0.0121795
-1.50	467.9	468.2	0.3	0.4	0.0320513	0.0442308
-1.25	408.3	408.8	0.5	0.9	0.0534188	0.0976496
-1.00	473.2	473.3	0.1	1.0	0.0106838	0.108333
-0.75	452.0	452.0	0.0	1.0	0.0	0.108333
-0.50	364.6	364.8	0.2	1.2	0.0213675	0.129701
-0.25	452.0	452.3	0.3	1.5	0.0320513	0.161752
+0.00	342.1	342.4	0.3	1.8	0.0320513	0.193804
+0.25	428.9	429.4	0.5	2.3	0.0534188	0.247222
+0.50	412.2	413.1	0.9	3.2	0.0961538	0.343376
+0.75	413.9	415.6	1.7	4.9	0.181624	0.525
+1.00	397.6	407.3	9.7	14.6	1.03632	1.56132
+1.25	307.3	335.4	28.1	42.7	3.00214	4.56346
+1.50	339.2	434.2	95.0	137.7	10.1496	14.7131
+1.75	379.3	449.2	69.9	207.6	7.46795	22.181
+2.00	324.5	500.1	175.6	383.2	18.7607	40.9417
+2.25	360.0	486.2	126.2	509.4	13.4829	54.4246
+2.50	309.1	441.6	132.5	641.9	14.156	68.5806
+2.75	353.0	464.6	111.6	753.5	11.9231	80.5037
+3.00	316.7	352.0	35.3	788.8	3.77137	84.2751
+3.25	255.2	328.4	73.2	862.0	7.82051	92.0956
+3.50	329.7	346.8	17.1	879.1	1.82692	93.9225
+3.75	338.6	359.2	20.6	899.7	2.20085	96.1234
+4.00	288.1	305.4	17.3	917.0	1.84829	97.9717
>4.00	296.4	315.4	19.0	936.0	2.02991	100.00
			936		0	100.00

Initial Weight = 936.5g Percent Loss = 0.053

Summary Statistics: M_z = 2.20ϕ σ_i = 0.67ϕ

Sk_i = 0.07 K_G = 1.07

Sample 22 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.1	1205.5	637.4	637.4	10.2183	10.2183
-4.50	498.8	1270.4	771.6	1409.0	12.3697	22.588
-4.25	607.2	821.6	214.4	1623.4	3.43711	26.0252
-4.00	568.2	947.6	379.4	2002.8	6.08227	32.1074
-3.75	576.5	736.8	160.3	2163.1	2.56982	34.6772
-3.50	514.3	817.2	302.9	2466.0	4.85588	39.5331
-3.25	501.7	733.6	231.9	2697.9	3.71766	43.2508
-3.00	524.7	734.3	209.6	2907.5	3.36016	46.6109
-2.75	465.1	713.1	248.0	3155.5	3.97576	50.5867
-2.50	474.5	697.3	222.8	3378.3	3.57177	54.1585
-2.25	454.7	651.4	196.7	3575.0	3.15336	57.3118
-2.00	453.9	665.8	211.9	3786.9	3.39703	60.7089
-1.75	444.0	600.8	156.8	3943.7	2.51371	63.2226
-1.50	468.7	613.5	144.8	4088.5	2.32133	65.5439
-1.25	409.0	504.7	95.7	4184.2	1.53419	67.0781
-1.00	473.8	556.0	82.2	4266.4	1.31777	68.3959
-0.75	452.9	509.6	56.7	4323.1	0.908974	69.3048
-0.50	365.4	413.3	47.9	4371.0	0.767899	70.0727
-0.25	453.0	505.2	52.2	4423.2	0.836833	70.9096
+0.00	342.9	383.0	40.1	4463.3	0.642855	71.5524
+0.25	430.2	472.4	42.2	4505.5	0.676521	72.229
+0.50	413.6	461.2	47.6	4553.1	0.76309	72.992
+0.75	415.2	443.2	28.0	4581.1	0.448876	73.1409
+1.00	398.8	428.3	29.5	4610.6	0.472923	73.9138
+1.25	308.1	325.2	17.1	4627.7	0.274135	74.188
+1.50	339.8	363.8	24.0	4651.7	0.384751	74.5727
+1.75	380.0	399.6	19.6	4671.3	0.314213	74.8869
+2.00	324.9	372.7	47.8	4719.1	0.766296	75.6532
+2.25	360.6	405.4	44.8	4763.9	0.718202	76.3714
+2.50	309.5	373.0	63.5	4827.4	1.01799	77.3894
+2.75	353.9	452.6	98.7	4926.1	1.58229	78.9717
+3.00	317.4	423.8	106.4	5032.5	1.70573	80.6774
+3.25	255.6	496.0	240.4	5272.9	3.85392	84.5314
+3.50	330.1	437.7	107.6	5380.5	1.72497	86.2563
+3.75	339.1	537.3	198.2	5578.7	3.1774	89.4337
+4.00	288.6	473.3	184.7	5763.4	2.96098	92.3947
>4.00	297.8	772.2	474.4	6237.8	7.60525	100
			6237.8		0	100

Initial Weight = 6245.3g Percent Loss = 0.12

Summary Statistics: M_i = -0.80ϕ σ_i = 3.90ϕ

Sample 23 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1189.4	684	684	14.5702	14.5702
-5.50	557.6	775.1	217.5	901.5	4.63308	19.2033
-5.00	568.3	698.8	130.5	1032	2.77985	21.9832
-4.50	498.8	600.8	102	1134	2.17276	24.1559
-4.25	607.3	659.5	52.2	1186.2	1.11194	25.2679
-4.00	568.4	651.9	83.5	1269.7	1.77868	27.0465
-3.75	576.6	646.4	69.8	1339.5	1.48685	28.5334
-3.50	514.4	589.4	75	1414.5	1.59761	30.131
-3.25	501.8	572.2	70.4	1484.9	1.49963	31.6306
-3.00	524.7	588.6	63.9	1548.8	1.36117	32.9918
-2.75	465.0	551.0	86	1634.8	1.83193	34.8237
-2.50	474.0	560.2	86.2	1721	1.83619	36.6599
-2.25	454.8	548.1	93.3	1814.3	1.98743	38.6473
-2.00	454.0	569.8	115.8	1930.1	2.46672	41.1141
-1.75	444.2	534.3	90.1	2020.2	1.91927	43.0333
-1.50	468.7	574.7	106	2126.2	2.25796	45.2913
-1.25	409.0	489.6	80.6	2206.8	1.7169	47.0082
-1.00	474.0	534.6	60.6	2267.4	1.29087	48.2991
-0.75	453.0	512.8	59.8	2327.2	1.27383	49.5729
-0.50	365.5	423.3	57.8	2385	1.23123	50.8041
-0.25	453.2	521.8	68.6	2453.6	1.46128	52.2654
+0.00	343.2	392.0	48.8	2502.4	1.03951	53.3049
+0.25	430.3	477.4	47.1	2549.5	1.0033	54.3082
+0.50	413.8	466.2	52.4	2601.9	1.1162	55.4244
+0.75	415.3	442.5	27.2	2629.1	0.579401	56.0038
+1.00	399.1	452.9	53.8	2682.9	1.14602	57.1498
+1.25	308.5	357.2	48.7	2731.6	1.03738	58.1872
+1.50	340.1	403.0	62.9	2794.5	1.33987	59.5271
+1.75	380.2	422.2	42	2836.5	0.894664	60.4217
+2.00	325.0	393.7	68.7	2905.2	1.46341	61.8852
+2.25	360.6	398.0	37.4	2942.6	0.796677	62.6818
+2.50	309.6	380.8	71.2	3013.8	1.51667	64.1985
+2.75	354.0	454.6	100.6	3114.4	2.14293	66.3414
+3.00	317.5	401.8	84.3	3198.7	1.79572	68.1372
+3.25	343.9	513.5	169.6	3368.3	3.61274	71.7499
+3.50	298.4	425.9	127.5	3495.8	2.71594	74.4658
+3.75	339.2	481.5	142.3	3638.1	3.03121	77.497
+4.00	288.8	522.4	233.6	3871.7	4.97604	82.4731
>4.00	337.1	1159.9	822.8	4694.5	17.5269	100
			4694.5		0	100

Initial Weight = 4726.4g

Percent Loss = 0.67

Summary Statistics: M_i = -0.90ϕ

σ_i = 4.90ϕ

Sample 24 Mount View Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.3	548.3	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.4	498.4	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.6	567.6	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.1	514.1	0.00	0.00	0.00	0.00
-3.25	501.2	501.2	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.7	465.6	0.9	0.9	0.168099	0.170154
-2.50	474.2	474.4	0.2	1.1	0.0373552	0.207509
-2.25	454.5	454.5	0.0	1.1	0.0	0.207509
-2.00	453.7	453.7	0.0	1.1	0.0	0.207509
-1.75	443.6	444.1	0.5	1.6	0.0933881	0.300897
-1.50	468.2	468.7	0.5	2.1	0.0933881	0.394285
-1.25	408.8	409.0	0.2	2.3	0.0373552	0.43164
-1.00	473.5	474.0	0.5	2.8	0.0933881	0.525028
-0.75	452.7	453.2	0.5	3.3	0.0933881	0.618416
-0.50	365.0	366.2	1.2	4.5	0.224131	0.842547
-0.25	452.4	455.5	3.1	7.6	0.579006	1.42155
+0.00	342.1	346.3	4.2	11.8	0.78446	2.20601
+0.25	429.3	435.4	6.1	17.9	1.13934	3.34535
+0.50	412.7	422.2	9.5	27.4	1.77437	5.11972
+0.75	414.2	423.3	9.1	36.5	1.69966	6.81938
+1.00	397.9	414.7	16.8	53.3	3.13784	9.95722
+1.25	307.4	328.3	20.9	74.2	3.90362	13.8608
+1.50	339.2	372.0	32.8	107.0	6.12626	19.9871
+1.75	379.5	401.4	21.9	128.9	4.0904	24.0775
+2.00	324.5	365.5	41.0	169.9	7.65783	31.7353
+2.25	360.1	391.3	31.2	201.1	5.82742	37.5628
+2.50	309.1	348.1	39.0	240.1	7.28427	44.847
+2.75	353.1	391.8	38.7	278.8	7.22824	52.0753
+3.00	316.7	336.7	20.0	298.8	3.73552	55.8108
+3.25	255.2	295.9	40.7	339.5	7.60179	63.4126
+3.50	329.6	344.2	14.6	354.1	2.72693	66.1395
+3.75	338.7	368.2	29.5	383.6	5.5099	71.6494
+4.00	288.2	317.2	29.0	412.6	5.41651	77.0659
>4.00	295.9	418.7	122.8	535.4	22.9361	100.00
			535.4		0	100.00

Initial Weight = 537.5g Percent Loss = 0.39

Summary Statistics: Were not performed as over 20% of the sample is finer than +4.00ϕ

Sample 25 Mount View Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.5	548.5	0.00	0.00	0.00	0.00
-6.00	505.2	505.2	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	568.1	568.1	0.00	0.00	0.00	0.00
-4.50	498.7	498.7	0.00	0.00	0.00	0.00
-4.25	607.2	627.7	20.5	20.5	1.42105	1.4214
-4.00	568.5	602.5	34.0	54.5	2.35686	3.77826
-3.75	576.5	588.6	12.1	66.6	0.838763	4.61702
-3.50	514.3	544.5	30.2	96.8	2.09344	6.71046
-3.25	501.7	547.1	45.4	142.2	3.1471	9.85756
-3.00	524.6	570.6	46.0	188.2	3.18869	13.0462
-2.75	464.9	501.2	36.3	224.5	2.51629	15.5625
-2.50	474.3	510.5	36.2	260.7	2.50936	18.0719
-2.25	454.7	501.3	46.6	307.3	3.23028	21.3022
-2.00	454.0	504.0	50.0	357.3	3.46596	24.7681
-1.75	444.2	490.7	46.5	403.8	3.22335	27.9915
-1.50	468.6	528.2	59.6	463.4	4.13143	32.1229
-1.25	409.0	466.8	57.8	521.2	4.00665	36.1296
-1.00	473.9	544.3	70.4	591.6	4.88008	41.0096
-0.75	453.0	516.0	63.0	654.6	4.36711	45.3768
-0.50	365.4	441.0	75.6	730.2	5.24054	50.6173
-0.25	453.2	552.0	98.8	829.0	6.84875	57.466
+0.00	343.0	411.9	68.9	897.9	4.7761	62.2421
+0.25	430.6	497.0	66.4	964.3	4.6028	66.8449
+0.50	413.7	477.1	63.4	1027.7	4.39484	71.2398
+0.75	415.2	449.3	34.1	1061.8	2.36379	73.6036
+1.00	398.8	442.4	43.6	1105.4	3.02232	76.6259
+1.25	308.2	336.2	28.0	1133.4	1.94094	78.5668
+1.50	339.9	375.1	35.2	1168.6	2.44004	81.0069
+1.75	380.1	407.9	27.8	1196.4	1.92708	82.934
+2.00	325.0	375.1	50.1	1246.5	3.4729	86.4069
+2.25	360.7	394.5	33.8	1280.3	2.34299	88.7498
+2.50	309.3	351.6	42.3	1322.6	2.93221	91.6821
+2.75	353.8	384.2	30.4	1353.0	2.10731	93.7894
+3.00	317.3	337.4	20.1	1373.1	1.39332	95.1827
+3.25	343.8	365.4	21.6	1394.7	1.4973	96.68
+3.50	298.2	307.9	9.7	1404.4	0.672397	97.3524
+3.75	339.1	350.4	11.3	1415.7	0.783308	98.1357
+4.00	288.6	296.9	8.3	1424.0	0.57535	98.711
>4.00	338.5	357.1	18.6	1442.6	1.28934	100
			1442.6		0	100

Initial Weight = 1444.3g Percent Loss = 0.069

Summary Statistics: M_z = -0.56ϕ σ_i = 2.06ϕ

Sk_i = 0.03 K_G = 0.95

Sample 26 Mount View Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	991.3	485.9	485.9	5.3706	5.37061
-5.50	557.5	2396.7	1839.2	2325.1	20.3285	25.6991
-5.00	568.1	2262.6	1694.5	4019.6	18.7291	44.4282
-4.50	498.8	1656.6	1157.8	5177.4	12.797	57.2252
-4.25	607.2	832.6	225.4	5402.8	2.49132	59.7165
-4.00	568.2	982.1	413.9	5816.7	4.57479	64.2913
-3.75	576.5	815.9	239.4	6056.1	2.64606	66.9374
-3.50	514.3	730.0	215.7	6271.8	2.38411	69.3215
-3.25	501.8	649.7	147.9	6419.7	1.63472	70.9562
-3.00	524.7	657.3	132.6	6552.3	1.46561	72.4218
-2.75	465.1	573.3	108.2	6660.5	1.19592	73.6177
-2.50	474.5	560.8	86.3	6746.8	0.953865	74.5716
-2.25	454.6	518.4	63.8	6810.6	0.705175	75.2768
-2.00	453.8	503.4	49.6	6860.2	0.548224	75.825
-1.75	443.9	477.1	33.2	6893.4	0.366956	76.192
-1.50	468.7	497.8	29.1	6922.5	0.321639	76.5136
-1.25	409.0	429.3	20.3	6942.8	0.224374	76.738
-1.00	473.9	497.4	23.5	6966.3	0.259743	76.9977
-0.75	452.8	477.3	24.5	6990.8	0.270796	77.2685
-0.50	365.3	392.9	27.6	7018.4	0.30506	77.5736
-0.25	452.9	499.2	46.3	7064.7	0.511749	78.0853
+0.00	342.9	388.9	46	7110.7	0.508433	78.5938
+0.25	430.1	498.9	68.8	7179.5	0.760439	79.3542
+0.50	413.5	524.9	111.4	7290.9	1.23129	80.5855
+0.75	415.1	512.9	97.8	7388.7	1.08097	81.6665
+1.00	398.7	624.6	225.9	7614.6	2.49685	84.1633
+1.25	308.0	471.1	163.1	7777.7	1.80273	85.966
+1.50	339.7	639.6	299.9	8077.6	3.31476	89.2808
+1.75	379.9	562.0	182.1	8259.7	2.01273	91.2935
+2.00	324.8	538.4	213.6	8473.3	2.3609	93.6544
+2.25	360.6	463.6	103	8576.3	1.13845	94.7929
+2.50	309.4	411.6	102.2	8678.5	1.12961	95.9225
+2.75	353.7	426.3	72.6	8751.1	0.80244	96.7249
+3.00	317.3	365.1	47.8	8798.9	0.528329	97.2533
+3.25	255.5	323.3	67.8	8866.7	0.749387	98.0026
+3.50	330.1	351.3	21.2	8887.9	0.234321	98.237
+3.75	339.1	372.6	33.5	8921.4	0.370272	98.6072
+4.00	288.6	319.0	30.4	8951.8	0.336008	98.9432
>4.00	297.6	393.2	95.6	9047.4	1.05666	100.00
			9047.4		0	100.00

Initial Weight = 9052.3g Percent Loss = 0.054

Summary Statistics: M_z = -3.26ϕ σ_i = 2.88ϕ

Sk_i = 0.70 K_G = 1.14

Sample 27 Mount View Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	1750.1	1192.6	1192.6	17.9912	17.9912
-5.00	568.1	1375.1	807.0	1999.6	12.1741	30.1653
-4.50	498.8	799.6	300.8	2300.4	4.53777	34.7031
-4.25	607.2	685.0	77.8	2378.2	1.17367	35.8768
-4.00	568.2	654.5	86.3	2464.5	1.30189	37.1787
-3.75	576.5	624.9	48.4	2512.9	0.730147	37.9088
-3.50	514.3	564.4	50.1	2563.0	0.755793	38.6646
-3.25	501.7	536.9	35.2	2598.2	0.531016	39.1956
-3.00	524.6	553.3	28.7	2626.9	0.432959	39.6286
-2.75	465.0	485.5	20.5	2647.4	0.309257	39.9378
-2.50	474.5	500.8	26.3	2673.7	0.396754	40.3346
-2.25	454.6	479.6	25.0	2698.7	0.377142	40.7117
-2.00	453.8	470.5	16.7	2715.4	0.251931	40.9637
-1.75	444.0	459.4	15.4	2730.8	0.23232	41.196
-1.50	468.7	492.7	24.0	2754.8	0.362056	41.558
-1.25	409.0	430.8	21.8	2776.6	0.328868	41.8869
-1.00	473.9	500.1	26.2	2802.8	0.395245	42.2821
-0.75	452.9	501.7	48.8	2851.6	0.736182	43.0183
-0.50	365.4	396.9	31.5	2883.1	0.475199	43.4935
-0.25	452.9	501.7	48.8	2931.9	0.736182	44.2297
+0.00	342.9	372.1	29.2	2961.1	0.440502	44.6702
+0.25	430.0	475.8	45.8	3006.9	0.690924	45.3611
+0.50	413.6	482.7	69.1	3076.0	1.04242	46.4036
+0.75	415.2	477.5	62.3	3138.3	0.939838	47.3434
+1.00	398.8	503.0	104.2	3242.5	1.57193	48.9153
+1.25	308.2	431.3	123.1	3365.6	1.85705	50.7724
+1.50	339.8	546.6	206.8	3572.4	3.11972	53.8921
+1.75	380.0	547.4	167.4	3739.8	2.52534	56.4174
+2.00	324.9	620.5	295.6	4035.4	4.45933	60.8768
+2.25	360.6	557.7	197.1	4232.5	2.97339	63.8502
+2.50	309.5	558.8	249.3	4481.8	3.76086	67.611
+2.75	353.8	553.8	200.0	4681.8	3.01714	70.6282
+3.00	317.3	489.1	171.8	4853.6	2.59172	73.2199
+3.25	255.6	635.7	380.1	5233.7	5.73407	78.9539
+3.50	330.1	454.6	124.5	5358.2	1.87817	80.8321
+3.75	339.1	721.2	382.1	5740.3	5.76424	86.5964
+4.00	288.6	612.1	323.5	6063.8	4.88022	91.4766
>4.00	297.2	862.2	565.0	6628.8	8.52341	100
			6628.8		0	100

Initial Weight = 6621.5g Percent Loss = +0.11

Summary Statistics: M_i = -1.05ϕ σ_i = 4.55ϕ

Sample 28 Mount View Esker - Site 5

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	955.3	449.9	449.9	6.6352	6.63521
-5.50	557.5	1529.5	972.0	1421.9	14.3352	20.9704
-5.00	568.1	2027.8	1459.7	2881.6	21.5279	42.4983
-4.50	498.8	1748.9	1250.1	4131.7	18.4367	60.935
-4.25	607.2	860.4	253.2	4384.9	3.73424	64.6693
-4.00	568.2	888.0	319.8	4704.7	4.71647	69.3857
-3.75	576.5	724.2	147.7	4852.4	2.17831	71.564
-3.50	514.3	670.5	156.2	5008.6	2.30366	73.8677
-3.25	501.7	607.9	106.2	5114.8	1.56626	75.434
-3.00	524.6	620.4	95.8	5210.6	1.41288	76.8468
-2.75	465.0	548.8	83.8	5294.4	1.2359	78.0827
-2.50	474.5	522.1	47.6	5342.0	0.702013	78.7847
-2.25	454.7	503.0	48.3	5390.3	0.712337	79.4971
-2.00	453.9	491.2	37.3	5427.6	0.550107	80.0472
-1.75	443.9	475.6	31.7	5459.3	0.467517	80.5147
-1.50	468.8	506.4	37.6	5496.9	0.554531	81.0692
-1.25	409.0	447.2	38.2	5535.1	0.56338	81.6326
-1.00	473.9	527.9	54.0	5589.1	0.796401	82.429
-0.75	452.9	515.9	63.0	5652.1	0.929135	83.3582
-0.50	365.4	452.2	86.8	5738.9	1.28014	84.6383
-0.25	453.0	587.1	134.1	5873.0	1.97773	86.616
+0.00	342.9	460.2	117.3	5990.3	1.72996	88.346
+0.25	430.1	544.9	114.8	6105.1	1.69309	90.0391
+0.50	413.7	557.1	143.4	6248.5	2.11489	92.154
+0.75	415.2	513.6	98.4	6346.9	1.45122	93.6052
+1.00	398.8	536.6	137.8	6484.7	2.0323	95.6375
+1.25	308.2	390.3	82.1	6566.8	1.21083	96.8483
+1.50	339.8	404.7	64.9	6631.7	0.957157	97.8055
+1.75	380.0	405.6	25.6	6657.3	0.377553	98.183
+2.00	324.9	351.4	26.5	6683.8	0.390827	98.5739
+2.25	360.6	373.6	13.0	6696.8	0.191726	98.7656
+2.50	309.5	322.4	12.9	6709.7	0.190251	98.9558
+2.75	353.8	365.3	11.5	6721.2	0.169604	99.1254
+3.00	317.3	326.3	9.0	6730.2	0.132734	99.2582
+3.25	255.6	266.9	11.3	6741.5	0.166654	99.4248
+3.50	330.1	334.8	4.7	6746.2	0.0693164	99.4941
+3.75	339.1	345.0	5.9	6752.1	0.0870142	99.5812
+4.00	288.6	294.3	5.7	6757.8	0.0840646	99.6652
>4.00	297.8	320.5	22.7	6780.5	0.334784	100
			6780.5		0	100

Initial Weight = 6784.4g

Percent Loss = 0.057

Summary Statistics: M_z = -3.80ϕ σ_i = 2.24ϕ

Sk_i = 0.62 K_G = 1.49

Sample 29 Mount View Esker - Site 5

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.8	548.8	0.00	0.00	0.00	0.00
-6.00	505.5	505.5	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	568.3	0.00	0.00	0.00	0.00
-4.50	498.9	498.9	0.00	0.00	0.00	0.00
-4.25	607.3	607.3	0.00	0.00	0.00	0.00
-4.00	568.4	568.4	0.00	0.00	0.00	0.00
-3.75	576.7	583.1	6.4	6.4	0.625794	0626478
-3.50	514.4	518.3	3.9	10.3	0.381344	1.00782
-3.25	501.8	503.7	1.9	12.2	0.185783	1.19361
-3.00	524.7	525.8	1.1	13.3	0.107558	1.30116
-2.75	465.0	465.7	0.7	14.0	0.0684463	1.36961
-2.50	474.4	475.0	0.6	14.6	0.0586682	1.42828
-2.25	454.8	454.9	0.1	14.7	0.00977804	1.43806
-2.00	454.1	455.2	1.1	15.8	0.107558	1.54561
-1.75	444.2	445.1	0.9	16.7	0.0880023	1.63362
-1.50	468.8	469.7	0.9	17.6	0.0880023	1.72162
-1.25	409.1	410.6	1.5	19.1	0.146671	1.86829
-1.00	474.0	476.2	2.2	21.3	0.215117	2.08341
-0.75	452.9	455.6	2.7	24.0	0.264007	2.34741
-0.50	365.6	369.6	4.0	28.0	0.391122	2.73854
-0.25	453.2	460.1	6.9	34.9	0.674685	3.41322
+0.00	343.2	350.0	6.8	41.7	0.664907	4.07813
+0.25	430.3	440.5	10.2	51.9	0.99736	5.07549
+0.50	413.8	429.9	16.1	68.0	1.57426	6.64975
+0.75	415.3	432.4	17.1	85.1	1.67204	8.32179
+1.00	399.2	437.5	38.3	123.4	3.74499	12.0668
+1.25	308.5	348.6	40.1	163.5	3.92099	15.9878
+1.50	340.0	411.7	71.7	235.2	7.01085	22.9986
+1.75	380.2	443.4	63.2	298.4	6.17972	29.1783
+2.00	325.0	429.1	104.1	402.5	10.1789	39.3572
+2.25	360.6	422.0	61.4	463.9	6.00372	45.361
+2.50	309.6	413.0	103.4	567.3	10.1105	55.4715
+2.75	354.0	456.9	102.9	670.2	10.0616	65.5331
+3.00	317.5	383.3	65.8	736.0	6.43395	71.967
+3.25	343.9	432.4	88.5	824.5	8.65356	80.6206
+3.50	298.5	346.4	47.9	872.4	4.68368	85.3042
+3.75	339.3	398.5	59.2	931.6	5.7886	91.0928
+4.00	288.8	321.3	32.5	964.1	3.17786	94.2707
>4.00	297.5	356.1	58.6	1022.7	5.72993	100.00
			1022.7		0	100.00

Initial Weight = 1026.6g

Percent Loss = 0.38

Summary Statistics: M_z = 2.30ϕ

σ_I = 1.10ϕ

Sk_I = -0.15

K_G = 1.04

Sample 30 Hopeville Esker - Site 6 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	2497.6	1948.9	1948.9	28.3147	28.3147
-6.00	505.3	2691.5	2186.2	4135.1	31.7623	60.077
-5.50	557.5	872.9	315.4	4450.5	4.5823	64.6593
-5.00	568.1	833.2	265.1	4715.6	3.85152	68.5108
-4.50	498.8	709.0	210.2	4925.8	3.0539	71.5647
-4.25	607.2	646.4	39.2	4965.0	0.569519	72.1342
-4.00	568.2	686.5	118.3	5083.3	1.71873	73.853
-3.75	576.5	682.3	105.8	5189.1	1.53712	75.3901
-3.50	514.3	651.6	137.3	5226.4	1.99477	77.3849
-3.25	501.8	619.4	117.6	5444.0	1.70856	79.0934
-3.00	524.7	628.8	104.1	5548.1	1.51242	80.6058
-2.75	465.1	596.4	131.3	5679.4	1.9076	82.5134
-2.50	474.5	585.7	111.2	5790.6	1.61557	84.129
-2.25	454.8	572.2	117.4	5908.0	1.70565	85.8347
-2.00	453.8	561.3	107.5	6015.5	1.56182	87.3965
-1.75	444.0	519.3	75.3	6090.8	1.094	88.4905
-1.50	468.7	545.9	77.2	6168.0	1.1216	89.6121
-1.25	409.0	467.1	58.1	6226.1	0.844109	90.4562
-1.00	473.9	532.4	58.5	6284.6	0.84992	91.3061
-0.75	452.9	497.4	44.5	6329.1	0.64652	91.9526
-0.50	365.4	406.3	40.9	6370.0	0.594218	92.5468
-0.25	453.1	502.0	48.9	6418.9	0.710446	93.2573
+0.00	342.9	377.5	34.6	6453.5	0.502688	93.76
+0.25	430.0	457.7	27.7	6481.2	0.402441	94.1624
+0.50	413.6	445.0	31.4	6512.6	0.456196	94.6186
+0.75	415.2	436.8	21.6	6534.2	0.313817	94.9324
+1.00	398.7	428.4	29.7	6563.9	0.431498	95.3639
+1.25	308.2	328.4	20.2	6584.1	0.293477	95.6574
+1.50	339.8	359.6	19.8	6603.9	0.287665	95.9451
+1.75	380.0	388.6	8.6	6612.5	0.124946	96.07
+2.00	324.9	336.2	11.3	6623.8	0.164173	96.2342
+2.25	360.6	368.3	7.7	6631.5	0.11187	96.3461
+2.50	309.5	319.0	9.5	6641.0	0.138021	96.4841
+2.75	353.8	364.7	10.9	6651.9	0.158361	96.6424
+3.00	317.3	323.1	5.8	6657.7	0.0842656	96.7267
+3.25	255.6	265.3	9.7	6667.4	0.140927	96.8676
+3.50	330.1	335.7	5.6	6673.0	0.0813599	96.949
+3.75	339.1	365.6	26.5	6699.5	0.385007	97.334
+4.00	288.6	366.3	77.7	6777.2	1.12887	98.4629
>4.00	297.7	403.5	105.8	6883.0	1.53712	100
			6883.0		0	100

Initial Weight = 6890.7g Percent Loss = 0.11

Summary Statistics: Were not performed as more than 25% of the sample is coarser than -6.50ϕ

Sample 33 Hopeville Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	4182.2	3676.8	3676.8	38.396	38.396
-5.50	557.5	1830.5	1273.0	4949.8	13.2937	51.6897
-5.00	568.1	1088.8	520.7	5470.5	5.43755	57.1273
-4.50	498.8	778.6	279.8	5750.3	2.92189	60.0492
-4.25	607.2	675.1	67.9	5818.2	0.709064	60.7582
-4.00	568.0	663.5	95.5	5913.7	0.997285	61.7555
-3.75	576.5	685.5	109.0	6022.7	1.13826	62.8938
-3.50	514.2	622.7	108.5	6131.2	1.13304	64.0268
-3.25	501.7	545.3	43.6	6174.8	0.455305	64.4821
-3.00	524.6	571.6	47.0	6221.8	0.49081	64.9729
-2.75	465.0	507.0	42.0	6263.8	0.438596	65.4115
-2.50	474.4	516.0	41.6	6305.4	0.434419	65.8459
-2.25	454.6	487.7	33.1	6338.5	0.345656	66.1916
-2.00	453.7	490.0	36.3	6374.8	0.379073	66.5707
-1.75	443.9	478.8	34.9	6409.7	0.364453	66.9351
-1.50	468.7	510.3	41.6	6451.3	0.434419	67.3695
-1.25	408.9	447.3	38.4	6489.7	0.401003	67.7705
-1.00	473.8	524.1	50.3	6540.0	0.525272	68.2958
-0.75	452.7	504.4	51.7	6591.7	0.539891	68.8357
-0.50	365.2	433.2	68.0	6659.7	0.710109	69.5458
-0.25	452.8	565.2	112.4	6772.1	1.17377	70.7196
+0.00	342.7	448.0	105.3	6877.4	1.09962	71.8192
+0.25	430.1	579.6	149.5	7026.9	1.56119	73.3804
+0.50	413.4	634.3	220.9	7247.8	2.30681	75.6872
+0.75	415.1	592.5	177.4	7425.2	1.85255	77.5397
+1.00	398.6	686.6	288.0	7713.2	3.00752	80.5473
+1.25	308.0	533.3	225.3	7938.5	2.35276	82.9
+1.50	339.7	598.9	259.2	8197.7	2.70677	85.6068
+1.75	379.9	510.1	130.2	8327.9	1.35965	86.9664
+2.00	324.8	541.4	216.6	8544.5	2.2619	89.2283
+2.25	360.5	504.8	144.3	8688.8	1.50689	90.7352
+2.50	309.4	458.1	148.7	8837.5	1.55284	92.2881
+2.75	353.8	477.8	124.0	8961.5	1.2949	93.583
+3.00	317.3	368.1	50.8	9012.3	0.530493	94.1135
+3.25	255.5	378.5	123.0	9135.3	1.28446	95.3979
+3.50	330.1	403.6	73.5	9208.8	0.767544	96.1655
+3.75	339.1	464.9	125.8	9334.6	1.3137	97.4792
+4.00	288.5	390.7	102.2	9436.8	1.06725	98.5464
>4.00	337.5	476.7	139.2	9576.0	1.45363	100
			9576.0		0	100

Initial Weight = 9590.5g

Percent Loss = 0.15

Summary Statistics: M_z = -3.53ϕ

σ_i = 3.35ϕ

Sk_i = 0.82

K_G = 0.59

Sample 34 Hopeville Esker - Site 5

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1603.7	1098.3	1098.3	22.6959	22.6959
-5.50	557.5	1670.1	1112.6	2210.9	22.9914	45.6873
-5.00	568.1	1194.9	626.8	2837.7	12.9526	58.6399
-4.50	498.8	1003.4	504.6	3342.3	10.4273	69.0672
-4.25	607.2	653.1	45.9	3388.2	0.948504	70.0157
-4.00	568.2	717.6	149.4	3537.6	3.08729	73.103
-3.75	576.5	679.6	103.1	3640.7	2.13052	75.2335
-3.50	514.3	586.8	72.5	3713.2	1.49818	76.7317
-3.25	501.7	547.3	45.6	3758.8	0.942305	77.674
-3.00	524.7	583.2	58.5	3817.3	1.20888	78.8829
-2.75	465.0	512.0	47.0	3864.3	0.971235	79.8541
-2.50	474.5	502.5	28.0	3892.3	0.578608	80.4327
-2.25	454.7	472.6	17.9	3910.2	0.369896	80.8026
-2.00	453.9	471.8	17.9	3928.1	0.369896	81.1725
-1.75	444.0	453.1	9.1	3937.2	0.188048	81.3606
-1.50	468.7	476.4	7.7	3944.9	0.159117	81.5197
-1.25	409.0	413.8	4.8	3949.7	0.0991899	81.6189
-1.00	473.9	478.1	4.2	3953.9	0.0867912	81.7057
-0.75	452.9	456.0	3.1	3957.0	0.0640602	81.7697
-0.50	365.4	368.9	3.5	3960.5	0.072326	81.8421
-0.25	453.0	457.7	4.7	3965.2	0.0971235	81.9392
+0.00	342.9	346.4	3.5	3968.7	0.072326	82.0115
+0.25	430.1	434.6	4.5	3973.2	0.0929906	82.1045
+0.50	413.6	419.8	6.2	3979.4	0.12812	82.2326
+0.75	415.2	420.7	5.5	3984.9	0.113655	82.3463
+1.00	398.8	410.2	11.4	3996.3	0.235576	82.5819
+1.25	308.2	320.0	11.8	4008.1	0.243842	82.8257
+1.50	339.8	355.2	15.4	4023.5	0.318234	83.1439
+1.75	380.0	390.6	10.6	4034.1	0.219044	83.363
+2.00	324.8	338.9	14.1	4048.2	0.29137	83.6543
+2.25	360.6	369.9	9.3	4057.5	0.192181	83.8465
+2.50	309.4	320.2	10.8	4068.3	0.223177	84.0697
+2.75	353.8	361.8	8.0	4076.3	0.165317	84.235
+3.00	317.3	324.2	6.9	4083.2	0.142586	84.3776
+3.25	255.6	267.0	11.4	4094.6	0.235576	84.6132
+3.50	330.1	335.6	5.5	4100.1	0.113655	84.7268
+3.75	339.1	352.3	13.2	4113.3	0.272772	84.9996
+4.00	288.6	360.1	71.5	4184.8	1.47752	86.4771
>4.00	336.4	990.8	654.4	4839.2	13.5229	100
			4839.2		0	100

Initial Weight = 4848.4g Percent Loss = 0.19

Summary Statistics: M_i = -2.60ϕ σ_i = 3.60ϕ

Sample 35 Hopeville Esker - Site 5

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.1	568.1	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	568.2	592.8	24.6	24.6	2.68354	2.68419
-3.75	576.5	642.3	65.8	90.4	7.17792	9.86211
-3.50	514.3	603.8	89.5	179.9	9.76328	19.6254
-3.25	501.7	594.0	92.3	272.2	10.0687	29.6941
-3.00	524.6	644.9	120.3	392.5	13.1232	42.8173
-2.75	465.0	562.1	97.1	489.6	10.5923	53.4096
-2.50	474.5	552.0	77.5	567.1	8.45424	61.8638
-2.25	454.7	508.4	53.7	620.8	5.85797	67.7218
-2.00	453.9	492.1	38.2	659.0	4.16712	71.8889
-1.75	444.0	462.5	18.5	677.5	2.01811	73.907
-1.50	468.7	482.2	13.5	691.0	1.47267	75.3797
-1.25	409.0	417.8	8.8	699.8	0.959965	76.3397
-1.00	473.9	483.8	9.9	709.7	1.07996	77.4196
-0.75	452.9	460.7	7.8	717.5	0.850878	78.2705
-0.50	365.4	372.9	7.5	725.0	0.818152	79.0887
-0.25	453.0	461.8	8.8	733.8	0.959965	80.0486
+0.00	343.0	348.6	5.6	739.4	0.610887	80.6595
+0.25	430.0	434.6	4.6	744.0	0.5018	81.1613
+0.50	413.7	419.5	5.8	749.8	0.632704	81.794
+0.75	415.3	419.8	4.5	754.3	0.490891	82.2849
+1.00	398.8	406.5	7.7	762.0	0.839969	83.1249
+1.25	308.3	313.4	5.1	767.1	0.556343	83.6812
+1.50	339.9	346.7	6.8	773.9	0.741791	84.423
+1.75	380.0	383.7	3.7	777.6	0.403622	84.8266
+2.00	324.9	329.7	4.8	782.4	0.523617	85.3502
+2.25	360.6	363.5	2.9	785.3	0.316352	85.6666
+2.50	309.5	313.2	3.7	789.0	0.403622	86.0702
+2.75	353.9	357.2	3.3	792.3	0.359987	86.4302
+3.00	317.3	319.5	2.2	794.5	0.239991	86.6702
+3.25	255.5	258.8	3.3	797.8	0.359987	87.0302
+3.50	330.1	331.8	1.7	799.5	0.185448	87.2156
+3.75	339.1	341.4	2.3	801.8	0.2509	87.4665
+4.00	288.6	291.7	3.1	804.9	0.33817	87.8047
>4.00	297.2	409.0	111.8	916.7	12.1959	100.00
			916.7		0	100.00

Initial Weight = 917.4g Percent Loss = 0.076

Summary Statistics: M_i = -1.05ϕ σ_i = 2.25ϕ

Sample 36 Hopeville Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.7	557.5	-0.2	-0.2	-0.0037	-0.0037
-5.00	568.1	1039.5	471.4	471.2	8.86724	8.86352
-4.50	498.8	726.2	227.4	698.6	4.27749	13.141
-4.25	607.2	705.0	97.8	796.4	1.83966	14.9807
-4.00	568.2	792.8	224.6	1021.0	4.22482	19.2055
-3.75	576.5	768.2	191.7	1212.7	3.60596	22.8114
-3.50	514.3	736.0	221.7	1434.4	4.17027	26.9817
-3.25	501.8	676.1	174.3	1608.7	3.27866	30.2604
-3.00	524.7	687.0	162.3	1771.0	3.05293	33.3133
-2.75	465.1	659.2	194.1	1965.1	3.6511	36.9644
-2.50	474.5	629.6	155.1	2120.2	2.9175	39.8819
-2.25	454.7	584.1	129.4	2249.6	2.43407	42.316
-2.00	453.9	588.3	134.4	2384.0	2.52812	44.8441
-1.75	443.9	553.6	109.7	2493.7	2.0635	46.9076
-1.50	468.7	592.1	123.4	2617.1	2.32121	49.2288
-1.25	409.0	515.0	106.0	2723.1	1.99391	51.2227
-1.00	473.9	596.6	122.7	2845.8	2.30804	53.5308
-0.75	452.9	566.9	114.0	2959.8	2.14439	55.6751
-0.50	365.4	510.3	144.9	3104.7	2.72563	58.4008
-0.25	453.0	672.3	219.3	3324.0	4.12513	62.5259
+0.00	342.9	562.1	219.2	3543.2	4.12325	66.6492
+0.25	430.0	671.7	241.7	3784.9	4.54648	71.1956
+0.50	413.6	771.0	357.4	4142.3	6.72285	77.9185
+0.75	415.1	677.9	262.8	4405.1	4.94338	82.8619
+1.00	398.8	771.5	372.7	4777.8	7.01065	89.8725
+1.25	308.2	526.9	218.7	4996.5	4.11384	93.9864
+1.50	339.8	495.2	155.4	5151.9	2.92314	96.9095
+1.75	380.0	430.5	50.5	5202.4	0.949927	97.8594
+2.00	324.9	368.7	43.8	5246.2	0.823897	98.6833
+2.25	360.6	376.1	15.5	5261.7	0.291562	98.9749
+2.50	309.4	321.2	11.8	5273.5	0.221963	99.1968
+2.75	353.9	360.4	6.5	5280.0	0.122268	99.3191
+3.00	317.3	317.3	0.0	5280.0	0.0	99.3191
+3.25	255.6	255.6	0.0	5280.0	0.0	99.3191
+3.50	330.1	330.1	0.0	5280.0	0.0	99.3191
+3.75	339.1	339.1	0.0	5280.0	0.0	99.3191
+4.00	288.6	288.6	0.0	5280.0	0.0	99.3191
>4.00	297.2	333.4	36.2	5316.2	0.680938	100
			5316.2		0	100

Initial Weight = 5319.8g

Percent Loss = 0.068

Summary Statistics: M_z = -1.63ϕ σ_i = 2.21ϕ

Sk_i = -0.16 K_G = 0.67

Sample 37 Hopeville Esker - Site 3

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	2875.8	2327.1	2327.1	33.9035	33.9035
-6.00	505.4	1570.3	1064.9	3392.0	15.5145	49.418
-5.50	557.6	1414.2	856.6	4248.6	12.4798	61.8978
-5.00	568.2	1133.8	565.6	4814.2	8.24021	70.138
-4.50	498.9	841.7	342.8	5157.0	4.99425	75.1323
-4.25	607.3	698.8	91.5	5248.5	1.33306	76.4653
-4.00	568.3	664.6	96.3	5344.8	1.40299	77.8683
-3.75	576.6	653.5	76.9	5421.7	1.12035	78.9887
-3.50	514.4	613.3	98.9	5520.6	1.44087	80.4295
-3.25	501.8	584.3	82.5	5603.1	1.20194	81.6315
-3.00	524.7	585.7	61.0	5664.1	0.888708	82.5202
-2.75	465.0	541.3	76.3	5740.4	1.11161	83.6318
-2.50	474.5	545.3	70.8	5811.2	1.03148	84.6633
-2.25	454.8	514.3	59.5	5870.7	0.866854	85.5301
-2.00	454.0	525.1	71.1	5941.8	1.03585	86.566
-1.75	444.0	504.7	60.7	6002.5	0.884337	87.4503
-1.50	468.8	538.6	69.8	6072.3	1.01691	88.4672
-1.25	409.1	476.1	67.0	6139.3	0.976121	89.4433
-1.00	474.0	556.0	82.0	6221.3	1.19466	90.638
-0.75	453.1	528.2	75.1	6296.4	1.09413	91.7321
-0.50	365.5	446.4	80.9	6377.3	1.17863	92.9108
-0.25	453.2	541.0	87.8	6465.1	1.27916	94.1899
+0.00	343.1	398.6	55.5	6520.6	0.808578	94.9985
+0.25	430.2	481.2	51.0	6571.6	0.743018	95.7415
+0.50	413.7	461.8	48.1	6619.7	0.700768	96.4423
+0.75	415.2	444.4	29.2	6648.9	0.425414	96.8677
+1.00	399.1	437.5	38.4	6687.3	0.559449	97.4271
+1.25	308.4	332.6	24.2	6711.5	0.352569	97.7797
+1.50	340.0	362.6	22.6	6734.1	0.329259	98.109
+1.75	380.1	391.6	11.5	6745.6	0.167543	98.2765
+2.00	324.9	337.1	12.2	6757.8	0.177742	98.4543
+2.25	360.6	367.8	7.2	6765.0	0.104897	98.5592
+2.50	309.6	317.7	8.1	6773.1	0.118009	98.6772
+2.75	354.0	366.1	12.1	6785.2	0.176285	98.8535
+3.00	317.5	320.1	2.6	6787.8	0.0378793	98.8913
+3.25	343.9	350.4	6.5	6794.3	0.0946983	98.986
+3.50	298.4	302.9	4.5	6798.8	0.0655604	99.0516
+3.75	339.2	346.6	7.4	6806.2	0.10781	99.1594
+4.00	288.8	321.5	32.7	6838.9	0.476406	99.6358
>4.00	297.4	322.4	25.0	6863.9	0.364224	100
			6863.9		0	100

Initial Weight = 6866.7g Percent Loss = 0.041

Summary Statistics: Were not performed as over 35% of the sample is coarser than -6.50ϕ

Sample 38 Hopeville Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	1894.9	1389.6	1389.6	19.9827	19.9827
-5.50	557.5	1278.4	720.9	2110.5	10.3667	30.3494
-5.00	568.1	806.4	238.3	2348.8	3.4268	33.7762
-4.50	498.8	888.6	389.8	2738.6	5.60541	39.3816
-4.25	607.2	796.7	189.5	2928.1	2.72505	42.1067
-4.00	568.2	768.6	200.4	3128.5	2.88179	44.9885
-3.75	576.5	695.5	119.0	3247.5	1.71125	46.6997
-3.50	514.3	664.6	150.3	3397.8	2.16135	48.8611
-3.25	501.7	683.5	181.8	3579.6	2.61432	51.4754
-3.00	524.7	667.3	142.6	3722.2	2.05062	53.526
-2.75	465.1	599.1	134.0	3856.2	1.92695	55.453
-2.50	474.5	582.8	108.3	3964.5	1.55738	57.0103
-2.25	454.6	562.0	107.4	4071.9	1.54443	58.5548
-2.00	453.9	550.0	96.1	4168.0	1.38194	59.9367
-1.75	443.9	522.3	78.4	4246.4	1.12741	61.0641
-1.50	468.7	560.7	92.0	4338.4	1.32298	62.3871
-1.25	409.0	489.3	80.3	4418.7	1.15473	63.5418
-1.00	473.9	570.9	97.0	4515.7	1.39488	64.9367
-0.75	452.8	546.3	93.5	4609.2	1.34455	66.2813
-0.50	365.3	481.2	115.9	4725.1	1.66667	67.9479
-0.25	452.9	624.7	171.8	4896.9	2.47052	70.4184
+0.00	342.9	491.7	148.8	5045.7	2.13978	72.5582
+0.25	430.1	603.0	172.9	5218.6	2.48634	75.0446
+0.50	413.5	656.0	242.5	5461.1	3.4872	78.5318
+0.75	415.2	600.8	185.6	5646.7	2.66897	81.2007
+1.00	398.7	666.0	267.3	5914.0	3.84383	85.0446
+1.25	308.1	481.0	172.9	6086.9	2.48634	87.5309
+1.50	339.8	548.2	208.4	6295.3	2.99684	90.5277
+1.75	379.9	476.9	97.0	6392.3	1.39488	91.9226
+2.00	324.8	480.2	155.4	6547.7	2.23469	94.1573
+2.25	360.6	439.4	78.8	6626.5	1.13316	95.2905
+2.50	309.4	379.4	70.0	6696.5	1.00661	96.2971
+2.75	353.8	401.2	47.4	6743.9	0.681622	96.9787
+3.00	317.3	341.3	24.0	6767.9	0.345125	97.3238
+3.25	255.5	289.5	34.0	6801.9	0.488927	97.8128
+3.50	330.1	342.2	12.1	6814.0	0.174001	97.9868
+3.75	339.1	359.3	20.2	6834.2	0.29048	98.2772
+4.00	288.6	312.6	24.0	6858.2	0.345125	98.6224
>4.00	297.1	392.9	95.8	6954.0	1.37762	100
			6954.0		0	100

Initial Weight = 6959.4g Percent Loss = 0.077

Summary Statistics: M_z = -2.96ϕ σ_i = 2.96ϕ

Sk_i = 0.27 K_G = 0.57

Sample 39 Hopeville Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	884.1	378.8	378.8	7.38862	7.38864
-5.50	557.5	1218.4	660.9	1039.7	12.8911	20.2797
-5.00	568.2	726.4	158.2	1197.9	3.08575	23.3655
-4.50	498.8	725.6	226.8	1424.7	4.42381	27.7893
-4.25	607.2	660.9	53.7	1478.4	1.04744	28.8367
-4.00	568.3	621.7	53.4	1531.8	1.04159	29.8783
-3.75	576.6	635.7	59.1	1590.9	1.15277	31.0311
-3.50	514.3	616.8	102.5	1693.4	1.9993	33.0304
-3.25	501.8	590.6	88.8	1782.2	1.73207	34.7625
-3.00	524.7	576.0	51.3	1833.5	1.00062	35.7631
-2.75	465.1	543.0	77.9	1911.4	1.51947	37.2826
-2.50	474.5	529.2	54.7	1966.1	1.06694	38.3495
-2.25	454.9	498.0	43.1	2009.2	0.84068	39.1902
-2.00	454.1	509.5	55.4	2064.6	1.0806	40.2708
-1.75	444.0	471.2	27.2	2091.8	0.530545	40.8013
-1.50	468.8	505.5	36.7	2128.5	0.715846	41.5172
-1.25	409.1	440.7	31.6	2160.1	0.616369	42.1335
-1.00	474.0	507.0	33.0	2193.1	0.643676	42.7772
-0.75	453.0	484.8	31.8	2224.9	0.62027	43.3975
-0.50	365.5	403.5	38.0	2262.9	0.741203	44.1387
-0.25	453.2	514.3	61.1	2324.0	1.19178	45.3305
+0.00	343.2	406.8	63.6	2387.6	1.24054	46.571
+0.25	430.2	512.6	82.4	2470.0	1.60724	48.1782
+0.50	413.8	537.2	123.4	2593.4	2.40696	50.5852
+0.75	415.3	520.3	105.0	2698.4	2.04806	52.6333
+1.00	399.1	576.9	177.8	2876.2	3.46805	56.1013
+1.25	308.4	451.5	143.1	3019.3	2.79121	58.8925
+1.50	340.0	523.0	183.0	3202.3	3.56948	62.462
+1.75	380.1	496.0	115.9	3318.2	2.26067	64.7227
+2.00	324.9	548.9	224.0	3542.2	4.3692	69.0919
+2.25	360.6	539.5	178.9	3721.1	3.48951	72.5814
+2.50	309.6	566.4	256.8	3977.9	5.00897	77.5904
+2.75	353.9	579.1	225.2	4203.1	4.3926	81.983
+3.00	317.4	437.9	120.5	4323.6	2.35039	84.3333
+3.25	255.6	497.9	242.3	4565.9	4.72614	89.0595
+3.50	298.4	359.5	61.1	4627.0	1.19178	90.2513
+3.75	339.2	454.2	115.0	4742.0	2.24311	92.4944
+4.00	288.7	373.2	84.5	4826.5	1.6482	94.1426
>4.00	338.2	638.5	300.3	5126.8	5.85745	100
			5126.8		0	100

Initial Weight = 5139.8g

Percent Loss = 0.25

Summary Statistics: M_z = -0.80ϕ σ_I = 3.71ϕ

Sk_I = -0.35 K_G = 0.59

Sample 40 Hopeville Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	2812.1	2306.8	2306.8	26.3445	26.3445
-5.50	557.5	1467.8	910.3	3217.1	10.3959	36.7404
-5.00	568.1	1301.6	733.5	3950.6	8.37683	45.1172
-4.50	498.8	1430.5	931.7	4882.3	10.6403	55.7575
-4.25	607.2	824.4	217.2	5099.5	2.4805	58.238
-4.00	568.2	906.6	338.4	5437.9	3.86465	62.1027
-3.75	576.5	924.8	348.3	5786.2	3.97771	66.0804
-3.50	514.3	765.4	251.1	6037.3	2.86765	68.9481
-3.25	501.7	662.9	161.2	6198.5	1.84096	70.789
-3.00	524.6	704.7	180.1	6378.6	2.0568	72.8458
-2.75	465.0	649.5	184.5	6563.1	2.10705	74.9529
-2.50	474.5	599.8	125.3	6688.4	1.43097	76.3838
-2.25	454.6	562.9	108.3	6796.7	1.23682	77.6207
-2.00	453.8	556.1	102.3	6899.0	1.1683	78.789
-1.75	444.0	518.1	74.1	6973.1	0.846248	79.6352
-1.50	468.7	544.2	75.5	7048.6	0.862236	80.4974
-1.25	409.0	463.5	54.5	7103.1	0.622409	81.1198
-1.00	473.8	521.5	47.7	7150.8	0.544751	81.6646
-0.75	452.8	488.8	36.0	7186.8	0.411133	82.0757
-0.50	365.3	399.3	34.0	7220.8	0.388292	82.464
-0.25	452.9	488.3	35.4	7256.2	0.40428	82.8683
+0.00	342.8	369.1	26.3	7282.5	0.300355	83.1687
+0.25	430.1	460.9	30.8	7313.3	0.351747	83.5204
+0.50	413.5	458.6	45.1	7358.4	0.515058	84.0355
+0.75	415.2	456.5	41.3	7399.7	0.47166	84.5071
+1.00	398.7	501.2	102.5	7502.2	1.17059	85.6777
+1.25	308.1	415.1	107.0	7609.2	1.22198	86.8997
+1.50	339.7	518.3	178.6	7787.8	2.03967	88.9394
+1.75	379.9	502.6	122.7	7910.5	1.40128	90.3406
+2.00	324.8	502.2	177.4	8087.9	2.02597	92.3666
+2.25	360.6	462.6	102.0	8189.9	1.16488	93.5315
+2.50	309.4	421.9	112.5	8302.4	1.28479	94.8163
+2.75	353.8	440.0	86.2	8388.6	0.984434	95.8007
+3.00	317.3	356.2	38.9	8427.5	0.444252	96.245
+3.25	255.6	328.8	73.2	8500.7	0.83597	97.0809
+3.50	330.1	355.7	25.6	8526.3	0.292361	97.3733
+3.75	339.1	399.1	60.0	8586.3	0.685221	98.0585
+4.00	288.6	326.5	37.9	8624.2	0.432831	98.4913
>4.00	297.7	429.8	132.1	8756.3	1.50863	100
			8756.3		0	100

Initial Weight = 8764.3g Percent Loss = 0.091

Summary Statistics: M_z = -3.73ϕ σ_i = 2.90ϕ

Sk_i = 0.58 K_G = 1.10

Sample 43 Hopeville Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	2422.5	1917.1	1917.1	24.3166	24.3166
-5.50	557.6	1040.1	482.5	2399.6	6.12007	30.4367
-5.00	568.1	1539.4	971.3	3370.9	12.32	42.7567
-4.50	498.8	1359.9	861.1	4232.0	10.9223	53.679
-4.25	607.2	847.3	240.1	4472.1	3.04545	56.7244
-4.00	568.3	910.4	342.1	4814.2	4.33922	61.0637
-3.75	576.5	768.5	192.0	5006.2	2.43534	63.499
-3.50	514.3	769.2	254.9	5261.1	3.23317	66.7322
-3.25	501.8	707.2	205.4	5466.5	2.60531	69.3375
-3.00	524.7	699.1	174.4	5640.9	2.2121	71.5496
-2.75	465.1	615.5	150.4	5791.3	1.90769	73.4573
-2.50	474.5	605.0	130.5	5921.8	1.65527	75.1125
-2.25	454.7	580.1	125.4	6047.2	1.59058	76.7031
-2.00	453.8	568.6	114.8	6162.0	1.45613	78.1592
-1.75	444.0	537.8	93.8	6255.8	1.18977	79.349
-1.50	468.7	570.5	101.8	6357.6	1.29124	80.6403
-1.25	409.0	491.9	82.9	6440.5	1.05151	81.6918
-1.00	473.9	562.6	88.7	6529.2	1.12508	82.8168
-0.75	452.9	530.3	77.4	6606.6	0.981748	83.7986
-0.50	365.4	450.3	84.9	6691.5	1.07688	84.8755
-0.25	452.9	556.6	103.7	6795.2	1.31534	86.1908
+0.00	342.9	438.8	95.9	6891.1	1.2164	87.4072
+0.25	430.0	553.2	123.2	7014.3	1.56268	88.9699
+0.50	413.6	577.4	163.8	7178.1	2.07765	91.0475
+0.75	415.3	530.4	115.1	7293.2	1.45994	92.5075
+1.00	398.8	564.2	165.4	7458.6	2.09795	94.6054
+1.25	308.2	400.6	92.4	7551.0	1.17201	95.7774
+1.50	339.8	438.6	98.8	7649.8	1.25319	97.0306
+1.75	380.0	421.8	41.8	7691.6	0.530194	97.5608
+2.00	324.8	365.3	40.5	7732.1	0.513705	98.0745
+2.25	360.6	379.5	18.9	7751.0	0.239729	98.3143
+2.50	309.4	326.4	17.0	7768.0	0.215629	98.5299
+2.75	353.8	362.3	8.5	7776.5	0.107815	98.6377
+3.00	317.3	323.1	5.8	7782.3	0.0735677	98.7113
+3.25	255.6	262.6	7.0	7789.3	0.0887885	98.8001
+3.50	330.1	333.2	3.1	7792.4	0.0393206	98.8394
+3.75	339.1	367.5	28.4	7820.8	0.360228	99.1996
+4.00	288.5	304.2	15.7	7836.5	0.19914	99.3987
>4.00	297.2	344.6	47.4	7883.9	0.601225	100
			7883.9		0	100

Initial Weight = 7889.4g

Percent Loss = 0.70

Summary Statistics: M_z = -4.00ϕ σ_I = 2.42ϕ

Sk_I = 0.51 K_G = 0.95

Sample 44 Hopeville Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	2328.0	1822.6	1822.6	25.1241	25.1241
-5.50	557.5	1529.3	971.8	2794.4	13.396	38.5201
-5.00	568.1	1452.2	884.1	3678.5	12.1871	50.7072
-4.50	498.7	1366.2	867.5	4546.0	11.9583	62.6655
-4.25	607.2	829.5	222.3	4768.3	3.06435	65.7299
-4.00	568.2	859.5	291.3	5059.6	4.01549	69.7454
-3.75	576.5	793.4	216.9	5276.5	2.98991	72.7353
-3.50	514.2	671.2	157.0	5433.5	2.1642	74.8995
-3.25	501.7	599.4	97.7	5531.2	1.34677	76.2462
-3.00	524.6	625.8	101.2	5632.4	1.39502	77.6413
-2.75	465.0	576.4	111.4	5743.8	1.53562	79.1769
-2.50	474.5	566.1	91.6	5835.4	1.26268	80.4396
-2.25	454.6	544.8	90.2	5925.6	1.24338	81.6829
-2.00	453.8	531.3	77.5	6003.1	1.06832	82.7513
-1.75	443.9	504.2	60.3	6063.4	0.83122	83.5825
-1.50	468.7	530.0	61.3	6124.7	0.845004	84.4275
-1.25	409.0	454.1	45.1	6169.8	0.621692	85.0492
-1.00	473.9	523.9	50.0	6219.8	0.689237	85.7384
-0.75	452.8	498.3	45.5	6265.3	0.627206	86.3656
-0.50	365.3	415.2	49.9	6315.2	0.687858	87.0535
-0.25	452.9	526.6	73.7	6388.9	1.01594	88.0694
+0.00	342.8	404.0	61.2	6450.1	0.843626	88.913
+0.25	430.2	500.1	69.9	6520.0	0.963553	89.8766
+0.50	413.5	498.1	84.6	6604.6	1.16619	91.0428
+0.75	415.2	476.5	61.3	6665.9	0.845004	91.8878
+1.00	398.7	501.0	102.3	6768.2	1.41018	93.298
+1.25	308.1	387.2	79.1	6847.3	1.09037	94.3883
+1.50	339.8	424.1	84.3	6931.6	1.16205	95.5504
+1.75	379.9	426.7	46.8	6978.4	0.645126	96.1955
+2.00	324.8	382.0	57.2	7035.6	0.788487	96.984
+2.25	360.6	392.6	32.0	7067.6	0.441112	97.4251
+2.50	309.4	341.3	31.9	7099.5	0.439733	97.8648
+2.75	353.8	379.7	25.9	7125.4	0.357025	98.2219
+3.00	317.3	328.1	10.8	7136.2	0.148875	98.3707
+3.25	255.5	274.5	19.0	7155.2	0.26191	98.6327
+3.50	330.1	337.5	7.4	7162.6	0.102007	98.7347
+3.75	339.1	350.0	10.9	7173.5	0.150254	98.8849
+4.00	288.5	304.0	15.5	7189.0	0.213663	99.0986
>4.00	297.1	362.5	65.4	7254.4	0.901522	100
			7254.4		0	100

Initial Weight = 7257.2g

Percent Loss = 0.038

Summary Statistics: M_z = -4.36ϕ

σ_1 = 2.26ϕ

Sk_1 = 0.58

K_G = 1.26

Sample 46 Egerton Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	4785.9	4280.5	4280.5	54.6693	54.6693
-5.50	557.5	1060.3	502.8	4783.3	6.42162	61.0909
-5.00	568.1	778.8	210.7	4994.0	2.691	63.7819
-4.50	498.8	1213.1	714.3	5708.3	9.12284	72.9048
-4.25	607.2	758.4	151.2	5859.5	1.93108	74.8359
-4.00	568.2	639.7	71.5	5931.0	0.913178	75.749
-3.75	576.6	607.5	30.9	5961.9	0.394646	76.1437
-3.50	514.3	530.5	16.2	5978.1	0.206902	76.3506
-3.25	501.8	534.0	32.2	6010.3	0.411249	76.7618
-3.00	524.7	548.9	24.2	6034.5	0.309076	77.0709
-2.75	465.0	502.8	37.8	6072.3	0.482771	77.5537
-2.50	474.5	507.2	32.7	6105.0	0.417635	77.9713
-2.25	454.7	495.8	41.1	6146.1	0.524918	78.4962
-2.00	453.9	503.7	49.8	6195.9	0.636032	79.1323
-1.75	444.0	500.7	56.7	6252.6	0.724156	79.8564
-1.50	468.7	543.1	74.4	6327.0	0.950216	80.8066
-1.25	409.0	484.7	75.7	6402.7	0.966819	81.7735
-1.00	473.9	569.9	96.0	6498.7	1.22608	82.9995
-0.75	452.9	555.1	102.2	6600.9	1.30527	84.3048
-0.50	365.5	487.1	121.6	6722.5	1.55304	85.8578
-0.25	453.1	596.2	143.1	6865.6	1.82763	87.6855
+0.00	342.9	451.1	108.2	6973.8	1.3819	89.0674
+0.25	430.0	536.0	106.0	7079.8	1.3538	90.4212
+0.50	413.6	507.3	93.7	7173.5	1.19671	91.6179
+0.75	415.2	467.6	52.4	7225.9	0.669238	92.2871
+1.00	398.8	472.8	74.0	7299.9	0.945107	93.2322
+1.25	308.2	365.8	57.6	7357.5	0.735651	93.9679
+1.50	339.8	398.7	58.9	7416.4	0.752254	94.7201
+1.75	380.0	408.0	28.0	7444.4	0.357608	95.0777
+2.00	324.8	351.4	26.6	7471.0	0.339728	95.4175
+2.25	360.6	374.8	14.2	7485.2	0.181358	95.5988
+2.50	309.5	323.3	13.8	7499.0	0.17625	95.7751
+2.75	353.8	365.4	11.6	7510.6	0.148152	95.9232
+3.00	317.3	323.8	6.5	7517.1	0.0830162	96.0062
+3.25	255.6	264.9	9.3	7526.4	0.118777	96.125
+3.50	330.1	334.8	4.7	7531.1	0.0600271	96.185
+3.75	339.1	354.9	15.8	7546.9	0.201793	96.3868
+4.00	288.6	350.4	61.8	7608.7	0.789292	97.1761
>4.00	337.9	559.0	221.1	7829.8	2.82383	100
			7829.8		0	100

Initial Weight = 7836.8g

Percent Loss = 0.089

Summary Statistics: M_z = -4.50ϕ σ_I = 2.56ϕ

Sk_I = 0.91 K_G = 4.00

Sample 47 Egerton Esker - Site 4

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	2905.2	2399.9	2399.9	28.1536	28.1536
-5.50	557.5	1417.8	860.3	3260.2	10.0923	38.2459
-5.00	568.1	1024.2	456.1	3716.3	5.35059	43.5965
-4.50	498.7	1513.5	1014.8	4731.1	11.9048	55.5013
-4.25	607.2	956.0	348.8	5079.9	4.09183	59.5931
-4.00	568.2	992.4	424.2	5504.1	4.97636	64.5695
-3.75	576.5	869.0	292.5	5796.6	3.43137	68.0009
-3.50	514.2	784.6	270.4	6067.0	3.17211	71.173
-3.25	501.7	718.9	217.2	6284.2	2.54801	73.721
-3.00	524.6	722.9	198.3	6482.5	2.32629	76.0473
-2.75	465.0	651.0	186.0	6668.5	2.182	78.2293
-2.50	474.4	627.5	153.1	6821.6	1.79604	80.0253
-2.25	454.6	592.4	137.8	6959.4	1.61656	81.6419
-2.00	453.7	578.9	125.2	7084.6	1.46874	83.1106
-1.75	443.9	548.5	104.6	7189.2	1.22708	84.3377
-1.50	468.6	578.5	109.9	7299.1	1.28926	85.627
-1.25	408.9	497.1	88.2	7387.3	1.03469	86.6616
-1.00	473.8	575.1	101.3	7488.6	1.18837	87.85
-0.75	452.7	540.3	87.6	7576.2	1.02765	88.8777
-0.50	365.3	453.7	88.4	7664.6	1.03704	89.9147
-0.25	452.9	557.4	104.5	7769.1	1.22591	91.1406
+0.00	342.8	417.9	75.1	7844.2	0.881011	92.0216
+0.25	430.1	512.4	82.3	7926.5	0.965475	92.9871
+0.50	413.5	493.0	79.5	8006.0	0.932628	93.9197
+0.75	415.2	461.9	46.7	8052.7	0.547846	94.4676
+1.00	398.7	456.4	57.7	8110.4	0.676888	95.1445
+1.25	308.1	342.6	34.5	8144.9	0.404725	95.5492
+1.50	339.8	370.9	31.1	8176.0	0.364839	95.914
+1.75	380.0	395.5	15.5	8191.5	0.181833	96.0959
+2.00	324.8	343.3	18.5	8210.0	0.217027	96.3129
+2.25	360.6	372.8	12.2	8222.2	0.14312	96.456
+2.50	309.4	338.2	28.8	8251.0	0.337858	96.7939
+2.75	353.8	374.9	21.1	8272.1	0.247528	97.0414
+3.00	317.3	317.9	0.6	8272.7	0.0070387	97.0484
+3.25	255.5	267.3	11.8	8284.5	0.138428	97.1869
+3.50	330.1	345.3	15.2	8299.7	0.178314	97.3652
+3.75	339.1	365.8	26.7	8326.4	0.313222	97.6784
+4.00	288.6	353.8	65.2	8391.6	0.764872	98.4433
>4.00	297.6	430.3	132.7	8524.3	1.55673	100
			8524.3		0	100

Initial Weight = 8529.1g Percent Loss = 0.056

Summary Statistics: M_z = -4.36ϕ σ_i = 2.16ϕ

Sk_i = 0.43 K_G = 1.02

Sample 50 Egerton Esker - Site 3

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1232.8	727.4	727.4	9.09364	9.09365
-5.50	557.5	1238.6	681.1	1408.5	8.51481	17.6085
-5.00	568.1	1330.7	762.6	2171.1	9.53369	27.1422
-4.50	498.8	1239.8	741.0	2912.1	9.26366	36.4058
-4.25	607.2	862.9	255.7	3167.8	3.19665	39.6025
-4.00	568.2	866.5	298.3	3466.1	3.72922	43.3317
-3.75	576.5	735.4	158.9	3625.0	1.9865	45.3182
-3.50	514.3	735.5	221.2	3846.2	2.76535	48.0835
-3.25	501.7	589.3	87.6	3933.8	1.09514	49.1787
-3.00	524.6	613.0	88.4	4022.2	1.10514	50.2838
-2.75	465.0	546.1	81.1	4103.3	1.01388	51.2977
-2.50	474.5	533.0	58.5	4161.8	0.731341	52.029
-2.25	454.7	508.4	53.7	4215.5	0.671334	52.7004
-2.00	453.9	512.4	58.5	4274.0	0.731341	53.4317
-1.75	443.9	484.9	41.0	4315.0	0.512564	53.9443
-1.50	468.7	516.3	47.6	4362.6	0.595074	54.5393
-1.25	409.0	451.7	42.7	4405.3	0.533817	55.0732
-1.00	473.9	527.7	53.8	4459.1	0.672584	55.7457
-0.75	452.9	582.3	129.4	4588.5	1.6177	57.3634
-0.50	365.3	447.7	82.4	4670.9	1.03013	58.3936
-0.25	452.9	582.3	129.4	4800.3	1.6177	60.0113
+0.00	342.9	476.7	133.8	4934.1	1.67271	61.684
+0.25	429.9	607.5	177.6	5111.7	2.22028	63.9043
+0.50	413.5	655.4	241.9	5353.6	3.02413	66.9284
+0.75	415.2	577.2	162.0	5515.6	2.02525	68.9536
+1.00	398.7	636.5	237.8	5753.4	2.97287	71.9265
+1.25	308.1	454.2	146.1	5899.5	1.82648	73.753
+1.50	339.8	531.0	191.2	6090.7	2.3903	76.1433
+1.75	380.0	544.7	164.7	6255.4	2.05901	78.2023
+2.00	324.8	632.5	307.7	6563.1	3.84673	82.049
+2.25	360.6	613.7	253.1	6816.2	3.16415	85.2132
+2.50	309.4	642.6	333.2	7149.4	4.16552	89.3787
+2.75	353.8	616.1	262.3	7411.7	3.27916	92.6579
+3.00	317.3	441.1	123.8	7535.5	1.54769	94.2056
+3.25	255.5	447.9	192.4	7727.9	2.4053	96.6109
+3.50	330.1	377.7	47.6	7775.5	0.595074	97.2059
+3.75	339.1	405.5	66.4	7841.9	0.830104	98.036
+4.00	288.6	335.4	46.8	7888.7	0.585073	98.6211
>4.00	297.1	407.4	110.3	7999.0	1.37892	100
			7999.0		0	100

Initial Weight = 7941.7g

Percent Loss = +0.72

Summary Statistics: $M_z = 2.36\phi$

$\sigma_i = 3.31\phi$

$Sk_i = 0.42$

$K_G = 0.59$

Sample 51 Egerton Esker - Site 1 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	3936.8	3431.5	3431.5	42.1529	42.1529
-5.50	557.5	2095.9	1538.4	4969.9	18.8979	61.0508
-5.00	568.1	1318.2	750.1	5720.0	9.21431	70.2651
-4.50	498.8	886.5	387.7	6107.7	4.76255	75.0277
-4.25	607.2	652.2	45.0	6152.7	0.552785	75.5805
-4.00	568.2	704.8	136.6	6289.3	1.67801	77.2585
-3.75	576.5	697.4	120.9	6410.2	1.48515	78.7436
-3.50	514.2	646.3	132.1	6542.3	1.62273	80.3663
-3.25	501.7	610.8	109.1	6651.4	1.3402	81.7065
-3.00	524.6	634.6	110.0	6761.4	1.35125	83.0578
-2.75	465.0	575.2	110.2	6871.6	1.35371	84.4115
-2.50	474.4	581.3	106.9	6978.5	1.31317	85.7247
-2.25	454.6	552.8	98.2	7076.7	1.2063	86.931
-2.00	453.8	540.8	87.0	7163.7	1.06872	87.9997
-1.75	443.9	515.4	71.5	7235.2	0.878314	88.878
-1.50	468.7	543.4	74.7	7309.9	0.917623	89.7956
-1.25	409.0	474.6	65.6	7375.5	0.805837	90.6015
-1.00	473.9	545.6	71.7	7447.2	0.88077	91.4822
-0.75	452.9	516.0	63.1	7510.3	0.775127	92.2574
-0.50	365.4	432.9	67.5	7577.8	0.829177	93.0865
-0.25	453.0	539.7	86.7	7664.5	1.06503	94.1516
+0.00	342.9	403.1	60.2	7724.7	0.739503	94.8911
+0.25	430.0	488.3	58.3	7783.0	0.716163	95.6072
+0.50	413.6	470.0	56.4	7839.4	0.692824	96.3001
+0.75	415.2	447.8	32.6	7872.0	0.400462	96.7005
+1.00	398.8	443.4	44.6	7916.6	0.547871	97.2484
+1.25	308.2	336.9	28.7	7945.3	0.352554	97.601
+1.50	339.8	368.3	28.5	7973.8	0.350097	97.951
+1.75	380.0	394.1	14.1	7987.9	0.173206	98.1243
+2.00	324.8	341.9	17.1	8005.0	0.210058	98.3343
+2.25	360.6	370.5	9.9	8014.9	0.121613	98.4559
+2.50	309.4	321.2	11.8	8026.7	0.144952	98.6009
+2.75	353.8	360.6	6.8	8033.5	0.0835319	98.6844
+3.00	317.3	323.8	6.5	8040.0	0.0798467	98.7643
+3.25	255.6	267.3	11.7	8051.7	0.143724	98.908
+3.50	330.1	335.8	5.7	8057.4	0.0700194	98.978
+3.75	339.1	364.4	25.3	8082.7	0.310788	99.2888
+4.00	288.6	323.8	35.2	8117.9	0.432401	99.7212
>4.00	297.9	320.6	22.7	8140.6	0.278849	100
			8140.6		0	100

Initial Weight = 8142.4g

Percent Loss = 0.022

Summary Statistics: M_z = -5.03ϕ

σ_1 = 1.78ϕ

Sk_1 = 0.74

K_G = 1.52

Sample 52 Egerton Esker - Site 1 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	2422.3	1916.9	1916.9	23.2507	23.2507
-5.50	557.5	1849.7	1292.2	3209.1	15.6735	38.9242
-5.00	568.1	1831.2	1263.1	4472.2	15.3205	54.2447
-4.50	498.8	1117.6	618.8	5091.0	7.50561	61.7503
-4.25	607.2	779.2	172.0	5263.0	2.08624	63.8366
-4.00	568.2	855.9	287.7	5550.7	3.4896	67.3262
-3.75	576.5	715.4	138.9	5689.6	1.68476	69.0109
-3.50	514.3	748.1	233.8	5923.4	2.83583	71.8468
-3.25	501.7	648.7	147.0	6070.4	1.78301	73.6298
-3.00	524.6	618.5	93.9	6164.3	1.13894	74.7687
-2.75	465.0	586.7	121.7	6286.0	1.47614	76.2448
-2.50	474.5	572.0	97.5	6383.5	1.18261	77.4275
-2.25	454.6	556.1	101.5	6485.0	1.23112	78.6586
-2.00	453.8	557.6	103.8	6588.8	1.25902	79.9176
-1.75	444.0	542.2	98.2	6687.0	1.1911	81.1087
-1.50	468.7	586.1	117.4	6804.4	1.42398	82.5327
-1.25	409.0	520.3	111.3	6915.7	1.34999	83.8827
-1.00	473.9	604.5	130.6	7046.3	1.58409	85.4668
-0.75	452.8	576.4	123.6	7169.9	1.49918	86.9659
-0.50	365.4	506.9	141.5	7311.4	1.7163	88.6822
-0.25	452.9	610.5	157.6	7469.0	1.91158	90.5938
+0.00	342.9	472.8	129.9	7598.9	1.5756	92.1694
+0.25	430.1	572.4	142.3	7741.2	1.726	93.8954
+0.50	413.5	549.8	136.3	7877.5	1.65322	95.5486
+0.75	415.2	490.7	75.5	7953.0	0.915762	96.4644
+1.00	398.8	486.8	88.0	8041.0	1.06738	97.5318
+1.25	308.1	361.0	52.9	8093.9	0.64164	98.1734
+1.50	339.8	381.3	41.5	8135.4	0.503366	98.6768
+1.75	379.9	396.8	16.9	8152.3	0.204985	98.8818
+2.00	324.8	339.9	15.1	8167.4	0.183152	99.0649
+2.25	360.6	369.2	8.6	8176.0	0.104312	99.1692
+2.50	309.4	317.0	7.6	8183.6	0.0921827	99.2614
+2.75	353.8	361.7	7.9	8191.5	0.0958215	99.3572
+3.00	317.3	320.9	3.6	8195.1	0.0436655	99.4009
+3.25	255.5	261.6	6.1	8201.2	0.0739887	99.4749
+3.50	330.1	333.4	3.3	8204.5	0.0400267	99.5149
+3.75	339.1	351.0	11.9	8216.4	0.144339	99.6593
+4.00	288.6	291.9	3.3	8219.7	0.0400267	99.6993
>4.00	297.1	321.9	24.8	8244.5	0.300807	100
			8244.5		0	100

Initial Weight = 8246.5g

Percent Loss = 0.024

Summary Statistics: M_z = -4.26ϕ σ_I = 2.21ϕ

Sk_I = 0.61 K_G = 0.98

Sample 53 Egerton Esker - Site 1 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	629.5	61.2	61.2	2.71964	2.71977
-4.50	498.9	566.7	67.8	129.0	3.01293	5.7327
-4.25	607.2	663.5	56.3	185.3	2.50189	8.23459
-4.00	568.3	659.2	90.9	276.2	4.03946	12.2741
-3.75	576.6	699.0	122.4	398.6	5.43927	17.7133
-3.50	514.4	664.6	150.2	548.8	6.67467	24.388
-3.25	501.8	620.7	118.9	667.7	5.28374	29.6717
-3.00	524.7	668.4	143.7	811.4	6.38582	36.0576
-2.75	465.1	614.8	149.7	961.1	6.65245	42.71
-2.50	474.5	589.7	115.2	1076.3	5.11932	47.8293
-2.25	454.7	555.4	100.7	1177.0	4.47496	52.3043
-2.00	454.0	543.1	89.1	1266.1	3.95947	56.2638
-1.75	444.1	510.2	66.1	1332.2	2.93739	59.2011
-1.50	468.9	533.0	64.1	1396.3	2.84851	62.0497
-1.25	409.1	457.3	48.2	1444.5	2.14194	64.1916
-1.00	474.0	520.0	46.0	1490.5	2.04417	66.2358
-0.75	453.1	493.3	40.2	1530.7	1.78643	68.0222
-0.50	365.5	407.6	42.1	1572.8	1.87086	69.8931
-0.25	453.2	505.2	52.0	1624.8	2.3108	72.2039
+0.00	343.2	383.8	40.6	1665.4	1.8042	74.0081
+0.25	430.3	475.0	44.7	1710.1	1.9864	75.9945
+0.50	413.8	478.2	64.4	1774.5	2.86184	78.8563
+0.75	415.2	465.2	50.0	1824.5	2.22193	81.0782
+1.00	399.1	485.8	86.7	1911.2	3.85282	84.931
+1.25	308.4	374.0	65.6	1976.8	2.91517	87.8462
+1.50	339.9	419.4	79.5	2056.3	3.53286	91.3791
+1.75	380.0	423.7	43.7	2100.0	1.94196	93.321
+2.00	324.9	375.1	50.2	2150.2	2.23081	95.5518
+2.25	360.6	386.7	26.1	2176.3	1.15985	96.7117
+2.50	309.6	332.2	22.6	2198.9	1.00431	97.716
+2.75	354.0	368.9	14.9	2213.8	0.662134	98.3781
+3.00	317.4	325.9	8.5	2222.3	0.377727	98.7559
+3.25	343.9	349.6	5.7	2228.0	0.2533	99.0092
+3.50	298.4	303.7	5.3	2233.3	0.235524	99.2447
+3.75	339.2	343.6	4.4	2237.7	0.195529	99.4402
+4.00	288.7	291.8	3.1	2240.8	0.137759	99.578
>4.00	298.0	307.5	9.5	2250.3	0.422166	100
			2250.3		0	100

Initial Weight = 2251.7g Percent Loss = 0.06

Summary Statistics: M_z = -1.80ϕ σ_i = 2.12ϕ

Sk_i = 0.35 K_G = 0.73

Sample 54 Egerton Esker - Site 2

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1220.5	715.1	715.1	8.23165	8.23166
-5.50	557.5	924.6	367.1	1082.2	4.22576	12.4574
-5.00	568.1	1132.7	564.6	1646.8	6.49922	18.9566
-4.50	498.8	1117.7	618.9	2265.7	7.12427	26.0809
-4.25	607.2	722.0	114.8	2380.5	1.32148	27.4024
-4.00	568.1	847.2	279.1	2659.6	3.21277	30.6152
-3.75	576.5	782.4	205.9	2865.5	2.37015	32.9853
-3.50	514.3	764.8	250.5	3116.0	2.88355	35.8689
-3.25	501.7	636.9	135.2	3251.2	1.55631	37.4252
-3.00	524.7	671.3	146.6	3397.8	1.68754	39.1127
-2.75	465.1	629.9	164.8	3562.6	1.89704	41.0098
-2.50	474.5	626.6	152.1	3714.7	1.75085	42.7606
-2.25	454.6	592.5	137.9	3852.6	1.58739	44.348
-2.00	453.8	607.2	153.4	4006.0	1.76582	46.1138
-1.75	443.9	568.5	124.6	4130.6	1.43429	47.5481
-1.50	468.7	624.4	155.7	4286.3	1.79229	49.3404
-1.25	409.0	545.5	136.5	4422.8	1.57128	50.9117
-1.00	473.9	633.5	159.6	4582.4	1.83719	52.7489
-0.75	452.8	611.1	158.3	4740.7	1.82222	54.5711
-0.50	365.3	575.3	210.0	4950.7	2.41735	56.9884
-0.25	452.9	688.1	235.2	5185.9	2.70743	59.6959
+0.00	342.8	685.1	342.3	5528.2	3.94028	63.6361
+0.25	430.0	711.3	281.3	5809.5	3.2381	66.8742
+0.50	413.4	738.3	324.9	6134.4	3.73999	70.6142
+0.75	415.1	619.8	204.7	6339.1	2.35634	72.9706
+1.00	398.6	716.9	318.3	6657.4	3.66401	76.6346
+1.25	308.0	565.1	257.1	6914.5	2.95953	79.5941
+1.50	339.7	688.3	348.6	7263.1	4.0128	83.6069
+1.75	379.9	587.1	207.2	7470.3	2.38512	85.992
+2.00	324.8	580.4	255.6	7725.9	2.94226	88.9343
+2.25	360.5	543.0	182.5	7908.4	2.10079	91.0351
+2.50	309.4	590.1	280.7	8189.1	3.23119	94.2663
+2.75	353.7	535.6	181.9	8371.0	2.09389	96.3602
+3.00	317.2	426.4	109.2	8480.2	1.25702	97.6172
+3.25	255.5	367.3	111.8	8592.0	1.28695	98.9041
+3.50	330.0	348.8	18.8	8610.8	0.21641	99.1205
+3.75	339.0	364.5	25.5	8636.3	0.293535	99.4141
+4.00	288.5	305.2	16.7	8653.0	0.192237	99.6063
>4.00	297.0	331.2	34.2	8687.2	0.393683	100
			8687.2		0	100

Initial Weight = 8594.1g Percent Loss = +1.08

Summary Statistics: M_z = -1.73ϕ σ_I = 2.99ϕ

Sk_I = -0.09 K_G = 0.66

Sample 55 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	847.2	289.7	289.7	11.181	11.1811
-5.00	568.1	626.2	58.1	347.8	2.24238	13.4235
-4.50	498.8	685.5	186.7	534.5	7.20571	20.6292
-4.25	607.2	648.9	41.7	576.2	1.60942	22.2386
-4.00	568.3	641.2	72.9	649.1	2.81359	25.0522
-3.75	576.6	651.6	75.0	724.1	2.89464	27.9468
-3.50	514.3	582.0	67.7	791.8	2.61289	30.5597
-3.25	501.8	561.1	59.3	851.1	2.28869	32.8484
-3.00	524.7	581.0	56.3	907.4	2.17291	35.0213
-2.75	465.1	511.5	46.4	953.8	1.79081	36.8121
-2.50	474.5	510.2	35.7	989.5	1.37785	38.19
-2.25	454.7	489.2	34.5	1024.0	1.33153	39.5215
-2.00	454.1	483.6	29.5	1053.5	1.13856	40.6601
-1.75	444.0	468.0	24.0	1077.5	0.926283	41.5863
-1.50	468.8	497.2	28.4	1105.9	1.0961	42.6824
-1.25	409.1	427.9	18.8	1124.7	0.725589	43.408
-1.00	473.9	491.1	17.2	1141.9	0.663836	44.0719
-0.75	452.9	466.4	13.5	1155.4	0.521034	44.5929
-0.50	365.4	377.8	12.4	1167.8	0.47858	45.0715
-0.25	453.1	465.0	11.9	1179.7	0.459282	45.5308
+0.00	343.0	349.1	6.1	1185.8	0.23543	45.7662
+0.25	430.3	436.3	6.0	1191.8	0.231571	45.9978
+0.50	413.8	420.0	6.2	1198.0	0.23929	46.2371
+0.75	415.3	420.4	5.1	1203.1	0.196835	46.4339
+1.00	398.9	408.7	9.8	1212.9	0.378232	46.8121
+1.25	308.3	321.0	12.7	1225.6	0.490158	47.3023
+1.50	339.9	365.8	25.9	1251.5	0.999614	48.3019
+1.75	380.0	403.9	23.9	1275.4	0.922424	49.2243
+2.00	324.9	365.8	40.9	1316.3	1.57854	50.8029
+2.25	360.6	395.6	35.0	1351.3	1.35083	52.1537
+2.50	309.5	360.9	51.4	1402.7	1.98379	54.1375
+2.75	353.9	418.5	64.6	1467.3	2.49325	56.6307
+3.00	317.3	366.1	48.8	1516.1	1.88344	58.5142
+3.25	255.6	352.8	97.2	1613.3	3.75145	62.2656
+3.50	298.3	342.9	44.6	1657.9	1.72134	63.987
+3.75	339.2	437.0	97.8	1755.7	3.7746	67.7616
+4.00	288.6	417.2	128.6	1884.3	4.96333	72.7249
>4.00	297.9	1004.6	706.7	2591.0	27.2752	100
			2591.0		0	100

Initial Weight = 2604.8g Percent Loss = 0.53

Summary Statistics: Were not performed as over 25% of the sample is finer than +4.00ϕ

Sample 56 Mount View Esker - Site 1

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.1	557.1	0.00	0.00	0.00	0.00
-5.00	567.8	567.8	0.00	0.00	0.00	0.00
-4.50	498.6	520.9	22.3	22.3	1.8658	1.86613
-4.25	607.1	607.1	0.0	22.3	0.0	1.86613
-4.00	567.8	577.2	9.4	31.7	0.786479	2.65261
-3.75	576.1	620.0	43.9	75.6	3.67303	6.32564
-3.50	513.9	529.3	15.4	91.0	1.28849	7.61413
-3.25	501.6	505.1	3.5	94.5	0.292838	7.90697
-3.00	524.4	540.6	16.2	110.7	1.35542	9.26239
-2.75	464.8	475.1	10.3	121.0	0.86178	10.1242
-2.50	474.2	485.1	10.9	131.9	0.911981	11.0362
-2.25	454.5	463.9	9.4	141.3	0.786479	11.8226
-2.00	453.6	471.9	18.3	159.6	1.53112	13.3538
-1.75	443.5	459.2	15.7	175.3	1.31359	14.6673
-1.50	468.3	500.3	32.0	207.3	2.67738	17.3447
-1.25	408.8	443.8	35.0	242.3	2.92838	20.2731
-1.00	473.6	520.0	46.4	288.7	3.8822	24.1553
-0.75	452.6	495.9	43.3	332.0	3.62282	27.7781
-0.50	365.0	408.6	43.6	375.6	3.64793	31.4261
-0.25	452.8	506.1	53.3	428.9	4.4595	35.8856
+0.00	342.5	378.5	36.0	464.9	3.01205	38.8976
+0.25	429.5	455.7	26.2	491.1	2.1921	41.0897
+0.50	413.1	448.9	35.8	526.9	2.99531	44.085
+0.75	414.6	438.2	23.6	550.5	1.97456	46.0596
+1.00	398.3	434.0	35.7	586.2	2.98695	49.0465
+1.25	307.7	335.7	28.0	614.2	2.3427	51.3892
+1.50	339.4	372.2	32.8	647.0	2.74431	54.1335
+1.75	379.7	401.9	22.2	669.2	1.85743	55.991
+2.00	324.6	354.8	30.2	699.4	2.52677	58.5177
+2.25	360.3	382.1	21.8	721.2	1.82396	60.3417
+2.50	309.1	334.3	25.2	746.4	2.10843	62.4501
+2.75	353.6	379.5	25.9	772.3	2.167	64.6171
+3.00	317.2	336.5	19.3	791.6	1.61479	66.2319
+3.25	255.4	287.3	31.9	823.5	2.66901	68.9009
+3.50	329.9	346.5	16.6	840.1	1.38889	70.2898
+3.75	338.9	365.1	26.2	866.3	2.1921	72.4819
+4.00	288.4	319.9	31.5	897.8	2.63554	75.1175
>4.00	297.3	594.7	297.4	1195.2	24.8829	100
			1195.2		0	100

Initial Weight = 1197.2g Percent Loss = 0.17

Summary Statistics: Were not performed as over 20% of the sample is finer than +4.00ϕ

Sample 57 Mount View Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.00	0.00	0.00	0.00
-5.50	557.5	2326.4	1768.9	1768.9	28.824	28.824
-5.00	568.1	1571.7	1003.6	2772.5	16.3535	45.1775
-4.50	498.8	1010.8	512.0	3284.5	8.34297	53.5205
-4.25	607.2	745.1	137.9	3422.4	2.24706	55.7676
-4.00	568.2	706.9	138.7	3561.1	2.2601	58.0277
-3.75	576.5	812.3	235.8	3796.9	3.84233	61.87
-3.50	514.3	816.5	302.2	4099.1	4.92431	66.7943
-3.25	501.7	797.7	296.0	4395.1	4.82328	71.6176
-3.00	524.7	726.5	201.8	4596.9	3.28831	74.9059
-2.75	465.1	681.8	216.7	4813.6	3.5311	78.437
-2.50	474.5	618.9	144.4	4958.0	2.35298	80.79
-2.25	454.6	559.7	105.1	5063.1	1.71259	82.5026
-2.00	453.8	552.7	98.9	5162.0	1.61156	84.1141
-1.75	444.0	505.8	61.8	5223.8	1.00702	85.1211
-1.50	468.7	525.7	57.0	5280.8	0.928808	86.05
-1.25	409.0	448.6	39.6	5320.4	0.645277	86.6952
-1.00	473.9	511.3	37.4	5357.8	0.609428	87.3047
-0.75	452.8	486.9	34.1	5391.9	0.555655	87.8603
-0.50	365.4	406.1	40.7	5432.6	0.663201	88.5235
-0.25	452.9	514.6	61.7	5494.3	1.00539	89.5289
+0.00	342.8	400.6	57.8	5552.1	0.941844	90.4707
+0.25	430.1	491.3	61.2	5613.3	0.997246	91.468
+0.50	413.5	491.8	78.3	5691.6	1.27589	92.7439
+0.75	415.2	466.9	51.7	5743.3	0.842445	93.5863
+1.00	398.7	472.5	73.8	5817.1	1.20256	94.7889
+1.25	308.1	356.6	48.5	5865.6	0.790301	95.5792
+1.50	339.8	379.8	40.0	5905.6	0.651795	96.231
+1.75	380.0	397.0	17.0	5922.6	0.277013	96.508
+2.00	324.8	345.0	20.2	5942.8	0.329156	96.8372
+2.25	360.6	371.9	11.3	5954.1	0.184132	97.0213
+2.50	309.4	321.0	11.6	5965.7	0.189021	97.2103
+2.75	353.8	363.7	9.9	5975.6	0.161319	97.3716
+3.00	317.3	323.5	6.2	5981.8	0.101028	97.4727
+3.25	255.5	262.9	7.4	5989.2	0.120582	97.5932
+3.50	330.1	333.2	3.1	5992.3	0.0505141	97.6437
+3.75	339.1	343.4	4.3	5996.6	0.0700679	97.7138
+4.00	288.6	295.1	6.5	6003.1	0.105917	97.8197
>4.00	297.1	430.9	133.8	6136.9	2.18025	100
			6136.9		0	100

Initial Weight = 6140.5g

Percent Loss = 0.058

Summary Statistics: M_z = -4.26ϕ

σ_1 = 1.96ϕ

Sk_1 = 0.56

K_G = 1.06

Sample 58 Mount View Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.6	527.5	28.9	28.9	5.12593	5.12664
-4.25	606.7	606.7	0.0	28.9	0.0	5.12664
-4.00	567.8	567.8	0.0	28.9	0.0	5.12664
-3.75	576.6	576.6	0.0	28.9	0.0	5.12664
-3.50	514.0	514.0	0.0	28.9	0.0	5.12664
-3.25	501.3	504.8	3.5	32.4	0.620788	5.74743
-3.00	524.3	524.3	0.0	32.4	0.0	5.74743
-2.75	464.7	465.1	0.4	32.8	0.0709471	5.81837
-2.50	474.0	474.2	0.2	33.0	0.0354736	5.85385
-2.25	454.3	455.3	1.0	34.0	0.177368	6.03122
-2.00	453.4	453.6	0.2	34.2	0.0354736	6.06669
-1.75	443.5	443.9	0.4	34.6	0.0709471	6.13764
-1.50	468.4	468.9	0.5	35.1	0.0886839	6.22632
-1.25	408.6	409.1	0.5	35.6	0.0886839	6.315
-1.00	473.4	473.9	0.5	36.1	0.0886839	6.40369
-0.75	452.4	452.8	0.4	36.5	0.0709471	6.47464
-0.50	364.8	365.3	0.5	37.0	0.0886839	6.56332
-0.25	452.4	452.8	0.4	37.4	0.0709471	6.63427
+0.00	342.2	342.5	0.3	37.7	0.0532104	6.68748
+0.25	429.4	429.6	0.2	37.9	0.0354736	6.72295
+0.50	412.6	413.1	0.5	38.4	0.0886839	6.81163
+0.75	413.9	414.4	0.5	38.9	0.0886839	6.90032
+1.00	397.9	398.6	0.7	39.6	0.124158	7.02448
+1.25	307.5	308.1	0.6	40.2	0.106421	7.1309
+1.50	339.3	340.3	1.0	41.2	0.177368	7.30827
+1.75	379.4	380.1	0.7	41.9	0.124158	7.43242
+2.00	324.6	325.6	1.0	42.9	0.177368	7.60979
+2.25	360.2	361.3	1.1	44.0	0.195105	7.8049
+2.50	309.3	312.3	3.0	47.0	0.532104	8.337
+2.75	353.3	363.7	10.4	57.4	1.84463	10.1816
+3.00	316.8	333.2	16.4	73.8	2.90883	13.0905
+3.25	255.4	318.6	63.2	137.0	11.2096	24.3001
+3.50	329.7	363.1	33.4	170.4	5.92409	30.2242
+3.75	338.9	408.4	69.5	239.9	12.3271	42.5513
+4.00	288.3	352.5	64.2	304.1	11.387	53.9383
>4.00	296.0	555.5	259.5	563.6	46.027	99.9653
			563.6		0	99.9653

Initial Weight = 1854.8g
Split Weight = 565.2g

Percent Loss = 0.28
Split Factor = 3.28

Summary Statistics: Were not performed as over 45% of the sample is finer than +4.00ϕ

Sample 59 Mount View Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1008.9	503.5	503.5	8.92066	8.92068
-5.50	557.5	1915.0	1357.5	1861.0	24.0512	32.9719
-5.00	568.1	813.5	245.4	2106.4	4.34783	37.3197
-4.50	498.8	1298.5	799.7	2906.1	14.1685	51.4882
-4.25	607.2	903.1	295.9	3202.0	5.24255	56.7308
-4.00	568.3	840.7	272.4	3474.4	4.82619	61.5569
-3.75	576.6	812.7	236.1	3710.5	4.18306	65.74
-3.50	514.3	788.2	273.9	3984.4	4.85277	70.5928
-3.25	501.7	685.7	184.0	4168.4	3.25998	73.8528
-3.00	524.6	661.9	137.3	4305.7	2.43259	76.2853
-2.75	465.0	607.6	142.6	4448.3	2.52649	78.8118
-2.50	474.5	582.1	107.6	4555.9	1.90638	80.7182
-2.25	454.7	538.3	83.6	4639.5	1.48117	82.1994
-2.00	453.9	520.4	66.5	4706.0	1.1782	83.3776
-1.75	444.1	491.0	46.9	4752.9	0.830941	84.2085
-1.50	468.8	517.0	48.2	4801.1	0.853974	85.0625
-1.25	409.0	447.6	38.6	4839.7	0.683888	85.7464
-1.00	473.9	513.8	39.9	4879.6	0.70692	86.4533
-0.75	452.9	488.4	35.5	4915.1	0.628964	87.0823
-0.50	365.4	404.1	38.7	4953.8	0.68566	87.7679
-0.25	453.1	506.0	52.9	5006.7	0.937245	88.7052
+0.00	343.0	384.7	41.7	5048.4	0.738812	89.444
+0.25	430.2	481.3	51.1	5099.5	0.905354	90.3493
+0.50	413.7	478.2	64.5	5164.0	1.14277	91.4921
+0.75	415.3	462.0	46.7	5210.7	0.827398	92.3195
+1.00	399.0	476.6	77.6	5288.3	1.37486	93.6944
+1.25	308.3	368.9	60.6	5348.9	1.07367	94.768
+1.50	339.9	405.6	65.7	5414.6	1.16403	95.9321
+1.75	380.1	411.2	31.1	5445.7	0.551008	96.4831
+2.00	324.9	369.6	44.7	5490.4	0.791963	97.275
+2.25	360.6	386.1	25.5	5515.9	0.451791	97.7268
+2.50	309.5	336.4	26.9	5542.8	0.476595	98.2034
+2.75	353.9	374.6	20.7	5563.5	0.366748	98.5702
+3.00	317.3	329.3	12.0	5575.5	0.212608	98.7828
+3.25	255.6	271.4	15.8	5591.3	0.279933	99.0627
+3.50	298.3	303.6	5.3	5596.6	0.0939017	99.1566
+3.75	339.1	346.7	7.6	5604.2	0.134652	99.2913
+4.00	288.6	296.8	8.2	5612.4	0.145282	99.4366
>4.00	297.3	329.1	31.8	5644.2	0.56341	100
			5644.2		0	100

Initial Weight = 5646.5g

Percent Loss = 0.041

Summary Statistics: M_z = -4.23ϕ σ_i = 2.01ϕ

Sk_i = 0.43 K_G = 1.23

Sample 60 Mount View Esker - Site 7

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.4	567.4	0.00	0.00	0.00	0.00
-3.75	575.7	575.7	0.00	0.00	0.00	0.00
-3.50	513.5	513.5	0.00	0.00	0.00	0.00
-3.25	501.1	501.1	0.00	0.00	0.00	0.00
-3.00	523.9	524.6	0.7	0.7	0.0849102	0.0851232
-2.75	464.3	464.7	0.4	1.1	0.0485201	0.134643
-2.50	474.0	474.0	0.0	1.1	0.0	0.134643
-2.25	454.5	454.6	0.1	1.2	0.01213	0.146773
-2.00	453.6	454.3	0.7	1.9	0.0849102	0.231684
-1.75	443.4	444.2	0.8	2.7	0.0970403	0.328724
-1.50	468.3	469.1	0.8	3.5	0.0970403	0.425764
-1.25	408.6	409.8	1.2	4.7	0.14556	0.571324
-1.00	473.4	475.0	1.6	6.3	0.194081	0.765405
-0.75	452.4	454.0	1.6	7.9	0.194081	0.959486
-0.50	364.8	367.0	2.2	10.1	0.266861	1.22635
-0.25	451.9	456.3	4.4	14.5	0.533721	1.76007
+0.00	342.0	346.7	4.7	19.2	0.570112	2.33018
+0.25	429.4	438.0	8.6	27.8	1.04318	3.37336
+0.50	412.6	431.1	18.5	46.3	2.24406	5.61742
+0.75	414.2	435.3	21.1	67.4	2.55944	8.17686
+1.00	398.0	452.8	54.8	122.2	6.64726	14.8241
+1.25	307.5	384.9	77.4	199.6	9.38865	24.2128
+1.50	339.2	482.6	143.4	343.0	17.3945	41.6073
+1.75	379.6	434.2	54.6	397.6	6.623	48.2303
+2.00	324.7	476.6	151.9	549.5	18.4255	66.6558
+2.25	360.3	447.0	86.7	636.2	10.5167	77.1725
+2.50	309.2	387.6	78.4	714.6	9.50995	86.6824
+2.75	353.2	401.9	48.7	763.3	5.90733	92.5898
+3.00	316.5	335.9	19.4	782.7	2.35323	94.943
+3.25	255.1	277.1	22.0	804.7	2.66861	97.6116
+3.50	329.9	335.1	5.2	809.9	0.630762	98.2424
+3.75	338.9	343.6	4.7	814.6	0.570112	98.8125
+4.00	288.2	292.1	3.9	818.5	0.473071	99.2855
>4.00	295.9	301.8	5.9	824.4	0.715672	100.00
			824.4		0	100.00

Initial Weight = 6647.4g
Split Weight = 825.1g

Percent Loss = 0.08
Split Factor = 8.06

Summary Statistics: M_z = 1.50ϕ

σ_i = 0.66ϕ

Sk_i = -0.24

K_G = 1.00

Sample 81 Mount View Esker - Site 2

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.3	548.3	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	567.5	667.4	99.9	99.9	3.76385	3.76396
-4.50	498.8	546.6	47.8	147.7	1.80092	5.56488
-4.25	607.2	639.3	32.1	179.8	1.2094	6.77428
-4.00	567.4	576.9	9.5	189.3	0.357923	7.13221
-3.75	575.7	585.6	9.9	199.2	0.372994	7.5052
-3.50	513.5	533.8	20.3	219.5	0.764826	8.27003
-3.25	501.1	510.7	9.6	229.1	0.361691	8.63172
-3.00	524.6	529.1	4.5	233.6	0.169543	8.80126
-2.75	464.7	475.2	10.5	244.1	0.395599	9.19686
-2.50	474.0	485.4	11.4	255.5	0.429508	9.62637
-2.25	454.6	463.3	8.7	264.2	0.327782	9.95415
-2.00	453.6	464.6	11.0	275.2	0.414437	10.3686
-1.75	443.5	449.5	6.0	281.2	0.226057	10.5946
-1.50	468.3	474.4	6.1	287.3	0.229824	10.8245
-1.25	408.6	416.2	7.6	294.9	0.286339	11.1108
-1.00	473.3	483.2	9.9	304.8	0.372994	11.4838
-0.75	452.4	467.6	15.2	320.0	0.572677	12.0565
-0.50	364.8	394.7	29.9	349.9	1.12652	13.183
-0.25	452.3	550.2	97.9	447.8	3.68849	16.8715
+0.00	342.1	499.5	157.4	605.2	5.93022	22.8017
+0.25	429.4	663.1	233.7	838.9	8.80491	31.6066
+0.50	412.5	782.4	369.9	1208.8	13.9364	45.543
+0.75	414.3	633.5	219.2	1428.0	8.25861	53.8016
+1.00	397.9	613.8	215.9	1643.9	8.13428	61.9359
+1.25	307.6	449.6	142.0	1785.9	5.35001	67.2859
+1.50	339.1	521.5	182.4	1968.3	6.87213	74.158
+1.75	379.6	452.3	72.7	2041.0	2.73906	76.8971
+2.00	324.7	485.3	160.6	2201.6	6.05079	82.9479
+2.25	360.2	464.7	104.5	2306.1	3.93716	86.8851
+2.50	309.2	410.6	101.4	2407.5	3.82036	90.7054
+2.75	353.1	437.1	84.0	2491.5	3.1648	93.8702
+3.00	316.7	347.4	30.7	2522.2	1.15666	95.0269
+3.25	255.3	310.0	54.7	2576.9	2.06088	97.0878
+3.50	329.8	347.0	17.2	2594.1	0.64803	97.7358
+3.75	338.8	356.7	17.9	2612.0	0.674403	98.4102
+4.00	288.3	304.9	16.6	2628.6	0.625424	99.0356
>4.00	296.0	321.6	25.6	2654.2	0.964509	100
			2654.2		0	100

Initial Weight = 4972.1g
Split Weight = 2657.9

Percent Loss = 0.014
Split Factor = 1.87

Summary Statistics: M_z = 0.66ϕ

σ_I = 1.58ϕ

Sk_I = 0.03

K_G = 2.05

Sample 62 Mount View Esker - Site 2

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.3	548.3	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.4	498.4	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.6	567.6	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.1	514.1	0.00	0.00	0.00	0.00
-3.25	501.4	501.4	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.7	464.7	0.00	0.00	0.00	0.00
-2.50	474.2	474.2	0.00	0.00	0.00	0.00
-2.25	454.4	454.4	0.00	0.00	0.00	0.00
-2.00	453.4	453.4	0.00	0.00	0.00	0.00
-1.75	443.7	443.8	0.1	0.1	0.0253614	0.0291656
-1.50	468.3	468.3	0.0	0.1	0.0	0.0291656
-1.25	408.6	409.2	0.6	0.7	0.152168	0.181334
-1.00	473.6	473.8	0.2	0.9	0.0507228	0.232056
-0.75	452.4	452.7	0.3	1.2	0.0760842	0.308141
-0.50	364.7	365.0	0.3	1.5	0.0760842	0.384225
-0.25	452.4	452.6	0.2	1.7	0.0507228	0.434948
+0.00	342.3	342.6	0.3	2.0	0.0760842	0.511032
+0.25	429.3	429.3	0.0	2.0	0.0	0.511032
+0.50	412.5	412.8	0.3	2.3	0.0760842	0.587116
+0.75	414.3	414.5	0.2	2.5	0.0507228	0.637839
+1.00	397.9	398.9	1.0	3.5	0.253614	0.891453
+1.25	307.6	309.4	1.8	5.3	0.456505	1.34796
+1.50	339.2	342.5	3.3	8.6	0.836926	2.18488
+1.75	379.5	382.4	2.9	11.5	0.735481	2.92036
+2.00	324.6	332.7	8.1	19.6	2.05427	4.97463
+2.25	360.2	371.6	11.4	31.0	2.8912	7.86583
+2.50	309.1	337.1	28.0	59.0	7.10119	14.967
+2.75	353.1	400.5	47.4	106.4	12.0213	26.9883
+3.00	316.7	345.6	28.9	135.3	7.32944	34.3178
+3.25	255.2	330.8	75.6	210.9	19.1732	53.491
+3.50	329.7	357.0	27.3	238.2	6.92366	60.4146
+3.75	338.8	381.5	42.7	280.9	10.8293	71.2439
+4.00	288.3	322.4	34.1	315.0	8.64824	79.8922
>4.00	296.0	375.3	79.3	394.3	20.1116	100.00
			394.3		0	100.00

Initial Weight = 3596.2g
Split Weight = 394.9g

Percent Loss = 0.15
Split Factor = 9.11

Summary Statistics: Were not performed as the value at 84% is finer than +4.00ϕ

Sample 63 Mount View Esker - Site 3 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.1	568.1	0.00	0.00	0.00	0.00
-4.50	498.9	498.9	0.00	0.00	0.00	0.00
-4.25	607.3	624.4	17.1	17.1	1.32302	1.32341
-4.00	567.7	583.2	15.5	32.6	1.19923	2.52264
-3.75	576.2	588.2	12.0	44.6	0.928433	3.45107
-3.50	514.4	518.3	3.9	48.5	0.301741	3.75281
-3.25	501.5	506.2	4.7	53.2	0.363636	4.11645
-3.00	524.3	536.0	11.7	64.9	0.905222	5.02167
-2.75	464.8	468.7	3.9	68.8	0.301741	5.32341
-2.50	474.2	485.8	11.6	80.4	0.897485	6.22089
-2.25	454.6	467.5	12.9	93.3	0.998066	7.21896
-2.00	453.9	470.6	16.7	110.0	1.29207	8.51103
-1.75	443.7	457.5	13.8	123.8	1.0677	9.57873
-1.50	468.4	488.2	19.8	143.6	1.53191	11.1106
-1.25	408.7	431.7	23.0	166.6	1.7795	12.8901
-1.00	473.5	508.5	35.0	201.6	2.70793	15.5981
-0.75	452.7	490.4	37.7	239.3	2.91683	18.5149
-0.50	365.2	414.4	49.2	288.5	3.80658	22.3215
-0.25	452.7	524.7	72.0	360.5	5.5706	27.8921
+0.00	342.6	397.9	55.3	415.8	4.27853	32.1706
+0.25	429.6	479.5	49.9	465.7	3.86074	36.0314
+0.50	413.3	472.1	58.8	524.5	4.54932	40.5807
+0.75	414.6	454.5	39.9	564.4	3.08704	43.6677
+1.00	398.2	454.2	56.0	620.4	4.33269	48.0004
+1.25	307.7	350.4	42.7	663.1	3.30368	51.3041
+1.50	339.4	389.2	49.8	712.9	3.853	55.1571
+1.75	379.7	403.4	23.7	736.6	1.83366	56.9907
+2.00	324.5	364.3	39.8	776.4	3.0793	60.07
+2.25	360.4	397.4	37.0	813.4	2.86267	62.9327
+2.50	309.1	340.7	31.6	845.0	2.44487	65.3776
+2.75	353.5	423.5	70.0	915.0	5.41586	70.7934
+3.00	317.2	317.2	0.0	915.0	0.0	70.7934
+3.25	255.4	255.4	0.0	915.0	0.0	70.7934
+3.50	330.1	330.1	0.0	915.0	0.0	70.7934
+3.75	339.1	339.1	0.0	915.0	0.0	70.7934
+4.00	288.5	288.5	0.0	915.0	0.0	70.7934
>4.00	296.7	674.2	377.5	1292.5	29.207	100
			1292.5		0	100

Initial Weight = 1293.7g Percent Loss = 0.09

Summary Statistics: Were not performed as over 25% of the sample is finer than +4.00ϕ

Sample 64 Mount View Esker - Site 3 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	606.7	606.7	0.00	0.00	0.00	0.00
-4.00	567.8	567.8	0.00	0.00	0.00	0.00
-3.75	576.6	576.6	0.00	0.00	0.00	0.00
-3.50	514.0	514.0	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.3	524.3	0.00	0.00	0.00	0.00
-2.75	464.7	464.7	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.4	454.4	0.00	0.00	0.00	0.00
-2.00	453.5	453.5	0.00	0.00	0.00	0.00
-1.75	443.5	443.5	0.00	0.00	0.00	0.00
-1.50	468.2	468.2	0.00	0.00	0.00	0.00
-1.25	409.2	409.3	0.1	0.1	0.0193686	0.0026613
-1.00	473.7	473.7	0.0	0.1	0.0	0.0026613
-0.75	452.4	452.4	0.0	0.1	0.0	0.0026613
-0.50	365.1	365.1	0.0	0.1	0.0	0.0026613
-0.25	452.4	452.6	0.2	0.3	0.0387372	0.0051985
+0.00	342.3	342.3	0.0	0.3	0.0	0.0051985
+0.25	429.6	429.7	0.1	0.4	0.0193686	0.0080671
+0.50	412.7	412.7	0.0	0.4	0.0	0.0080671
+0.75	414.3	414.4	0.1	0.5	0.0193686	0.100136
+1.00	397.8	398.0	0.2	0.7	0.0387372	0.138873
+1.25	307.2	307.9	0.7	1.4	0.13558	0.274453
+1.50	339.1	341.2	2.1	3.5	0.40674	0.681193
+1.75	379.3	383.1	3.8	7.3	0.736006	1.4172
+2.00	324.5	334.7	10.2	17.5	1.9756	3.3928
+2.25	360.1	373.3	13.2	30.7	2.55665	5.94945
+2.50	309.1	338.7	29.6	60.3	5.7331	11.6825
+2.75	353.2	403.1	49.9	110.2	9.66492	21.3475
+3.00	316.6	353.0	36.4	146.6	7.05016	28.3976
+3.25	255.2	343.7	88.5	235.1	17.1412	45.5388
+3.50	329.7	366.1	36.4	271.5	7.05016	52.589
+3.75	338.8	394.0	55.2	326.7	10.6915	63.2805
+4.00	288.1	344.8	56.7	383.4	10.982	74.2625
>4.00	296.0	428.9	132.9	516.3	25.7408	100.00
			516.3		0	100.00

Initial Weight = 4663.3g
Split Weight = 519.3g

Percent Loss = 0.58
Split Factor = 8.98

Summary Statistics: Were not performed as over 25% of the sample is finer than +4.00ϕ

Sample 65 Mount View Esker - Site 3 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	2909.5	2404.1	2404.1	31.0772	31.0772
-5.50	557.5	1893.0	1335.5	3739.6	17.2637	48.3409
-5.00	568.1	1231.7	663.6	4403.2	8.57819	56.9191
-4.50	498.8	1343.2	844.4	5247.6	10.9153	67.8344
-4.25	607.2	866.7	259.5	5507.1	3.35449	71.1889
-4.00	568.2	843.1	274.9	5782.0	3.55356	74.7425
-3.75	576.5	750.0	173.5	5955.5	2.24279	76.9852
-3.50	514.2	624.4	110.2	6065.7	1.42453	78.4098
-3.25	501.7	574.6	72.9	6138.6	0.94236	79.3521
-3.00	524.6	596.6	72.0	6210.6	0.930726	80.2829
-2.75	465.0	535.4	70.4	6281.0	0.910043	81.1929
-2.50	474.5	531.2	56.7	6337.7	0.732946	81.9258
-2.25	454.7	503.8	49.1	6386.8	0.634703	82.5606
-2.00	453.9	494.2	40.3	6427.1	0.520948	83.0815
-1.75	443.9	478.7	34.8	6461.9	0.449851	83.5313
-1.50	468.6	505.5	36.9	6498.8	0.476997	84.0083
-1.25	409.0	446.4	37.4	6536.2	0.48346	84.4918
-1.00	473.8	517.7	43.9	6580.1	0.567484	85.0593
-0.75	452.8	498.3	45.5	6625.6	0.588167	85.6475
-0.50	365.3	427.2	61.9	6687.5	0.800165	86.4476
-0.25	452.9	549.3	96.4	6783.9	1.24614	87.6938
+0.00	342.8	432.3	89.5	6873.4	1.15694	88.8507
+0.25	430.2	537.7	107.5	6980.9	1.38962	90.2403
+0.50	413.5	536.3	122.8	7103.7	1.5874	91.8277
+0.75	415.2	487.5	72.3	7176.0	0.934604	92.7623
+1.00	398.7	497.3	98.6	7274.6	1.27458	94.0369
+1.25	308.1	371.4	63.3	7337.9	0.818263	94.8552
+1.50	339.7	419.1	79.4	7417.3	1.02638	95.8815
+1.75	380.0	424.2	44.2	7461.5	0.571362	96.4529
+2.00	324.8	380.2	55.4	7516.9	0.716142	97.1691
+2.25	360.6	396.0	35.4	7552.3	0.457607	97.6267
+2.50	309.4	348.1	38.7	7591.0	0.500265	98.1269
+2.75	353.8	385.7	31.9	7622.9	0.412363	98.5393
+3.00	317.3	333.9	16.6	7639.5	0.214584	98.7539
+3.25	255.5	282.0	26.5	7666.0	0.342559	99.0964
+3.50	330.1	340.5	10.4	7676.4	0.134438	99.2309
+3.75	339.1	352.3	13.2	7689.6	0.170633	99.4015
+4.00	288.5	301.0	12.5	7702.1	0.161584	99.5631
>4.00	297.7	331.5	33.8	7735.9	0.436924	100
			7735.9		0	100

Initial Weight = 7737.1g Percent Loss = 0.015

Summary Statistics: M_z = -4.63ϕ σ_i = 2.18ϕ

Sk_i = 0.65 K_G = 1.48

Sample 66 Mount View Esker - Site 3 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1427.1	921.7	921.7	14.659	14.659
-5.50	557.5	1004.6	447.1	1368.8	7.11082	21.7698
-5.00	568.1	1235.5	667.4	2036.2	10.6145	32.3843
-4.50	498.8	1210.1	711.3	2747.5	11.3127	43.697
-4.25	607.2	872.7	265.5	3013.0	4.2226	47.9196
-4.00	568.2	899.0	330.8	3343.8	5.26115	53.1808
-3.75	576.6	825.3	248.7	3592.5	3.9554	57.1362
-3.50	514.3	752.6	238.3	3830.8	3.79	60.9262
-3.25	501.8	631.7	129.9	3960.7	2.06597	62.9922
-3.00	524.7	650.6	125.9	4086.6	2.00235	64.9945
-2.75	465.1	565.5	100.4	4187.0	1.59679	66.5913
-2.50	474.5	562.4	87.9	4274.9	1.39799	67.9893
-2.25	454.7	538.0	83.3	4358.2	1.32483	69.3141
-2.00	453.9	534.6	80.7	4438.9	1.28348	70.5976
-1.75	444.0	515.2	71.2	4510.1	1.13239	71.73
-1.50	468.8	539.3	70.5	4580.6	1.12125	72.8512
-1.25	409.0	477.5	68.5	4649.1	1.08945	73.9407
-1.00	473.9	599.1	125.2	4774.3	1.99122	75.9319
-0.75	452.9	539.9	87.0	4861.3	1.38368	77.3156
-0.50	365.5	476.7	111.2	4972.5	1.76856	79.0841
-0.25	453.0	625.0	172.0	5144.5	2.73554	81.8197
+0.00	343.0	508.4	165.4	5309.9	2.63057	84.4503
+0.25	430.1	579.4	149.3	5459.2	2.37451	86.8248
+0.50	413.6	635.9	222.3	5681.5	3.53553	90.3603
+0.75	415.2	560.3	145.1	5826.6	2.30772	92.668
+1.00	398.8	577.3	178.5	6005.1	2.83892	95.5069
+1.25	308.2	409.3	101.1	6106.2	1.60793	97.1149
+1.50	339.9	409.4	69.5	6175.7	1.10535	98.2202
+1.75	380.0	404.4	24.4	6200.1	0.388065	98.6083
+2.00	324.9	348.3	23.4	6223.5	0.372161	98.9804
+2.25	360.6	370.6	10.0	6233.5	0.159043	99.1395
+2.50	309.5	318.4	8.9	6242.4	0.141548	99.281
+2.75	353.9	360.6	6.7	6249.1	0.106559	99.3876
+3.00	317.4	322.2	4.8	6253.9	0.0763407	99.4639
+3.25	255.6	261.8	6.2	6260.1	0.0986068	99.5625
+3.50	330.2	332.9	2.7	6262.8	0.0429417	99.6055
+3.75	339.2	343.1	3.9	6266.7	0.0620268	99.6675
+4.00	288.6	292.7	4.1	6270.8	0.0652077	99.7327
>4.00	297.2	314.0	16.8	6287.6	0.267193	100.00
			6287.6		0	100.00

Initial Weight = 6250.5g Percent Loss = +0.59

Summary Statistics: M_z = -3.43ϕ σ_i = 2.56ϕ

Sk_i = 0.45 K_G = 0.73

Sample 67 Mount View Esker - Site 3 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.5	548.5	0.00	0.00	0.00	0.00
-6.00	504.8	504.8	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.2	567.2	0.00	0.00	0.00	0.00
-4.50	498.2	498.2	0.00	0.00	0.00	0.00
-4.25	607.3	607.3	0.00	0.00	0.00	0.00
-4.00	567.4	567.4	0.00	0.00	0.00	0.00
-3.75	576.0	576.0	0.00	0.00	0.00	0.00
-3.50	513.6	513.6	0.00	0.00	0.00	0.00
-3.25	501.2	501.2	0.00	0.00	0.00	0.00
-3.00	523.9	523.9	0.00	0.00	0.00	0.00
-2.75	464.6	464.6	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.2	454.2	0.00	0.00	0.00	0.00
-2.00	453.5	453.5	0.00	0.00	0.00	0.00
-1.75	443.5	443.5	0.00	0.00	0.00	0.00
-1.50	468.5	486.6	18.1	18.1	1.14695	1.14796
-1.25	409.2	443.0	33.8	51.9	2.14182	3.28978
-1.00	474.0	525.9	51.9	103.8	3.28876	6.57854
-0.75	452.7	512.8	60.1	163.9	3.80838	10.3869
-0.50	365.2	441.0	75.8	239.7	4.80324	15.1902
-0.25	452.7	557.1	104.4	344.1	6.61555	21.8057
+0.00	342.6	423.1	80.5	424.6	5.10107	26.9068
+0.25	429.5	508.9	79.4	504.0	5.03137	31.9382
+0.50	412.8	500.2	87.4	591.4	5.53831	37.4765
+0.75	414.6	473.9	59.3	650.7	3.75768	41.2341
+1.00	398.2	485.4	87.2	737.9	5.52563	46.7598
+1.25	307.4	378.3	70.9	808.8	4.49274	51.2525
+1.50	339.0	421.1	82.1	890.9	5.20246	56.455
+1.75	379.3	413.7	34.4	925.3	2.17984	58.6348
+2.00	324.5	383.4	58.9	984.2	3.73234	62.3672
+2.25	359.9	415.0	55.1	1039.3	3.49154	65.8587
+2.50	309.1	337.9	28.8	1068.1	1.82498	67.6837
+2.75	353.2	396.6	43.4	1111.5	2.75014	70.4338
+3.00	316.8	349.0	32.2	1143.7	2.04043	72.4742
+3.25	255.2	367.8	112.6	1256.3	7.13516	79.6094
+3.50	329.7	389.7	60.0	1316.3	3.80204	83.4114
+3.75	338.8	447.4	108.6	1424.9	6.88169	90.2931
+4.00	288.2	297.8	9.6	1434.5	0.608326	90.9015
>4.00	296.1	439.7	143.6	1578.1	9.09955	100.00
			1578.1		0	100.00

Initial Weight = 1590.0g Percent Loss = 0.75

Summary Statistics: M_i = 1.45ϕ σ_i = 1.95ϕ

Sample 68 Mount View Esker - Site 3 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.8	580.3	12.5	12.5	2.06851	2.0695
-3.75	575.7	575.7	0.0	12.5	0.0	2.0695
-3.50	513.5	513.5	0.0	12.5	0.0	2.0695
-3.25	501.1	501.1	0.0	12.5	0.0	2.0695
-3.00	524.3	525.8	1.5	14.0	0.248221	2.31772
-2.75	464.3	464.3	0.0	14.0	0.0	2.31772
-2.50	474.0	474.0	0.0	14.0	0.0	2.31772
-2.25	454.4	454.9	0.5	14.5	^)827404	2.40046
-2.00	453.5	454.2	0.7	15.2	0.115837	2.5163
-1.75	443.5	443.7	0.2	15.4	0.0330961	2.5494
-1.50	468.2	469.2	1.0	16.4	0.165481	2.71488
-1.25	409.0	409.4	0.4	16.8	0.0661923	2.78107
-1.00	473.7	474.0	0.3	17.1	0.0496442	2.83071
-0.75	452.4	453.9	1.5	18.6	0.248221	3.07894
-0.50	365.1	366.3	1.2	19.8	0.198577	3.27751
-0.25	452.6	455.7	3.1	22.9	0.51299	3.7905
+0.00	342.3	346.4	4.1	27.0	0.678471	4.46897
+0.25	429.5	436.4	6.9	33.9	1.14182	5.61079
+0.50	412.9	426.6	13.7	47.6	2.26709	7.87788
+0.75	414.5	427.1	12.6	60.2	2.08506	9.96294
+1.00	398.2	430.0	31.8	92.0	5.26229	15.2252
+1.25	307.6	361.8	54.2	146.2	8.96906	24.1943
+1.50	339.3	475.0	135.7	281.9	22.4557	46.65
+1.75	379.7	460.7	81.0	362.9	13.4039	60.0539
+2.00	324.9	436.9	112.0	474.9	18.5338	78.5877
+2.25	360.4	409.4	49.0	523.9	8.10856	86.6963
+2.50	309.3	344.0	34.7	558.6	5.74218	92.4384
+2.75	353.4	372.8	19.4	578.0	3.21033	95.6488
+3.00	316.8	325.9	9.1	587.1	1.50587	97.1546
+3.25	255.3	263.0	7.7	594.8	1.2742	98.4288
+3.50	329.8	332.2	2.4	597.2	0.397154	98.826
+3.75	338.8	340.4	1.6	598.8	0.264769	99.0908
+4.00	288.3	290.7	2.4	601.2	0.397154	99.4879
>4.00	296.0	299.1	3.1	604.3	0.51299	100.00
			604.3		0	100.00

Initial Weight = 4817.3g
Split Weight = 604.2g

Percent Loss = +0.016
Split Factor = 7.97

Summary Statistics: M_z = 1.40ϕ

σ_1 = 0.64ϕ

Sk_1 = 0.04

K_G = 1.97

Sample 69 Mount View Esker - Site 3 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.8	498.8	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.4	567.4	0.00	0.00	0.00	0.00
-3.75	575.7	575.7	0.00	0.00	0.00	0.00
-3.50	513.5	513.5	0.00	0.00	0.00	0.00
-3.25	501.1	501.1	0.00	0.00	0.00	0.00
-3.00	523.9	523.9	0.00	0.00	0.00	0.00
-2.75	464.3	464.3	0.00	0.00	0.00	0.00
-2.50	474.0	474.0	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.6	453.6	0.00	0.00	0.00	0.00
-1.75	443.4	443.4	0.00	0.00	0.00	0.00
-1.50	468.6	468.7	0.1	0.1	0.023753	0.023753
-1.25	408.4	408.6	0.2	0.3	0.0475059	0.071259
-1.00	473.4	473.4	0.0	0.3	0.0	0.071259
-0.75	452.5	452.5	0.0	0.3	0.0	0.071259
-0.50	364.7	364.7	0.0	0.3	0.0	0.071259
-0.25	452.4	452.7	0.3	0.6	0.0712589	0.142518
+0.00	342.2	342.4	0.2	0.8	0.0475059	0.190024
+0.25	429.4	429.4	0.0	0.8	0.0	0.190024
+0.50	412.7	412.7	0.0	0.8	0.0	0.190024
+0.75	414.1	414.5	0.4	1.2	0.0950119	0.285036
+1.00	397.9	398.4	0.5	1.7	0.118765	0.403801
+1.25	307.4	308.1	0.7	2.4	0.166271	0.570072
+1.50	339.3	340.6	1.3	3.7	0.308789	0.878861
+1.75	379.6	380.5	0.9	4.6	0.213777	1.09264
+2.00	324.8	327.6	2.8	7.4	0.665083	1.75772
+2.25	360.3	363.1	2.8	10.2	0.665083	2.42281
+2.50	309.3	315.6	6.3	16.5	1.49644	3.91924
+2.75	353.3	369.1	15.8	32.3	3.75297	7.67221
+3.00	316.9	334.0	17.1	49.4	4.06176	11.734
+3.25	255.3	325.0	69.7	119.1	16.5558	28.2898
+3.50	330.0	365.3	35.3	154.4	8.3848	36.6746
+3.75	339.0	408.1	69.1	223.5	16.4133	53.0879
+4.00	288.4	343.7	55.3	278.8	13.1354	66.2233
>4.00	295.8	438.0	142.2	421.0	33.7767	100.00
			421.0		0	100.00

Initial Weight = 3561.3g
Split Weight = 424.4g

Percent Loss = 0.80
Split Factor = 8.39

Summary Statistics: Were not performed as over 30% of the sample is finer than +4.00ϕ

Sample 70 Hopeville Esker - Site 8

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.00	0.00	0.00	0.00
-5.50	557.5	905.9	348.4	348.4	10.8428	10.8429
-5.00	568.1	1359.3	791.2	1139.6	24.6234	35.4663
-4.50	498.8	1256.2	757.4	1897.0	23.5715	59.0378
-4.25	607.2	828.1	220.9	2117.9	6.87477	65.9125
-4.00	568.2	767.2	199.0	2316.9	6.1932	72.1057
-3.75	576.5	613.5	37.0	2353.9	1.1515	73.2572
-3.50	514.2	529.2	15.0	2368.9	0.466824	73.7241
-3.25	501.7	501.7	0.0	2368.9	0.0	73.7241
-3.00	524.6	525.9	1.3	2370.2	0.0404581	73.7645
-2.75	465.0	465.6	0.6	2370.8	0.018673	73.7832
-2.50	474.5	474.8	0.3	2371.1	0.00933649	73.7925
-2.25	454.6	454.6	0.0	2371.1	0.0	73.7925
-2.00	453.8	453.8	0.0	2371.1	0.0	73.7925
-1.75	444.0	444.1	0.1	2371.2	0.00311216	73.7956
-1.50	468.7	468.9	0.2	2371.4	0.00622432	73.8019
-1.25	409.0	409.2	0.2	2371.6	0.00622432	73.8081
-1.00	473.9	474.1	0.2	2371.8	0.00622432	73.8143
-0.75	452.9	453.1	0.2	2372.0	0.00622432	73.8205
-0.50	365.4	365.6	0.2	2372.2	0.00622432	73.8268
-0.25	453.0	453.4	0.4	2372.6	0.0124486	73.8392
+0.00	342.9	343.2	0.3	2372.9	0.00933649	73.8485
+0.25	430.0	430.3	0.3	2373.2	0.00933649	73.8579
+0.50	413.7	414.2	0.5	2373.7	0.0155608	73.8734
+0.75	415.2	415.9	0.7	2374.4	0.0217851	73.8952
+1.00	398.8	400.6	1.8	2376.2	0.0560189	73.9512
+1.25	308.2	311.6	3.4	2379.6	0.105814	74.0571
+1.50	339.8	348.0	8.2	2387.8	0.255197	74.3123
+1.75	380.0	389.3	9.3	2397.1	0.289431	74.6017
+2.00	324.9	346.3	21.4	2418.5	0.666003	75.2677
+2.25	360.6	386.0	25.4	2443.9	0.790489	76.0582
+2.50	309.5	366.9	57.4	2501.3	1.78638	77.8446
+2.75	353.8	438.6	84.8	2586.1	2.63911	80.4837
+3.00	317.3	367.9	50.6	2636.7	1.57475	82.0584
+3.25	255.6	405.8	150.2	2786.9	4.67447	86.7329
+3.50	330.1	379.2	49.1	2836.0	1.52807	88.261
+3.75	339.2	441.0	101.8	2937.8	3.16818	91.4291
+4.00	288.6	367.1	78.5	3016.3	2.44305	93.8722
>4.00	337.9	534.8	196.9	3213.2	6.12785	100
			3213.2		0	100

Initial Weight = 3217.3g

Percent Loss = 0.13

Summary Statistics: M_z = -2.40ϕ

σ_i = 3.60ϕ

Sk_i = 0.83

K_G = 0.61

Sample 71 Hopeville Esker - Site 8

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	1888.3	1383.0	1383.0	24.227	24.227
-5.50	557.5	1280.2	722.7	2105.7	12.6601	36.8871
-5.00	568.1	1583.7	1015.6	3121.3	17.791	54.6781
-4.50	498.8	1099.1	600.3	3721.6	10.5159	65.194
-4.25	607.2	817.4	210.2	3931.8	3.68223	68.8762
-4.00	568.2	774.8	206.6	4138.4	3.61916	72.4954
-3.75	576.5	674.4	97.9	4236.3	1.71499	74.2104
-3.50	514.3	646.6	132.3	4368.6	2.3176	76.528
-3.25	501.8	586.7	84.9	4453.5	1.48726	78.0153
-3.00	524.7	591.2	66.5	4520.0	1.16493	79.1802
-2.75	465.1	533.8	68.7	4588.7	1.20347	80.3837
-2.50	474.5	535.5	61.0	4649.7	1.06858	81.4522
-2.25	454.6	507.2	52.6	4702.3	0.921433	82.3737
-2.00	453.8	501.6	47.8	4750.1	0.837348	83.211
-1.75	444.0	479.4	35.4	4785.5	0.620128	83.8311
-1.50	468.8	506.7	37.9	4823.4	0.663922	84.4951
-1.25	409.0	439.8	30.8	4854.2	0.539546	85.0346
-1.00	473.9	508.2	34.3	4888.5	0.600858	85.6355
-0.75	452.9	485.1	32.2	4920.7	0.564071	86.1995
-0.50	365.4	404.3	38.9	4959.6	0.68144	86.881
-0.25	453.0	510.7	57.7	5017.3	1.01077	87.8918
+0.00	343.0	390.9	47.9	5065.2	0.8391	88.7309
+0.25	430.1	491.8	61.7	5126.9	1.08084	89.8117
+0.50	413.6	489.2	75.6	5202.5	1.32434	91.136
+0.75	415.2	471.4	56.2	5258.7	0.984497	92.1205
+1.00	398.8	491.9	93.1	5351.8	1.6309	93.7514
+1.25	308.2	368.8	60.6	5412.4	1.06157	94.813
+1.50	339.8	412.1	72.3	5484.7	1.26653	96.0795
+1.75	380.0	416.7	36.7	5521.4	0.642901	96.7224
+2.00	324.8	371.9	47.1	5568.5	0.825085	97.5475
+2.25	360.6	385.4	24.8	5593.3	0.43444	97.982
+2.50	309.5	335.2	25.7	5619.0	0.450206	98.4322
+2.75	353.8	373.8	20.0	5639.0	0.350355	98.7825
+3.00	317.3	330.2	12.9	5651.9	0.225979	99.0085
+3.25	255.6	271.2	15.6	5667.5	0.273277	99.2818
+3.50	330.1	335.8	5.7	5673.2	0.0998511	99.3816
+3.75	339.1	345.6	6.5	5679.7	0.113865	99.4955
+4.00	288.6	298.1	9.5	5689.2	0.166418	99.6619
>4.00	297.3	316.6	19.3	5708.5	0.338092	100
			5708.5		0	100

Initial Weight = 5634.9g Percent Loss = +1.31

Summary Statistics: M_z = -4.53ϕ σ_1 = 2.14ϕ

Sk_1 = 0.59 K_G = 1.46

Sample 72 Hopeville Esker - Site 8

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.4	567.4	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	525.7	1.5	1.5	0.409724	0.412455
-2.75	464.6	466.2	1.6	3.1	0.437039	0.849494
-2.50	474.1	474.7	0.6	3.7	0.16389	1.01338
-2.25	454.2	454.8	0.6	4.3	0.16389	1.17727
-2.00	453.2	454.0	0.8	5.1	0.21852	1.39579
-1.75	443.7	444.1	0.4	5.5	0.10926	1.50505
-1.50	468.3	469.1	0.8	6.3	0.21852	1.72357
-1.25	408.3	409.3	1.0	7.3	0.273149	1.99672
-1.00	473.6	474.0	0.4	7.7	0.10926	2.10598
-0.75	452.5	452.7	0.2	7.9	0.0546299	2.16061
-0.50	364.8	365.3	0.5	8.4	0.136575	2.29719
-0.25	452.2	453.1	0.9	9.3	0.245834	2.54302
+0.00	342.5	342.8	0.3	9.6	0.0819448	2.62497
+0.25	429.0	429.7	0.7	10.3	0.191205	2.81617
+0.50	412.7	413.5	0.8	11.1	0.21852	3.03469
+0.75	414.4	415.1	0.7	11.8	0.191205	3.2259
+1.00	397.9	400.8	2.9	14.7	0.792133	4.01803
+1.25	307.4	312.7	5.3	20.0	1.44769	5.46572
+1.50	339.3	355.9	16.6	36.6	4.53428	10.0
+1.75	379.4	398.2	18.8	55.4	5.13521	15.1352
+2.00	324.6	357.7	33.1	88.5	9.04125	24.1765
+2.25	360.1	381.9	21.8	110.3	5.95466	30.1311
+2.50	309.1	334.0	24.9	135.2	6.80142	36.9325
+2.75	353.1	375.5	22.4	157.6	6.11855	43.0511
+3.00	316.7	329.1	12.4	170.0	3.38705	46.4381
+3.25	255.2	273.3	18.1	188.1	4.944	51.3821
+3.50	329.7	337.3	7.6	195.7	2.07594	53.4581
+3.75	338.7	347.8	9.1	204.8	2.48566	55.9437
+4.00	288.2	302.1	13.9	218.7	3.79678	59.7405
>4.00	295.9	443.3	147.4	366.1	40.2622	100.00
			366.1		0	100.00

Initial Weight = 2895.9g
Split Weight = 368.4

Percent Loss = 0.62
Split Factor = 7.86

Summary Statistics: Were not performed as over 40% of the sample is finer than +4.00ϕ

Sample 76 Egerton Esker - Site 5

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	2764.2	2258.8	2258.8	33.5124	33.5124
-5.50	557.5	1178.9	621.4	2880.2	9.21931	42.7317
-5.00	568.1	1270.1	702.0	3582.2	10.4151	53.1468
-4.50	498.8	677.6	178.8	3761.0	2.65274	55.7996
-4.25	607.2	684.3	77.1	3838.1	1.14388	56.9434
-4.00	568.3	684.5	116.2	3954.3	1.72398	58.6674
-3.75	576.6	655.5	78.9	4033.2	1.17059	59.838
-3.50	514.3	561.4	47.1	4080.3	0.698792	60.5368
-3.25	501.8	532.1	30.3	4110.6	0.449542	60.9863
-3.00	524.7	548.8	24.1	4134.7	0.357556	61.3439
-2.75	465.0	494.4	29.4	4164.1	0.436189	61.7801
-2.50	474.5	501.3	26.8	4190.9	0.397614	62.1777
-2.25	454.7	478.3	23.6	4214.5	0.350138	62.5278
-2.00	453.9	483.7	29.8	4244.3	0.442123	62.97
-1.75	444.0	464.1	20.1	4264.4	0.298211	63.2682
-1.50	468.7	496.5	27.8	4292.2	0.412451	63.6806
-1.25	409.0	439.8	30.8	4323.0	0.45696	64.1376
-1.00	473.9	518.3	44.4	4367.4	0.658734	64.7963
-0.75	452.9	501.4	48.5	4415.9	0.719563	65.5159
-0.50	365.5	432.7	67.2	4483.1	0.997003	66.5129
-0.25	453.1	565.4	112.3	4595.4	1.66612	68.179
+0.00	343.1	451.4	108.3	4703.7	1.60678	69.7858
+0.25	430.2	561.3	131.1	4834.8	1.94505	71.7308
+0.50	413.7	619.9	206.2	5041.0	3.05926	74.7901
+0.75	415.3	590.3	175.0	5216.0	2.59636	77.3865
+1.00	399.0	695.0	296.0	5512.0	4.39156	81.778
+1.25	308.3	546.5	238.2	5750.2	3.53402	85.312
+1.50	339.9	565.6	225.7	5975.9	3.34857	88.6606
+1.75	380.0	472.8	92.8	6068.7	1.37681	90.0374
+2.00	324.9	480.9	156.0	6224.7	2.31447	92.3519
+2.25	360.6	433.4	72.8	6297.5	1.08009	93.432
+2.50	309.5	397.3	87.8	6385.3	1.30263	94.7346
+2.75	353.9	425.0	71.1	6456.4	1.05486	95.7895
+3.00	317.4	357.1	39.7	6496.1	0.589003	96.3785
+3.25	255.6	325.9	70.3	6566.4	1.043	97.4215
+3.50	298.3	318.7	20.4	6586.8	0.302662	97.7241
+3.75	339.2	378.7	39.5	6626.3	0.586036	98.3102
+4.00	288.7	319.1	30.4	6656.7	0.451025	98.7612
>4.00	297.3	380.8	83.5	6740.2	1.23884	100
			6740.2		0	100

Initial Weight = 6744.4g

Percent Loss = 0.062

Summary Statistics: M_z = -3.46ϕ σ_i = 3.20ϕ

Sk_i = 0.72 K_G = 0.54

Sample 77 Egerton Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	3073.9	2568.5	2568.5	24.0211	24.0211
-5.50	557.5	2328.2	1770.7	4339.2	16.5599	40.581
-5.00	568.2	3364.2	2796.0	7135.2	26.1487	66.7297
-4.50	498.9	2120.4	1621.5	8756.7	15.1646	81.8943
-4.25	607.2	908.8	301.6	9058.3	2.82062	84.7149
-4.00	568.3	824.8	256.5	9314.8	2.39883	87.1138
-3.75	576.6	733.5	156.9	9471.7	1.46736	88.5811
-3.50	514.4	602.3	87.9	9559.6	0.822056	89.4032
-3.25	501.8	524.7	22.9	9582.5	0.214165	89.6173
-3.00	524.7	554.7	30.0	9612.5	0.280565	89.8979
-2.75	465.1	491.8	26.7	9639.2	0.249703	90.1476
-2.50	474.6	496.5	21.9	9661.1	0.204813	90.3524
-2.25	454.8	469.9	15.1	9676.2	0.141218	90.4936
-2.00	454.0	470.5	16.5	9692.7	0.154311	90.648
-1.75	444.1	457.5	13.4	9706.1	0.125319	90.7733
-1.50	468.8	486.7	17.9	9724.0	0.167404	90.9407
-1.25	409.1	424.3	15.2	9739.2	0.142153	91.0828
-1.00	474.0	494.1	20.1	9759.3	0.187979	91.2708
-0.75	453.0	474.6	21.6	9780.9	0.202007	91.4728
-0.50	365.6	391.9	26.3	9807.2	0.245962	91.7188
-0.25	453.2	499.1	45.9	9853.1	0.429265	92.148
+0.00	343.1	387.4	44.3	9897.4	0.414301	92.5623
+0.25	430.2	486.6	56.4	9953.8	0.527463	93.0898
+0.50	413.8	490.7	76.9	10030.7	0.719182	93.809
+0.75	415.3	473.1	57.8	10088.5	0.540556	94.3495
+1.00	399.1	495.0	95.9	10184.4	0.896874	95.2464
+1.25	308.4	382.6	74.2	10258.6	0.693931	95.9403
+1.50	340.0	422.4	82.4	10341.0	0.770619	96.711
+1.75	380.1	429.0	48.9	10389.9	0.457321	97.1683
+2.00	324.9	383.6	58.7	10448.6	0.548973	97.7173
+2.25	360.6	391.0	30.4	10479.0	0.284306	98.0016
+2.50	309.5	341.7	32.2	10511.2	0.30114	98.3027
+2.75	353.9	381.3	27.4	10538.6	0.25625	98.559
+3.00	317.4	332.6	15.2	10553.8	0.142153	98.7011
+3.25	255.6	281.9	26.3	10580.1	0.245962	98.9471
+3.50	298.3	307.3	9.0	10589.1	0.0841696	99.0312
+3.75	339.2	356.5	17.3	10606.4	0.161793	99.193
+4.00	288.7	304.5	15.8	10622.2	0.147764	99.3408
>4.00	298.0	368.5	70.5	10692.7	0.659328	100
			10692.7		0	100

Initial Weight = 10698.3g

Percent Loss = 0.052

Summary Statistics: M_z = -5.33ϕ

σ_1 = 1.56ϕ

Sk_1 = 0.29

K_G = 2.49

Sample 79 Egerton Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	505.3	0.00	0.00	0.00	0.00
-5.50	557.1	775.1	218.0	218.0	17.4596	17.4598
-5.00	568.1	568.1	0.0	218.0	0.0	17.4598
-4.50	498.8	684.8	186.0	404.0	14.8967	32.3565
-4.25	607.2	622.3	15.1	419.1	1.20935	33.5658
-4.00	568.2	613.6	45.4	464.5	3.63607	37.2019
-3.75	576.5	614.0	37.5	502.0	3.00336	40.2052
-3.50	514.2	546.0	31.8	533.8	2.54685	42.7521
-3.25	501.7	520.0	18.3	552.1	1.46564	44.2177
-3.00	524.6	540.4	15.8	567.9	1.26542	45.4832
-2.75	465.0	484.2	19.2	587.1	1.53772	47.0209
-2.50	474.5	495.7	21.2	608.3	1.6979	48.7188
-2.25	454.7	471.9	17.2	625.5	1.37754	50.0963
-2.00	453.9	469.8	15.9	641.4	1.27343	51.3697
-1.75	444.0	456.4	12.4	653.8	0.993112	52.3629
-1.50	468.7	480.3	11.6	665.4	0.929041	53.2919
-1.25	409.0	419.6	10.6	676.0	0.848951	54.1408
-1.00	474.0	486.4	12.4	688.4	0.993112	55.134
-0.75	453.0	463.8	10.8	699.2	0.864969	55.9989
-0.50	365.5	377.6	12.1	711.3	0.969085	56.968
-0.25	453.1	472.3	19.2	730.5	1.53772	58.5057
+0.00	343.1	360.9	17.8	748.3	1.4256	59.9313
+0.25	430.0	458.2	28.2	776.5	2.25853	62.1899
+0.50	413.6	457.2	43.6	820.1	3.49191	65.6818
+0.75	415.1	453.5	38.4	858.5	3.07544	68.7572
+1.00	398.8	467.0	68.2	926.7	5.46212	74.2193
+1.25	308.2	363.0	54.8	981.5	4.38892	78.6083
+1.50	339.8	394.9	55.1	1036.6	4.41294	83.0212
+1.75	380.0	409.4	29.4	1066.0	2.35464	85.3758
+2.00	324.8	369.6	44.8	1110.8	3.58802	88.9639
+2.25	360.6	388.3	27.7	1138.5	2.21848	91.1823
+2.50	309.5	340.7	31.2	1169.7	2.4988	93.6811
+2.75	353.8	377.7	23.9	1193.6	1.91414	95.5953
+3.00	317.3	330.4	13.1	1206.7	1.04918	96.6445
+3.25	255.6	272.0	16.4	1223.1	1.31347	97.9579
+3.50	330.1	335.6	5.5	1228.6	0.440493	98.3984
+3.75	339.1	345.3	6.2	1234.8	0.496556	98.895
+4.00	288.6	293.3	4.7	1239.5	0.376422	99.2714
>4.00	297.2	306.3	9.1	1248.6	0.728816	100
			1248.6		0	100

Initial Weight = 1249.2g

Percent Loss = 0.048

Summary Statistics: M_z = -2.20ϕ σ_1 = 3.03ϕ

Sk_1 = 0.16 K_G = 0.59

Sample 80 Egerton Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	1594.2	1036.7	1036.7	21.4137	21.4137
-5.00	568.1	972.5	404.4	1441.1	8.35313	29.7669
-4.50	498.8	644.3	145.5	1586.6	3.00539	32.7723
-4.25	607.2	740.5	133.3	1719.9	2.75339	35.5257
-4.00	568.3	588.5	20.2	1740.1	0.417243	35.9429
-3.75	576.7	594.9	18.2	1758.3	0.375932	36.3188
-3.50	514.3	534.0	19.7	1778.0	0.406915	36.7257
-3.25	501.8	510.0	8.2	1786.2	0.169376	36.8951
-3.00	524.6	527.3	2.7	1788.9	0.0557701	36.9509
-2.75	465.0	470.3	5.3	1794.2	0.109475	37.0604
-2.50	474.4	477.7	3.3	1797.5	0.0681635	37.1285
-2.25	454.6	459.9	5.3	1802.8	0.109475	37.238
-2.00	453.9	459.5	5.6	1808.4	0.115671	37.3537
-1.75	444.0	449.2	5.2	1813.6	0.107409	37.4611
-1.50	468.7	479.1	10.4	1824.0	0.214818	37.6759
-1.25	409.0	419.7	10.7	1834.7	0.221015	37.8969
-1.00	473.9	489.0	15.1	1849.8	0.3119	38.2088
-0.75	452.9	471.1	18.2	1868.0	0.375932	38.5847
-0.50	365.4	390.1	24.7	1892.7	0.510194	39.0949
-0.25	453.1	499.9	46.8	1939.5	0.966683	40.0616
+0.00	343.0	401.1	58.1	1997.6	1.20009	41.2617
+0.25	430.1	511.6	81.5	2079.1	1.68343	42.9451
+0.50	413.6	573.4	159.8	2238.9	3.30077	46.2459
+0.75	415.2	601.9	186.7	2425.6	3.8564	50.1023
+1.00	398.9	777.7	378.8	2804.4	7.82434	57.9267
+1.25	308.3	755.5	447.2	3251.6	9.23719	67.1638
+1.50	339.9	880.4	540.5	3792.1	11.1644	78.3282
+1.75	380.0	653.6	273.6	4065.7	5.65137	83.9796
+2.00	324.9	641.5	316.6	4382.3	6.53957	90.5192
+2.25	360.6	483.3	122.7	4505.0	2.53444	93.0536
+2.50	309.5	417.5	108.0	4613.0	2.23081	95.2844
+2.75	353.9	416.1	62.2	4675.2	1.28478	96.5692
+3.00	317.3	346.8	29.5	4704.7	0.60934	97.1786
+3.25	255.6	296.7	41.1	4745.8	0.848946	98.0275
+3.50	298.3	310.9	12.6	4758.4	0.260261	98.2878
+3.75	339.1	359.0	19.9	4778.3	0.411047	98.6988
+4.00	288.6	305.5	16.9	4795.2	0.34908	99.0479
>4.00	297.9	344.0	46.1	4841.3	0.952224	100
			4841.3		0	100

Initial Weight = 4849.0g

Percent Loss = 0.16

Summary Statistics: M_z = -1.06ϕ

σ_I = 3.08ϕ

Sk_I = -0.65

K_G = 0.51

Sample 81 Egerton Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1345.4	840.0	840.0	20.9628	20.9628
-5.50	557.6	1177.5	619.9	1459.9	15.47	36.4328
-5.00	568.2	626.4	58.2	1518.1	1.45242	37.8852
-4.50	498.8	662.5	163.7	1681.8	4.08525	41.9705
-4.25	607.2	619.7	12.5	1694.3	0.311946	42.2824
-4.00	568.3	614.1	45.8	1740.1	1.14297	43.4254
-3.75	576.6	599.6	23.0	1763.1	0.573981	43.9994
-3.50	514.4	535.5	21.1	1784.2	0.526565	44.526
-3.25	501.8	516.2	14.4	1798.6	0.359362	44.8853
-3.00	524.8	534.5	9.7	1808.3	0.24207	45.1274
-2.75	465.1	475.6	10.5	1818.8	0.262035	45.3894
-2.50	474.5	485.6	11.1	1829.9	0.277008	45.6664
-2.25	454.7	461.9	7.2	1837.1	0.179681	45.8461
-2.00	454.0	462.6	8.6	1845.7	0.214619	46.0607
-1.75	444.1	449.2	5.1	1850.8	0.127274	46.188
-1.50	468.8	474.4	5.6	1856.4	0.139752	46.3278
-1.25	409.1	413.3	4.2	1860.6	0.104814	46.4326
-1.00	474.0	480.1	6.1	1866.7	0.15223	46.5848
-0.75	453.1	459.5	6.4	1873.1	0.159717	46.7445
-0.50	365.6	373.8	8.2	1881.3	0.204637	46.9492
-0.25	453.2	468.9	15.7	1897.0	0.391805	47.341
+0.00	343.1	360.4	17.3	1914.3	0.431734	47.7727
+0.25	430.2	454.4	24.2	1938.5	0.603928	48.3766
+0.50	413.8	458.7	44.9	1983.4	1.12051	49.4971
+0.75	415.3	461.5	46.2	2029.6	1.15295	50.6501
+1.00	399.1	511.2	112.1	2141.7	2.79753	53.4476
+1.25	308.4	432.5	124.1	2265.8	3.097	56.5446
+1.50	340.0	504.3	164.3	2430.1	4.10022	60.6448
+1.75	380.1	453.7	73.6	2503.7	1.83674	62.4816
+2.00	324.9	462.1	137.2	2640.9	3.42392	65.9055
+2.25	360.6	448.4	87.8	2728.7	2.19111	68.0966
+2.50	309.6	486.7	177.1	2905.8	4.41966	72.5163
+2.75	354.0	537.3	183.3	3089.1	4.57438	77.0906
+3.00	317.5	403.8	86.3	3175.4	2.15368	79.2443
+3.25	255.6	398.6	143.0	3318.4	3.56867	82.813
+3.50	298.4	385.4	87.0	3405.4	2.17115	84.9841
+3.75	339.2	556.2	217.0	3622.4	5.41539	90.3995
+4.00	288.7	490.6	201.9	3824.3	5.03856	95.4381
>4.00	336.7	519.5	182.8	4007.1	4.5619	100
			4007.1		0	100

Initial Weight = 4015.7g Percent Loss = 0.21

Summary Statistics: M_z = -0.80ϕ σ_i = 3.93ϕ

Sk_i = -0.37 K_G = 0.49

Sample 82 Egerton Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	3017.9	2512.5	2512.5	37.6766	37.6766
-5.50	557.5	2007.7	1450.2	3962.7	21.7467	59.4233
-5.00	568.1	1632.3	1064.2	5026.9	15.9584	75.3817
-4.50	498.8	960.3	461.5	5488.4	6.92049	82.3022
-4.25	607.2	695.8	88.6	5577.0	1.32861	83.6308
-4.00	568.2	648.7	80.5	5657.5	1.20715	84.838
-3.75	576.5	649.0	72.5	5730.0	1.08718	85.9251
-3.50	514.3	566.1	51.8	5781.8	0.776775	86.7019
-3.25	501.7	526.7	25.0	5806.8	0.374891	87.0768
-3.00	524.7	555.3	30.6	5837.4	0.458867	87.5357
-2.75	465.0	480.4	15.4	5852.8	0.230933	87.7666
-2.50	474.5	498.8	24.3	5877.1	0.364394	88.131
-2.25	454.6	467.1	12.5	5889.6	0.187446	88.3185
-2.00	453.8	468.3	14.5	5904.1	0.217437	88.5359
-1.75	443.9	453.0	9.1	5913.2	0.13646	88.6723
-1.50	468.7	478.8	10.1	5923.3	0.151456	88.8238
-1.25	409.0	419.0	10.0	5933.3	0.149957	88.9738
-1.00	473.9	485.9	12.0	5945.3	0.179948	89.1537
-0.75	452.8	466.2	13.4	5958.7	0.200942	89.3547
-0.50	365.4	384.3	18.9	5977.6	0.283418	89.6381
-0.25	453.0	487.7	34.7	6012.3	0.520349	90.1584
+0.00	342.9	378.6	35.7	6048.0	0.535345	90.6938
+0.25	430.1	487.5	57.4	6105.4	0.86075	91.5545
+0.50	413.6	500.5	86.9	6192.3	1.30312	92.8576
+0.75	415.2	489.1	73.9	6266.2	1.10818	93.9658
+1.00	398.8	521.1	122.3	6388.5	1.83397	95.7998
+1.25	308.2	401.7	93.5	6482.0	1.40209	97.2019
+1.50	339.8	419.5	79.7	6561.7	1.19515	98.397
+1.75	380.0	410.7	30.7	6592.4	0.460366	98.8574
+2.00	324.8	358.6	33.8	6626.2	0.506853	99.3642
+2.25	360.6	372.9	12.3	6638.5	0.184447	99.5487
+2.50	309.5	319.1	9.6	6648.1	0.143958	99.6926
+2.75	353.8	359.9	6.1	6654.2	0.0914735	99.7841
+3.00	317.3	317.3	0.0	6654.2	0.0	99.7841
+3.25	255.6	255.6	0.0	6654.2	0.0	99.7841
+3.50	330.1	330.1	0.0	6654.2	0.0	99.7841
+3.75	339.2	339.2	0.0	6654.2	0.0	99.7841
+4.00	288.6	288.6	0.0	6654.2	0.0	99.7841
>4.00	297.2	311.6	14.4	6668.6	0.215937	100
			6668.6		0	100

Initial Weight = 6668.6g Percent Loss = 0.00

Summary Statistics: M_z = -5.50ϕ σ_i = 1.55ϕ

Sk_i = 0.65 K_G = 2.42

Sample 83 Egerton Esker - Site 6 (South)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	465.0	465.0	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.6	453.6	0.00	0.00	0.00	0.00
-1.75	443.7	443.8	0.1	0.1	0.0103756	0.0119319
-1.50	468.4	468.4	0.0	0.1	0.0	0.0119319
-1.25	408.7	408.8	0.1	0.2	0.0103756	0.0223075
-1.00	473.5	473.7	0.2	0.4	0.0207512	0.0430587
-0.75	452.4	453.1	0.7	1.1	0.0726292	0.115688
-0.50	364.8	365.4	0.6	1.7	0.0622536	0.177942
-0.25	452.2	453.8	1.6	3.3	0.16601	0.343952
+0.00	342.4	345.0	2.6	5.9	0.269766	0.613718
+0.25	429.2	437.0	7.8	13.7	0.809297	1.42301
+0.50	412.6	436.2	23.6	37.3	2.44864	3.87165
+0.75	414.4	451.6	37.2	74.5	3.85972	7.73137
+1.00	398.0	538.4	140.4	214.9	14.5673	22.2987
+1.25	307.5	510.1	202.6	417.5	21.021	43.3197
+1.50	339.6	604.3	264.7	682.2	27.4642	70.7839
+1.75	379.5	448.3	68.8	751.0	7.13841	77.9223
+2.00	324.7	444.0	119.3	870.3	12.3781	90.3004
+2.25	360.2	403.0	42.8	913.1	4.44076	94.7411
+2.50	309.2	335.4	26.2	939.3	2.71841	97.4596
+2.75	353.2	365.3	12.1	951.4	1.25545	98.715
+3.00	316.8	320.9	4.1	955.5	0.425399	99.1404
+3.25	255.3	258.8	3.5	959.0	0.363146	99.5035
+3.50	329.7	330.8	1.1	960.1	0.114132	99.6177
+3.75	338.8	339.8	1.0	961.1	0.103756	99.7214
+4.00	288.2	288.9	0.7	961.8	0.0726292	99.7941
>4.00	296.6	298.6	2.0	963.8	0.207512	100.00
			963.8		0	100.00

Initial Weight = 4188.2g
Split Weight = 965.6g

Percent Loss = 0.19
Split Factor = 4.34

Summary Statistics: M_z = 1.20ϕ σ_1 = 0.45ϕ

Sk_1 = 0.15 K_G = 2.23

Sample 84 Egerton Esker - Site 6

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1021.0	515.6	515.6	8.29606	8.29608
-5.50	557.5	740.8	183.3	698.9	2.94932	11.2454
-5.00	568.1	1796.9	1228.8	1927.7	19.7715	31.0169
-4.50	498.8	1630.5	1131.7	3059.4	18.2092	49.2261
-4.25	607.2	975.0	367.8	3427.2	5.91794	55.144
-4.00	568.2	869.3	301.1	3728.3	4.84473	59.9888
-3.75	576.5	890.8	314.3	4042.6	5.05712	65.0459
-3.50	514.3	771.9	257.6	4300.2	4.14481	69.1907
-3.25	501.7	634.8	133.1	4433.3	2.14159	71.3323
-3.00	524.6	635.8	111.2	4544.5	1.78922	73.1215
-2.75	465.0	554.4	89.4	4633.9	1.43846	74.56
-2.50	474.5	545.4	70.9	4704.8	1.14079	75.7008
-2.25	454.7	509.7	55.0	4759.8	0.884956	76.5857
-2.00	454.1	507.5	53.4	4813.2	0.859212	77.4449
-1.75	444.0	491.1	47.1	4860.3	0.757844	78.2028
-1.50	468.8	523.9	55.1	4915.4	0.886565	79.0893
-1.25	409.0	454.3	45.3	4960.7	0.728882	79.8182
-1.00	473.9	529.4	55.5	5016.2	0.893001	80.7112
-0.75	452.9	506.6	53.7	5069.9	0.864039	81.5753
-0.50	365.4	427.4	62.0	5131.9	0.997586	82.5728
-0.25	453.1	544.5	91.4	5223.3	1.47064	84.0435
+0.00	343.0	425.7	82.7	5306.0	1.33065	85.3741
+0.25	430.1	522.1	92.0	5398.0	1.48029	86.8544
+0.50	413.6	543.9	130.3	5528.3	2.09654	88.951
+0.75	415.2	512.9	97.7	5626.0	1.572	90.523
+1.00	398.9	551.9	153.0	5779.0	2.46179	92.9848
+1.25	308.3	413.7	105.4	5884.4	1.6959	94.6807
+1.50	339.9	440.4	100.5	5984.9	1.61706	96.2977
+1.75	380.0	420.1	40.1	6025.0	0.645213	96.9429
+2.00	324.9	383.8	58.9	6083.9	0.947707	97.8906
+2.25	360.6	390.7	30.1	6114.0	0.484312	98.3749
+2.50	309.5	338.2	28.7	6142.7	0.461786	98.8367
+2.75	353.9	374.2	20.3	6163.0	0.326629	99.1634
+3.00	317.3	327.7	10.4	6173.4	0.167337	99.3307
+3.25	255.6	268.3	12.7	6186.1	0.204344	99.535
+3.50	330.1	334.9	4.8	6190.9	0.0772325	99.6123
+3.75	339.1	344.2	5.1	6196.0	0.0820595	99.6943
+4.00	288.6	293.0	4.4	6200.4	0.0707965	99.7651
>4.00	297.3	311.9	14.6	6215.0	0.234916	100
			6215.0		0	100

Initial Weight = 6219.3g Percent Loss = 0.069

Summary Statistics: M_z = -3.40ϕ σ_i = 2.39ϕ

Sk_i = 0.59 K_G = 1.26

Sample 85 Egerton Esker - Site 6

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.1	727.7	159.6	159.6	17.9851	17.9854
-4.50	498.8	821.6	322.8	482.4	36.3759	54.3613
-4.25	607.2	654.2	47.0	529.4	5.29637	59.6577
-4.00	568.3	607.3	39.0	568.4	4.39486	64.0526
-3.75	576.5	621.0	44.5	612.9	5.01465	69.0672
-3.50	514.3	566.2	51.9	664.8	5.84855	74.9158
-3.25	501.8	541.9	40.1	704.9	4.51882	79.4346
-3.00	524.7	546.9	22.2	727.1	2.50169	81.9363
-2.75	465.0	490.2	25.2	752.3	2.83976	84.776
-2.50	474.5	490.4	15.9	768.2	1.79175	86.5678
-2.25	454.7	466.8	12.1	780.3	1.36353	87.9313
-2.00	453.9	463.7	9.8	790.1	1.10435	89.0357
-1.75	444.0	453.2	9.2	799.3	1.03674	90.0724
-1.50	468.8	476.2	7.4	806.7	0.833897	90.9063
-1.25	409.0	416.4	7.4	814.1	0.833897	91.7402
-1.00	473.9	481.8	7.9	822.0	0.890241	92.6304
-0.75	452.9	459.0	6.1	828.1	0.687401	93.3178
-0.50	365.5	373.0	7.5	835.6	0.845166	94.163
-0.25	453.1	463.1	10.0	845.6	1.12689	95.2899
+0.00	342.9	350.5	7.6	853.2	0.856435	96.1463
+0.25	430.1	436.8	6.7	859.9	0.755015	96.9014
+0.50	413.6	419.6	6.0	865.9	0.676133	97.5775
+0.75	415.2	418.4	3.2	869.1	0.360604	97.9381
+1.00	398.8	402.4	3.6	872.7	0.40568	98.3438
+1.25	308.3	310.6	2.3	875.0	0.259184	98.603
+1.50	339.9	342.1	2.2	877.2	0.247915	98.8509
+1.75	380.0	381.4	1.4	878.6	0.157764	99.0086
+2.00	324.9	324.9	0.0	878.6	0.0	99.0086
+2.25	360.6	360.6	0.0	878.6	0.0	99.0086
+2.50	309.5	309.5	0.0	878.6	0.0	99.0086
+2.75	353.9	353.9	0.0	878.6	0.0	99.0086
+3.00	317.3	317.3	0.0	878.6	0.0	99.0086
+3.25	255.6	255.6	0.0	878.6	0.0	99.0086
+3.50	298.3	298.3	0.0	878.6	0.0	99.0086
+3.75	339.2	339.2	0.0	878.6	0.0	99.0086
+4.00	288.7	288.7	0.0	878.6	0.0	99.0086
>4.00	297.9	306.7	8.8	887.4	0.991661	100
			887.4		0	100

Initial Weight = 877.2g Percent Loss = +0.022

Summary Statistics: M_z = -4.20ϕ σ_I = 1.31ϕ

Sk_I = 0.63 K_G = 1.46

Sample 86 Hopeville Esker - Site 9

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	1247.9	690.4	690.4	15.3048	15.3048
-5.00	568.1	1600.8	1032.7	1723.1	22.8929	38.1977
-4.50	498.8	790.9	292.1	2015.2	6.47528	44.673
-4.25	607.2	663.4	56.2	2071.4	1.24584	45.9189
-4.00	568.3	959.5	391.2	2462.6	8.67213	54.591
-3.75	576.6	710.4	133.8	2596.4	2.96608	57.5571
-3.50	514.3	718.0	203.7	2800.1	4.51563	62.0727
-3.25	501.8	631.1	129.3	2929.4	2.86633	64.939
-3.00	524.7	613.6	88.9	3018.3	1.97074	66.9098
-2.75	465.0	553.7	88.7	3107.0	1.9663	68.8761
-2.50	474.5	550.6	76.1	3183.1	1.68699	70.5631
-2.25	454.7	514.6	59.9	3243.0	1.32787	71.8909
-2.00	454.0	504.1	50.1	3293.1	1.11062	73.0016
-1.75	444.0	477.7	33.7	3326.8	0.747063	73.7486
-1.50	468.7	501.9	33.2	3360.0	0.735979	74.4846
-1.25	409.0	430.8	21.8	3381.8	0.483263	74.9679
-1.00	473.9	494.1	20.2	3402.0	0.447794	75.4157
-0.75	452.9	468.4	15.5	3417.5	0.343605	75.7593
-0.50	365.5	381.5	16.0	3433.5	0.354689	76.1139
-0.25	453.1	476.3	23.2	3456.7	0.514298	76.6282
+0.00	343.0	359.2	16.2	3472.9	0.359122	76.9874
+0.25	430.1	456.9	26.8	3499.7	0.594103	77.5815
+0.50	413.6	457.6	44.0	3543.7	0.975393	78.5569
+0.75	415.2	459.2	44.0	3587.7	0.975393	79.5323
+1.00	398.8	505.9	107.1	3694.8	2.3742	81.9065
+1.25	308.3	430.8	122.5	3817.3	2.71558	84.622
+1.50	339.9	491.9	152.0	3969.3	3.36954	87.9916
+1.75	380.1	435.3	55.2	4024.5	1.22368	89.2153
+2.00	324.9	436.7	111.8	4136.3	2.47839	91.6936
+2.25	360.6	417.5	56.9	4193.2	1.26136	92.955
+2.50	309.5	380.6	71.1	4264.3	1.57615	94.5312
+2.75	353.9	410.7	56.8	4321.1	1.25914	95.7903
+3.00	317.3	350.3	33.0	4354.1	0.731545	96.5218
+3.25	255.6	307.1	51.5	4405.6	1.14165	97.6635
+3.50	298.3	312.3	14.0	4419.6	0.310352	97.9738
+3.75	339.2	365.8	26.6	4446.2	0.58967	98.5635
+4.00	288.7	307.2	18.5	4464.7	0.410109	98.9736
>4.00	297.3	343.6	46.3	4511.0	1.02638	100
			4511.0		0	100

Initial Weight = 4514.1g

Percent Loss = 0.069

Summary Statistics: M_z = -2.90ϕ σ_i = 2.88ϕ

Sk_i = 0.61 K_G = 0.92

Sample 88 Mount View Esker - Site 3 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	568.3	0.00	0.00	0.00	0.00
-4.50	498.9	534.0	35.1	35.1	1.89147	1.89169
-4.25	607.3	627.7	20.4	55.5	1.09932	2.99101
-4.00	568.3	573.5	5.2	60.7	0.280218	3.27122
-3.75	576.6	583.4	6.8	67.5	0.366439	3.63766
-3.50	514.4	525.3	10.9	78.4	0.587379	4.22504
-3.25	501.8	513.4	11.6	90.0	0.625101	4.85014
-3.00	524.7	535.8	11.1	101.1	0.598157	5.4483
-2.75	465.1	474.1	9.0	110.1	0.484992	5.93329
-2.50	474.5	479.4	4.9	115.0	0.264051	6.19734
-2.25	454.8	458.9	4.1	119.1	0.220941	6.41828
-2.00	454.2	458.5	4.3	123.4	0.231718	6.65
-1.75	444.0	446.7	2.7	126.1	0.145498	6.7955
-1.50	468.8	472.6	3.8	129.9	0.204774	7.00027
-1.25	409.1	417.2	8.1	138.0	0.436493	7.43677
-1.00	474.0	497.2	23.2	161.2	1.2502	8.68697
-0.75	453.0	483.3	30.3	191.5	1.63281	10.3198
-0.50	365.5	398.9	33.4	224.9	1.79986	12.1196
-0.25	453.2	506.4	53.2	278.1	2.86684	14.9865
+0.00	343.1	385.0	41.9	320.0	2.25791	17.2444
+0.25	430.2	477.5	47.3	367.3	2.5489	19.7933
+0.50	413.7	452.9	39.2	406.5	2.11241	21.9057
+0.75	415.3	453.1	37.8	444.3	2.03697	23.9427
+1.00	399.1	478.0	78.9	523.2	4.25176	28.1944
+1.25	308.4	384.2	75.8	599.0	4.08471	32.2791
+1.50	339.9	454.8	114.9	713.9	6.19173	38.4709
+1.75	380.1	447.8	67.7	781.6	3.64822	42.1191
+2.00	324.9	471.1	146.2	927.8	7.87843	49.9975
+2.25	360.6	392.6	32.0	959.8	1.72442	51.7219
+2.50	309.6	412.4	102.8	1062.6	5.53969	57.2616
+2.75	354.0	464.1	110.1	1172.7	5.93307	63.1947
+3.00	317.4	368.1	50.7	1223.4	2.73212	65.9268
+3.25	255.6	344.0	88.4	1311.8	4.7637	70.6905
+3.50	298.3	333.8	35.5	1347.3	1.91302	72.6035
+3.75	339.2	409.9	70.7	1418.0	3.80988	76.4134
+4.00	288.7	485.3	196.6	1614.6	10.5944	87.0078
>4.00	336.7	577.8	241.1	1855.7	12.9924	100
			1855.7		0	100

Initial Weight = 1876.9g Percent Loss = 1.13

Summary Statistics: M_i = 1.95ϕ σ_i = 1.95ϕ

Sample 89 Mount View Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1161.5	656.1	656.1	10.9014	10.9014
-5.50	557.5	1382.2	824.7	1480.8	13.7027	24.6041
-5.00	568.2	1524.0	955.8	2436.6	15.881	40.4851
-4.50	498.9	820.1	321.2	2757.8	5.33688	45.822
-4.25	607.2	715.3	108.1	2865.9	1.79613	47.6181
-4.00	568.3	741.4	173.1	3039.0	2.87613	50.4943
-3.75	576.6	670.6	94.0	3133.0	1.56185	52.0561
-3.50	514.3	666.1	151.8	3284.8	2.52222	54.5783
-3.25	501.8	627.5	125.7	3410.5	2.08856	56.6669
-3.00	524.7	617.5	92.8	3503.3	1.54191	58.2088
-2.75	465.0	583.7	118.7	3622.0	1.97225	60.181
-2.50	474.5	554.1	79.6	3701.6	1.32259	61.5036
-2.25	454.7	531.8	77.1	3778.7	1.28105	62.7847
-2.00	453.9	523.8	69.9	3848.6	1.16142	63.9461
-1.75	444.0	492.3	48.3	3896.9	0.802526	64.7486
-1.50	468.7	527.3	58.6	3955.5	0.973665	65.7223
-1.25	409.0	452.2	43.2	3998.7	0.717787	66.4401
-1.00	473.9	522.8	48.9	4047.6	0.812495	67.2526
-0.75	453.0	494.0	41.0	4088.6	0.681233	67.9338
-0.50	365.5	414.5	49.0	4137.6	0.814156	68.748
-0.25	453.1	527.3	74.2	4211.8	1.23287	69.9808
+0.00	343.1	408.8	65.7	4277.5	1.09163	71.0725
+0.25	430.2	520.3	90.1	4367.6	1.49705	72.5695
+0.50	413.8	589.6	175.8	4543.4	2.92099	75.4905
+0.75	415.3	553.2	137.9	4681.3	2.29127	77.7818
+1.00	399.1	498.9	99.8	4781.1	1.65822	79.44
+1.25	308.4	481.1	172.7	4953.8	2.86949	82.3095
+1.50	340.0	551.8	211.8	5165.6	3.51915	85.8286
+1.75	380.1	495.7	115.6	5281.2	1.92074	87.7494
+2.00	324.9	478.3	153.4	5434.6	2.54881	90.2982
+2.25	360.6	414.6	54.0	5488.6	0.897234	91.1954
+2.50	309.5	398.9	89.4	5578.0	1.48542	92.6808
+2.75	353.9	402.5	48.6	5626.6	0.80751	93.4884
+3.00	317.4	362.6	45.2	5671.8	0.751018	94.2394
+3.25	255.6	319.3	63.7	5735.5	1.0584	95.2978
+3.50	298.3	313.4	15.1	5750.6	0.250893	95.5487
+3.75	339.2	371.7	32.5	5783.1	0.540002	96.0887
+4.00	288.7	319.4	30.7	5813.8	0.510094	96.5988
>4.00	338.1	542.8	204.7	6018.5	3.40118	100.00
			6018.5		0	100.00

Initial Weight = 6040.1g Percent Loss = 0.36

Summary Statistics: M_z = -2.90ϕ σ_I = 3.17ϕ

Sk_I = 0.52 K_G = 0.65

Sample 91 Mount View Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	1511.3	1005.9	1005.9	14.0158	14.0158
-5.50	557.5	2887.1	2329.6	3335.5	32.4597	46.4755
-5.00	568.2	1532.7	964.5	4300.0	13.4389	59.9144
-4.50	498.8	1111.3	612.5	4912.5	8.53433	68.4487
-4.25	607.2	804.7	197.5	5110.0	2.75188	71.2006
-4.00	568.3	844.4	276.1	5386.1	3.84706	75.0477
-3.75	576.6	699.2	122.6	5508.7	1.70826	76.7559
-3.50	514.3	665.8	151.5	5660.2	2.11094	78.8669
-3.25	501.8	576.3	74.5	5734.7	1.03805	79.9049
-3.00	524.7	565.6	40.9	5775.6	0.569884	80.4748
-2.75	465.0	526.7	61.7	5837.3	0.859703	81.3345
-2.50	474.5	509.9	35.4	5872.7	0.493249	81.8278
-2.25	454.7	484.0	29.3	5902.0	0.408254	82.236
-2.00	454.0	479.5	25.5	5927.5	0.355307	82.5913
-1.75	444.0	463.3	19.3	5946.8	0.268918	82.8602
-1.50	468.8	490.1	21.3	5968.1	0.296786	83.157
-1.25	409.1	422.6	13.5	5981.6	0.188103	83.3451
-1.00	474.0	489.2	15.2	5996.8	0.211791	83.5569
-0.75	453.0	466.8	13.8	6010.6	0.192284	83.7492
-0.50	365.5	380.4	14.9	6025.5	0.207611	83.9568
-0.25	453.2	476.2	23.0	6048.5	0.320473	84.2773
+0.00	343.1	363.3	20.2	6068.7	0.281459	84.5588
+0.25	430.2	458.9	28.7	6097.4	0.399894	84.9586
+0.50	413.7	458.6	44.9	6142.3	0.625618	85.5843
+0.75	415.3	458.0	42.7	6185.0	0.594964	86.1792
+1.00	399.1	501.2	102.1	6287.1	1.42262	87.6019
+1.25	308.4	426.3	117.9	6405.0	1.64277	89.2446
+1.50	339.9	483.1	143.2	6548.2	1.99529	91.2399
+1.75	380.0	490.1	110.1	6658.3	1.53409	92.774
+2.00	324.9	474.9	150.0	6808.3	2.09004	94.864
+2.25	360.6	429.1	68.5	6876.8	0.954451	95.8185
+2.50	309.5	391.9	82.4	6959.2	1.14813	96.9666
+2.75	354.0	410.2	56.2	7015.4	0.783068	97.7497
+3.00	317.4	345.8	28.4	7043.8	0.395714	98.1454
+3.25	255.7	293.8	38.1	7081.9	0.53087	98.6763
+3.50	298.4	311.0	12.6	7094.5	0.175563	98.8518
+3.75	339.2	359.2	20.0	7114.5	0.278672	99.1305
+4.00	288.7	304.3	15.6	7130.1	0.217364	99.3479
>4.00	298.0	344.8	46.8	7176.9	0.652092	100
			7176.9		0	100

Initial Weight = 7179.9g Percent Loss = 0.042

Summary Statistics: M_z = -4.33ϕ σ_i = 2.36ϕ

Sk_i = 0.75 K_G = 1.79

Sample 92 Mount View Esker - Site 6 (West)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	568.3	0.00	0.00	0.00	0.00
-4.50	498.9	521.9	23.0	23.0	0.789401	0.789538
-4.25	607.2	624.6	17.4	40.4	0.597199	1.38674
-4.00	568.4	676.2	107.8	148.2	3.69989	5.08663
-3.75	576.6	684.7	108.1	256.3	3.71019	8.79682
-3.50	514.4	708.2	193.8	450.1	6.65157	15.4484
-3.25	501.8	743.9	242.1	692.2	8.30931	23.7577
-3.00	524.8	780.0	255.2	947.4	8.75892	32.5166
-2.75	465.1	702.3	237.2	1184.6	8.14113	40.6577
-2.50	474.5	677.3	202.8	1387.4	6.96046	47.6182
-2.25	454.8	648.1	193.3	1580.7	6.6344	54.2526
-2.00	454.0	633.6	179.6	1760.3	6.1642	60.4168
-1.75	444.1	555.8	111.7	1872.0	3.83375	64.2506
-1.50	468.9	566.7	97.8	1969.8	3.35667	67.6072
-1.25	409.1	472.6	63.5	2033.3	2.17943	69.7867
-1.00	474.0	533.4	59.4	2092.7	2.03871	71.8254
-0.75	453.1	495.9	42.8	2135.5	1.46897	73.2943
-0.50	365.5	405.6	40.1	2175.6	1.3763	74.6706
-0.25	453.2	496.3	43.1	2218.7	1.47927	76.1499
+0.00	343.2	372.8	29.6	2248.3	1.01593	77.1658
+0.25	430.2	459.5	29.3	2277.6	1.00563	78.1715
+0.50	413.8	450.2	36.4	2314.0	1.24931	79.4208
+0.75	415.4	446.8	31.4	2345.4	1.0777	80.4985
+1.00	399.2	459.4	60.2	2405.6	2.06617	82.5646
+1.25	308.4	366.7	58.3	2463.9	2.00096	84.5656
+1.50	339.9	415.3	75.4	2539.3	2.58786	87.1535
+1.75	380.1	425.8	45.7	2585.0	1.56851	88.722
+2.00	325.0	385.6	60.6	2645.6	2.0799	90.8019
+2.25	360.7	404.6	43.9	2689.5	1.50673	92.3086
+2.50	309.6	361.7	52.1	2741.6	1.78817	94.0968
+2.75	354.0	396.9	42.9	2784.5	1.47241	95.5692
+3.00	317.5	340.3	22.8	2807.3	0.782537	96.3517
+3.25	343.9	374.3	30.4	2837.7	1.04338	97.3951
+3.50	298.4	309.3	10.9	2848.6	0.374108	97.7692
+3.75	339.2	353.4	14.2	2862.8	0.48737	98.2566
+4.00	288.8	300.5	11.7	2874.5	0.401565	98.6581
>4.00	297.4	336.5	39.1	2913.6	1.34198	100
			2913.6		0	100

Initial Weight = 2929.4 Percent Loss = 0.54

Summary Statistics: M_z = -1.70ϕ σ_i = 2.15ϕ

Sk_i = 0.53 K_G = 1.00

Sample 93 Mount View Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.3	1339.2	833.9	833.9	10.6762	10.6762
-5.50	557.5	1895.8	1338.3	2172.2	17.134	27.8102
-5.00	568.1	1106.8	538.7	2710.9	6.89686	34.7071
-4.50	498.8	1051.6	552.8	3263.7	7.07738	41.7845
-4.25	607.2	830.2	223.0	3486.7	2.85502	44.6395
-4.00	568.3	938.5	370.2	3856.9	4.73959	49.3791
-3.75	576.6	845.6	269.0	4125.9	3.44395	52.823
-3.50	514.3	762.2	247.9	4373.8	3.17381	55.9968
-3.25	501.7	720.6	218.9	4592.7	2.80253	58.7994
-3.00	524.7	682.8	158.1	4750.8	2.02412	60.8235
-2.75	465.0	639.8	174.8	4925.6	2.23793	63.0614
-2.50	474.5	595.0	120.5	5046.1	1.54274	64.6041
-2.25	454.8	572.4	117.6	5163.7	1.50561	66.1098
-2.00	454.0	563.5	109.5	5273.2	1.40191	67.5117
-1.75	444.0	524.8	80.8	5354.0	1.03447	68.5461
-1.50	468.8	551.3	82.5	5436.5	1.05623	69.6024
-1.25	409.0	477.0	68.0	5504.5	0.870589	70.473
-1.00	473.9	547.8	73.9	5578.4	0.946126	71.4191
-0.75	453.0	523.9	70.9	5649.3	0.907718	72.3268
-0.50	365.5	448.1	82.6	5731.9	1.05751	73.3843
-0.25	453.1	579.8	126.7	5858.6	1.62211	75.0064
+0.00	343.0	458.0	115.0	5973.6	1.47232	76.4787
+0.25	430.1	590.1	160.0	6133.6	2.04845	78.5272
+0.50	413.8	635.1	221.3	6354.9	2.83326	81.3604
+0.75	415.3	595.8	180.5	6535.4	2.3109	83.6713
+1.00	399.0	639.2	240.2	6775.6	3.07523	86.7466
+1.25	308.3	580.6	272.3	7047.9	3.4862	90.2328
+1.50	339.9	606.5	266.6	7314.5	3.41322	93.646
+1.75	380.0	520.3	140.3	7454.8	1.79623	95.4422
+2.00	324.9	472.3	147.4	7602.2	1.88713	97.3294
+2.25	360.6	414.4	53.8	7656.0	0.68879	98.0181
+2.50	309.5	363.9	54.4	7710.4	0.696472	98.7146
+2.75	353.9	388.6	34.7	7745.1	0.444257	99.1589
+3.00	317.4	333.0	15.6	7760.7	0.199723	99.3586
+3.25	255.6	273.7	18.1	7778.8	0.23173	99.5903
+3.50	298.3	303.0	4.7	7783.5	0.0601731	99.6505
+3.75	339.2	346.2	7.0	7790.5	0.0896195	99.7401
+4.00	288.7	293.5	4.8	7795.3	0.0614534	99.8016
>4.00	297.9	313.4	15.5	7810.8	0.198443	100
			7810.8		0	100

Initial Weight = 7794.9g Percent Loss = +0.20

Summary Statistics: M_z = -3.06ϕ σ_I = 2.78ϕ

Sk_I = 0.42 K_G = 0.61

Sample 94 Mount View Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.3	548.3	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.4	557.4	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.4	498.4	0.00	0.00	0.00	0.00
-4.25	607.2	607.2	0.00	0.00	0.00	0.00
-4.00	567.6	576.9	9.3	9.3	1.3299	1.33076
-3.75	576.4	576.4	0.0	9.3	0.0	1.33076
-3.50	514.1	514.1	0.0	9.3	0.0	1.33076
-3.25	501.4	503.2	1.8	11.1	0.2574	1.58816
-3.00	524.2	524.2	0.0	11.1	0.0	1.58816
-2.75	464.7	465.2	0.5	11.6	0.0715001	1.65966
-2.50	474.2	474.2	0.0	11.6	0.0	1.65966
-2.25	454.4	454.6	0.2	11.8	0.0286	1.68826
-2.00	453.4	453.7	0.3	12.1	0.0429	1.73116
-1.75	443.6	443.7	0.1	12.2	0.0143	1.74546
-1.50	468.3	468.8	0.5	12.7	0.0715001	1.81696
-1.25	408.6	409.0	0.4	13.1	0.0572001	1.87416
-1.00	473.8	474.3	0.5	13.6	0.0715001	1.94566
-0.75	452.6	453.3	0.7	14.3	0.1001	2.04576
-0.50	364.8	365.9	1.1	15.4	0.1573	2.20306
-0.25	452.3	454.9	2.6	18.0	0.3718	2.57486
+0.00	342.1	345.1	3.0	21.0	0.429	3.00386
+0.25	429.2	433.1	3.9	24.9	0.557701	3.56156
+0.50	412.7	419.2	6.5	31.4	0.929501	4.49106
+0.75	414.3	419.9	5.6	37.0	0.800801	5.29186
+1.00	397.9	412.6	14.7	51.7	2.1021	7.39396
+1.25	307.5	332.1	24.6	76.3	3.5178	10.9118
+1.50	339.3	405.5	66.2	142.5	9.46661	20.3784
+1.75	379.5	436.0	56.5	199.0	8.07951	28.4579
+2.00	324.5	458.7	134.2	333.2	19.1906	47.6485
+2.25	360.2	460.2	100.0	433.2	14.3	61.9485
+2.50	309.2	418.9	109.7	542.9	15.6871	77.6356
+2.75	353.2	426.2	73.0	615.9	10.439	88.0746
+3.00	316.6	344.1	27.5	643.4	3.9325	92.0071
+3.25	255.2	286.9	31.7	675.1	4.5331	96.5402
+3.50	329.8	337.1	7.3	682.4	1.0439	97.5841
+3.75	338.8	345.1	6.3	688.7	0.900901	98.485
+4.00	288.2	292.4	4.2	692.9	0.600601	99.0856
>4.00	295.9	302.3	6.4	699.3	0.915201	100.00
			699.3		0	100.00

Initial Weight = 3307.6g
Split Weight = 701.6g

Percent Loss = 0.33
Split Factor = 4.71

Summary Statistics: M_z = 1.80ϕ σ_i = 0.57ϕ

Sk_i = -0.12 K_G = 1.23

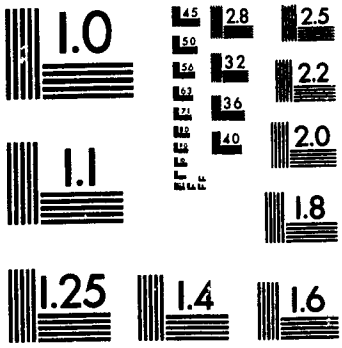
Sample 95 Mount View Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	465.0	465.0	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.4	453.4	0.00	0.00	0.00	0.00
-1.75	443.5	443.5	0.00	0.00	0.00	0.00
-1.50	468.5	468.5	0.00	0.00	0.00	0.00
-1.25	408.9	408.9	0.00	0.00	0.00	0.00
-1.00	473.0	473.1	0.1	0.1	0.0177399	0.0177331
-0.75	452.0	452.0	0.0	0.1	0.0	0.0177331
-0.50	364.6	364.7	0.1	0.2	0.0177399	0.035673
-0.25	452.0	452.2	0.2	0.4	0.0354799	0.0741529
+0.00	342.2	342.3	0.1	0.5	0.0177399	0.0918928
+0.25	429.0	429.2	0.2	0.7	0.0354799	0.127373
+0.50	412.3	412.9	0.6	1.3	0.10644	0.233813
+0.75	414.0	414.5	0.5	1.8	0.0886997	0.322512
+1.00	397.5	399.5	2.0	3.8	0.354799	0.677311
+1.25	307.1	310.3	3.2	7.0	0.567678	1.24499
+1.50	340.0	346.5	6.5	13.5	1.1531	2.39809
+1.75	379.3	385.9	6.6	20.1	1.17084	3.56893
+2.00	324.4	338.9	14.5	34.6	2.57229	6.14122
+2.25	360.0	374.1	14.1	48.7	2.50133	8.64255
+2.50	309.1	334.0	24.9	73.6	4.41724	13.0598
+2.75	353.1	390.9	37.8	111.4	6.70569	19.7655
+3.00	316.6	344.3	27.7	139.1	4.91396	24.6794
+3.25	255.2	317.2	62.0	201.1	10.9988	35.6782
+3.50	329.7	358.6	28.9	230.0	5.12684	40.8051
+3.75	338.8	384.9	46.1	276.1	8.17811	48.9832
+4.00	288.2	332.7	44.5	320.6	7.89427	56.8775
>4.00	295.9	539.0	243.1	563.7	43.1258	100.00
			563.7		0	100.00

Initial Weight = 3447.0g
Split Weight = 567.0g

Percent Loss = 0.58
Split Factor = 6.08

Summary Statistics: Were not performed as over 40% of the sample is finer than +4.00ϕ



Sample 96 Mount View Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.3	730.6	162.3	162.3	3.68897	3.68904
-4.50	498.9	993.8	494.9	657.2	11.2487	14.9377
-4.25	607.3	659.6	52.3	709.5	1.18874	16.1265
-4.00	568.4	828.9	260.5	970.0	5.92099	22.0475
-3.75	576.6	791.9	215.3	1185.3	4.89363	26.9411
-3.50	514.4	796.0	281.6	1466.9	6.40058	33.3417
-3.25	501.8	742.0	240.2	1707.1	5.45959	38.8013
-3.00	524.7	691.6	166.9	1874.0	3.79353	42.5948
-2.75	465.1	688.2	223.1	2097.1	5.07092	47.6657
-2.50	474.5	644.6	170.1	2267.2	3.86626	51.532
-2.25	454.8	609.9	155.1	2422.3	3.52532	55.0573
-2.00	454.0	608.6	154.6	2576.9	3.51396	58.5713
-1.75	444.1	568.1	124.0	2700.9	2.81844	61.3897
-1.50	468.8	602.8	134.0	2834.9	3.04573	64.4354
-1.25	409.1	521.0	111.9	2946.8	2.54341	66.9788
-1.00	474.0	606.6	132.6	3079.4	3.01391	69.9927
-0.75	453.0	572.7	119.7	3199.1	2.7207	72.7134
-0.50	365.5	499.4	133.9	3333.0	3.04346	75.7569
-0.25	453.2	589.3	136.1	3469.1	3.09346	78.8504
+0.00	343.2	452.7	109.5	3578.6	2.48886	81.3392
+0.25	430.2	542.1	111.9	3690.5	2.54341	83.8826
+0.50	413.8	528.2	114.4	3804.9	2.60024	86.4829
+0.75	415.3	488.7	73.4	3878.3	1.66833	88.1512
+1.00	399.2	510.6	111.4	3989.7	2.53205	90.6833
+1.25	308.4	386.7	78.3	4068.0	1.77971	92.463
+1.50	339.9	411.7	71.8	4139.8	1.63197	94.0949
+1.75	380.1	419.8	39.7	4179.5	0.902355	94.9973
+2.00	324.9	371.5	46.6	4226.1	1.05919	96.0565
+2.25	360.6	381.4	20.8	4246.9	0.47277	96.5293
+2.50	309.5	348.2	38.7	4285.6	0.879625	97.4089
+2.75	353.9	372.6	18.7	4304.3	0.425039	97.8339
+3.00	317.4	320.6	3.2	4307.5	0.0727339	97.9067
+3.25	343.9	347.2	3.3	4310.8	0.0750068	97.9817
+3.50	298.3	303.7	5.4	4316.2	0.122738	98.1044
+3.75	339.1	347.9	8.8	4325.0	0.200018	98.3044
+4.00	288.7	301.9	13.2	4338.2	0.300027	98.6044
>4.00	297.5	358.9	61.4	4399.6	1.39558	100
			4399.6		0	100

Initial Weight = 4406.0g

Percent Loss = 0.14

Summary Statistics: M_z = -2.30ϕ

σ_i = 2.08ϕ

Sk_i = 0.28

K_G = 0.76

Sample 97 Mount View Esker - Site 6 (North)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.2	1110.5	542.3	542.3	11.2301	11.2302
-4.50	498.8	843.8	345.0	887.3	7.14434	18.3745
-4.25	607.2	808.9	201.7	1089.0	4.17685	22.5514
-4.00	568.3	1046.8	478.5	1567.5	9.90888	32.4602
-3.75	576.6	1054.3	477.7	2045.2	9.89232	42.3526
-3.50	514.3	1026.4	512.1	2557.3	10.6047	52.9573
-3.25	501.8	990.0	488.2	3045.5	10.1098	63.0671
-3.00	524.7	849.7	325.0	3370.5	6.73017	69.7972
-2.75	465.0	774.2	309.2	3679.7	6.40298	76.2002
-2.50	474.5	672.2	197.7	3877.4	4.09402	80.2942
-2.25	454.8	582.1	127.3	4004.7	2.63616	82.9304
-2.00	454.0	564.9	110.9	4115.6	2.29654	85.2269
-1.75	444.0	512.3	68.3	4183.9	1.41437	86.6413
-1.50	468.8	527.8	59.0	4242.9	1.22179	87.8631
-1.25	409.0	448.0	39.0	4281.9	0.807621	88.6707
-1.00	474.0	507.1	33.1	4315.0	0.685442	89.3561
-0.75	453.0	478.9	25.9	4340.9	0.536343	89.8925
-0.50	365.5	389.5	24.0	4364.9	0.496997	90.3895
-0.25	453.2	481.5	28.3	4393.2	0.586043	90.9755
+0.00	343.1	361.7	18.6	4411.8	0.385173	91.3607
+0.25	430.3	451.0	20.7	4432.5	0.42866	91.7894
+0.50	413.7	438.5	24.8	4457.3	0.513564	92.3029
+0.75	415.3	433.6	18.3	4475.6	0.37896	92.6819
+1.00	399.1	433.1	34.0	4509.6	0.70408	93.386
+1.25	308.4	341.8	33.4	4543.0	0.691655	94.0776
+1.50	340.0	383.1	43.1	4586.1	0.892524	94.9701
+1.75	380.1	402.4	22.3	4608.4	0.461793	95.4319
+2.00	324.9	359.6	34.7	4643.1	0.718575	96.1505
+2.25	360.6	381.1	20.5	4663.6	0.424519	96.575
+2.50	309.5	330.5	21.0	4684.6	0.434873	97.0099
+2.75	353.9	371.1	17.2	4701.8	0.356181	97.3661
+3.00	317.4	326.1	8.7	4710.5	0.180162	97.5462
+3.50	298.3	314.3	16.0	4726.5	0.331332	97.8776
+3.75	339.2	350.0	10.8	4737.3	0.223649	98.1012
+4.00	288.7	362.8	74.1	4811.4	1.53448	99.6357
>4.00	298.0	315.6	17.6	4829.0	0.364465	100
			4829.0		0	100

Initial Weight = 4833.6g

Percent Loss = 0.095

Summary Statistics: M_z = -3.56ϕ

σ_i = 1.56ϕ

Sk_i = 0.26

K_G = 1.90

Sample 98 Hopeville Esker - Site 2 (Exposure A)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.6	557.6	0.00	0.00	0.00	0.00
-5.00	568.2	568.2	0.00	0.00	0.00	0.00
-4.50	498.9	498.9	0.00	0.00	0.00	0.00
-4.25	607.3	607.3	0.00	0.00	0.00	0.00
-4.00	568.3	568.3	0.00	0.00	0.00	0.00
-3.75	576.6	576.6	0.00	0.00	0.00	0.00
-3.50	514.4	514.4	0.00	0.00	0.00	0.00
-3.25	501.8	501.8	0.00	0.00	0.00	0.00
-3.00	524.7	524.7	0.00	0.00	0.00	0.00
-2.75	465.0	465.0	0.00	0.00	0.00	0.00
-2.50	474.5	474.5	0.00	0.00	0.00	0.00
-2.25	454.8	454.8	0.00	0.00	0.00	0.00
-2.00	454.0	454.0	0.00	0.00	0.00	0.00
-1.75	444.0	444.0	0.00	0.00	0.00	0.00
-1.50	468.8	468.8	0.00	0.00	0.00	0.00
-1.25	409.1	409.1	0.00	0.00	0.00	0.00
-1.00	474.0	474.0	0.00	0.00	0.00	0.00
-0.75	453.0	453.5	0.5	0.5	0.01675	0.01675
-0.50	365.5	365.5	0.0	0.5	0.0	0.01675
-0.25	453.2	453.2	0.0	0.5	0.0	0.01675
+0.00	343.1	343.1	0.0	0.5	0.0	0.01675
+0.25	430.2	430.2	0.0	0.5	0.0	0.01675
+0.50	413.7	413.8	0.1	0.6	0.00322737	0.0199774
+0.75	415.2	415.3	0.1	0.7	0.00322737	0.0232047
+1.00	399.1	399.3	0.2	0.9	0.00645474	0.0296595
+1.25	308.3	308.5	0.2	1.1	0.00645474	0.0361142
+1.50	339.9	341.8	1.9	3.0	0.06132	0.0974342
+1.75	380.1	389.2	9.1	12.1	0.29369	0.391124
+2.00	324.9	397.8	72.9	85.0	2.35275	2.74387
+2.25	360.6	541.5	180.9	265.9	5.83831	8.58218
+2.50	309.6	1021.4	711.8	977.7	22.9724	31.5546
+2.75	354.0	1132.1	778.1	1755.8	25.1122	56.6668
+3.00	317.4	702.3	384.9	2140.7	12.4221	69.0889
+3.25	343.9	837.1	493.2	2633.9	15.9174	85.0063
+3.50	298.4	453.8	155.4	2789.3	5.01533	90.0216
+3.75	339.2	476.4	137.2	2926.5	4.42795	94.4496
+4.00	288.7	378.2	89.5	3016.0	2.88849	97.3381
>4.00	298.1	380.6	82.5	3098.5	2.66258	100.00
			3098.5		0	100.00

Initial Weight = 3105.0g

Percent Loss = 0.21

Summary Statistics: $M_z = 2.63\phi$

$\sigma_i = 0.37\phi$

$Sk_i = 0.19$

$K_G = 1.06$

Sample 99 Hopeville Esker - Site 2 (Exposure A)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	6913.5	6408.1	6408.1	61.1279	61.1279
-5.50	557.5	1517.0	959.5	7367.6	9.15283	70.2807
-5.00	568.2	794.3	226.1	7593.7	2.1568	72.4375
-4.50	498.8	963.5	464.7	8058.4	4.43285	76.8704
-4.25	607.2	742.4	135.2	8193.6	1.28969	78.1601
-4.00	568.3	731.9	163.6	8357.2	1.56061	79.7207
-3.75	576.6	712.3	135.7	8492.9	1.29446	81.0151
-3.50	514.3	672.6	158.3	8651.2	1.51005	82.5252
-3.25	501.7	603.5	101.8	8753.0	0.971087	83.4963
-3.00	524.7	613.6	88.9	8841.9	0.848032	84.3443
-2.75	465.0	547.8	82.8	8924.7	0.789843	85.1342
-2.50	474.5	529.1	54.6	8979.3	0.520838	85.655
-2.25	454.7	497.3	42.6	9021.9	0.406368	86.0614
-2.00	453.9	489.8	35.9	9057.8	0.342456	86.4038
-1.75	444.1	464.5	20.4	9078.2	0.194599	86.5984
-1.50	468.7	487.8	19.1	9097.3	0.182198	86.7806
-1.25	409.0	425.0	16.0	9113.3	0.152627	86.9332
-1.00	473.9	490.9	17.0	9130.3	0.162166	87.0954
-0.75	452.9	470.4	17.5	9147.8	0.166935	87.2623
-0.50	365.5	387.2	21.7	9169.5	0.207	87.4693
-0.25	453.1	491.5	38.4	9207.9	0.366304	87.8357
+0.00	343.0	392.0	49.0	9256.9	0.467419	88.3031
+0.25	430.1	502.2	72.1	9329.0	0.687774	88.9908
+0.50	413.7	551.8	138.1	9467.1	1.31736	90.3082
+0.75	415.2	557.3	142.1	9609.2	1.35552	91.6637
+1.00	399.1	684.7	285.6	9894.8	2.72438	94.3881
+1.25	308.4	513.3	204.9	10099.7	1.95457	96.3427
+1.50	339.9	493.9	154.0	10253.7	1.46903	97.8117
+1.75	380.0	438.7	58.7	10312.4	0.559949	98.3717
+2.00	324.9	379.7	54.8	10367.2	0.522746	98.8944
+2.25	360.6	387.6	27.0	10394.2	0.257557	99.152
+2.50	309.5	331.5	22.0	10416.2	0.209862	99.3618
+2.75	353.9	369.5	15.6	10431.8	0.148811	99.5106
+3.00	317.4	325.6	8.2	10440.0	0.0782211	99.5889
+3.25	255.6	265.4	9.8	10449.8	0.0934838	99.6823
+3.50	298.3	301.6	3.3	10453.1	0.0314792	99.7138
+3.75	339.1	344.4	5.3	10458.4	0.0505576	99.7644
+4.00	288.6	293.1	4.5	10462.9	0.0429262	99.8073
>4.00	297.3	317.5	20.2	10483.1	0.192691	100
			10483.1		0	100

Initial Weight = 10487.0g

Percent Loss = 0.037

Summary Statistics: M_z = 5.26ϕ

σ_i = 1.93ϕ

Sk_i = 0.85

K_G = 2.07

Sample 100 Hopeville Esker - Site 2 (Exposure A)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	465.0	465.0	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.4	453.5	0.1	0.1	0.0249066	0.028385
-1.75	443.5	443.5	0.0	0.1	0.0	0.028385
-1.50	468.5	468.6	0.1	0.2	0.0249066	0.053301
-1.25	408.9	408.9	0.0	0.2	0.0	0.053301
-1.00	473.5	473.8	0.3	0.5	0.0747198	0.12802
-0.75	452.4	452.5	0.1	0.6	0.0249066	0.152927
-0.50	364.9	365.1	0.2	0.8	0.0498132	0.20274
-0.25	452.2	452.6	0.4	1.2	0.0996264	0.302366
+0.00	342.3	342.6	0.3	1.5	0.0747198	0.377086
+0.25	429.2	429.3	0.1	1.6	0.0249066	0.401993
+0.50	412.6	412.6	0.0	1.6	0.0	0.401993
+0.75	414.3	414.3	0.0	1.6	0.0	0.401993
+1.00	397.9	398.2	0.3	1.9	0.0747198	0.476712
+1.25	307.5	307.7	0.2	2.1	0.0498132	0.526526
+1.50	340.2	340.5	0.3	2.4	0.0747198	0.601245
+1.75	379.4	379.5	0.1	2.5	0.0249066	0.626152
+2.00	324.6	324.9	0.3	2.8	0.0747198	0.700872
+2.25	360.1	360.4	0.3	3.1	0.0747198	0.775592
+2.50	309.2	309.6	0.4	3.5	0.0996264	0.875218
+2.75	353.1	354.8	1.7	5.2	0.423412	1.29863
+3.00	316.7	318.2	1.5	6.7	0.373599	1.67223
+3.25	255.3	259.3	4.0	10.7	0.996264	2.66849
+3.50	329.8	331.6	1.8	12.5	0.448319	3.11681
+3.75	338.8	342.7	3.9	16.4	0.971357	4.08817
+4.00	288.3	300.6	12.3	28.7	3.06351	7.15168
>4.00	296.6	669.4	372.8	401.5	92.8518	100.00
			401.5		0	100.00

Initial Weight = 1683.8g
Split Weight = 403.9g

Percent Loss = 0.59
Split Factor = 4.17

Summary Statistics: Were not performed as over 90% of the sample is finer than +4.00ϕ

Sample 102 Hopeville Esker - Site 2 (Exposure D)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.1	659.6	91.5	91.5	2.47907	2.47915
-4.50	489.8	640.7	150.9	242.4	4.08843	6.56758
-4.25	607.2	693.7	86.5	328.9	2.3436	8.91118
-4.00	568.2	731.1	162.9	491.8	4.41356	13.3247
-3.75	576.6	675.0	98.4	590.2	2.66602	15.9908
-3.50	514.3	620.5	106.2	696.4	2.87735	18.8681
-3.25	501.7	621.9	120.2	816.6	3.25666	22.1248
-3.00	524.6	650.2	125.6	942.2	3.40296	25.5277
-2.75	465.0	582.3	117.3	1059.5	3.17809	28.7058
-2.50	474.5	591.1	116.6	1176.1	3.15912	31.8649
-2.25	454.7	548.2	93.5	1269.6	2.53326	34.3982
-2.00	454.0	580.0	126.0	1395.6	3.4138	37.812
-1.75	444.0	540.5	96.5	1492.1	2.61454	40.4265
-1.50	468.7	579.8	111.1	1603.2	3.01011	43.4367
-1.25	409.0	506.2	97.2	1700.4	2.6335	46.0702
-1.00	473.9	591.0	117.1	1817.5	3.17267	49.2428
-0.75	452.9	563.3	110.4	1927.9	2.99114	52.234
-0.50	365.4	505.1	139.7	2067.6	3.78498	56.0189
-0.25	453.1	653.5	200.4	2268.0	5.42957	61.4485
+0.00	343.0	526.6	183.6	2451.6	4.9744	66.4229
+0.25	430.2	593.4	163.2	2614.8	4.42169	70.8446
+0.50	413.7	667.6	253.9	2868.7	6.87908	77.7237
+0.75	415.2	618.3	203.1	3071.8	5.50272	83.2264
+1.00	399.0	672.5	273.5	3345.3	7.41012	90.6365
+1.25	308.3	457.0	148.7	3494.0	4.02883	94.6654
+1.50	339.9	436.2	96.3	3590.3	2.60912	97.2745
+1.75	380.0	409.6	29.6	3619.9	0.801972	98.0764
+2.00	324.9	348.6	23.7	3643.6	0.64212	98.7186
+2.25	360.6	369.0	8.4	3652.0	0.227587	98.9462
+2.50	309.5	315.9	6.4	3658.4	0.173399	99.1195
+2.75	353.9	358.0	4.1	3662.5	0.111084	99.2306
+3.00	317.4	319.9	2.5	3665.0	0.0677342	99.2984
+3.25	255.6	258.6	3.0	3668.0	0.081281	99.3796
+3.50	298.3	299.5	1.2	3669.2	0.0325124	99.4122
+3.75	339.1	341.3	2.2	3671.4	0.0596061	99.4718
+4.00	288.6	290.7	2.1	3673.5	0.0568967	99.5287
>4.00	297.9	315.3	17.4	3690.9	0.47143	100
			3690.9		0	100

Initial Weight = 3684.3g Percent Loss = +0.17

Summary Statistics: M_z = -1.36ϕ σ_i = 1.94ϕ

Sk_i = -0.28 K_G = 0.69

Sample 103 Hopeville Esker - Site 2 (Exposure D)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	465.0	465.8	0.8	0.8	0.162866	0.165105
-2.50	473.9	473.9	0.0	0.8	0.0	0.165105
-2.25	454.5	454.5	0.0	0.8	0.0	0.165105
-2.00	453.6	453.7	0.1	0.9	0.0203583	0.185464
-1.75	443.8	443.9	0.1	1.0	0.0203583	0.205822
-1.50	468.1	468.6	0.5	1.5	0.101792	0.307614
-1.25	408.6	408.6	0.0	1.5	0.0	0.307614
-1.00	473.7	473.8	0.1	1.6	0.0203583	0.327972
-0.75	452.3	452.6	0.3	1.9	0.0610749	0.389047
-0.50	365.0	365.0	0.0	1.9	0.0	0.389047
-0.25	452.2	452.4	0.2	2.1	0.0407166	0.429764
+0.00	342.3	342.4	0.1	2.2	0.0203583	0.450122
+0.25	429.2	429.2	0.0	2.2	0.0	0.450122
+0.50	412.5	412.7	0.2	2.4	0.0407166	0.490839
+0.75	414.3	414.4	0.1	2.5	0.0203583	0.511197
+1.00	397.8	398.1	0.3	2.8	0.0610749	0.572272
+1.25	307.3	307.7	0.4	3.2	0.0814332	0.653705
+1.50	339.6	340.0	0.4	3.6	0.0814332	0.735138
+1.75	379.3	379.5	0.2	3.8	0.0407166	0.775855
+2.00	324.6	324.9	0.3	4.1	0.0610749	0.83693
+2.25	360.1	360.4	0.3	4.4	0.0610749	0.898005
+2.50	309.1	310.2	1.1	5.5	0.223941	1.12195
+2.75	353.1	357.0	3.9	9.4	0.793974	1.91592
+3.00	316.7	321.6	4.9	14.3	0.997557	2.91348
+3.25	255.2	278.4	23.2	37.5	4.72313	7.63661
+3.50	329.7	350.3	20.6	58.1	4.19381	11.8304
+3.75	338.8	398.1	59.3	117.4	12.0725	23.9029
+4.00	288.2	398.4	110.2	227.6	22.4349	46.3378
>4.00	295.9	559.5	263.6	491.2	53.6645	100.00
			491.2		0	100.00

Initial Weight = 1949.8g
Split Weight = 490.5g

Percent Loss = +0.14
Split Factor = 3.97

Summary Statistics: Were not performed as over 50% of the sample is finer than +4.00ϕ

Sample 104 Hopeville Esker - Site 2 (Exposure E)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.6	548.6	0.00	0.00	0.00	0.00
-6.00	504.8	504.8	0.00	0.00	0.00	0.00
-5.50	557.0	557.0	0.00	0.00	0.00	0.00
-5.00	567.5	567.5	0.00	0.00	0.00	0.00
-4.50	498.5	554.3	55.8	55.8	4.31855	4.31886
-4.25	607.1	619.7	12.6	68.4	0.975157	5.29402
-4.00	567.8	573.9	6.1	74.5	0.4721	5.76612
-3.75	576.1	592.2	16.1	90.6	1.24603	7.01215
-3.50	513.9	525.2	11.3	101.9	0.874545	7.88669
-3.25	501.6	525.4	23.8	125.7	1.84196	9.72865
-3.00	524.2	536.9	12.7	138.4	0.982896	10.7115
-2.75	464.8	479.5	14.7	153.1	1.13768	11.8492
-2.50	474.2	491.0	16.8	169.9	1.30021	13.1494
-2.25	454.5	470.4	15.9	185.8	1.23055	14.38
-2.00	453.6	474.9	21.3	207.1	1.64848	16.0285
-1.75	443.5	461.9	18.4	225.5	1.42404	17.4525
-1.50	468.4	492.8	24.4	249.9	1.8884	19.3409
-1.25	408.7	439.8	31.1	281.0	2.40693	21.7478
-1.00	473.6	514.3	40.7	321.7	3.14991	24.8977
-0.75	452.6	493.1	40.5	362.2	3.13443	28.0322
-0.50	365.1	408.9	43.8	406.0	3.38983	31.422
-0.25	452.6	510.8	58.2	464.2	4.5043	35.9263
+0.00	342.5	379.5	37.0	501.2	2.86356	38.7899
+0.25	429.5	457.3	27.8	529.0	2.15154	40.9414
+0.50	413.2	454.3	41.1	570.1	3.18087	44.1223
+0.75	414.8	443.1	28.3	598.4	2.19023	46.3125
+1.00	398.3	440.5	42.2	640.6	3.266	49.5785
+1.25	307.8	337.9	30.1	670.7	2.32954	51.908
+1.50	339.5	376.4	36.9	707.6	2.85582	54.7639
+1.75	379.7	395.8	16.1	723.7	1.24603	56.0099
+2.00	324.6	353.5	28.9	752.6	2.23667	58.2466
+2.25	360.3	386.7	26.4	779.0	2.04319	60.2898
+2.50	309.1	346.6	37.5	816.5	2.90225	63.192
+2.75	353.6	422.0	68.4	884.9	5.29371	68.4857
+3.00	317.2	318.2	1.0	885.9	0.0773934	68.5631
+3.25	255.4	279.8	24.4	910.3	1.8884	70.4515
+3.50	329.9	350.5	20.6	930.9	1.5943	72.0458
+3.75	338.9	400.4	61.5	992.4	4.75969	76.8055
+4.00	288.4	408.3	119.9	1112.3	9.27947	86.085
>4.00	297.4	477.2	179.8	1292.1	13.9153	100
			1292.1		0	100

Initial Weight = 1294.5g Percent Loss = 0.18

Summary Statistics: M_i = 0.90ϕ σ_i = 3.00ϕ

Sample 105 Hopeville Esker - Site 2 (Exposure E)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	514.2	0.00	0.00	0.00	0.00
-3.25	501.3	501.3	0.00	0.00	0.00	0.00
-3.00	524.2	524.2	0.00	0.00	0.00	0.00
-2.75	464.6	464.6	0.00	0.00	0.00	0.00
-2.50	473.9	473.9	0.00	0.00	0.00	0.00
-2.25	454.5	454.5	0.00	0.00	0.00	0.00
-2.00	453.4	453.4	0.00	0.00	0.00	0.00
-1.75	443.6	443.6	0.00	0.00	0.00	0.00
-1.50	468.2	468.2	0.00	0.00	0.00	0.00
-1.25	408.7	408.7	0.00	0.00	0.00	0.00
-1.00	473.4	473.4	0.00	0.00	0.00	0.00
-0.75	452.4	452.4	0.00	0.00	0.00	0.00
-0.50	364.9	364.9	0.00	0.00	0.00	0.00
-0.25	452.2	452.2	0.00	0.00	0.00	0.00
+0.00	342.3	342.4	0.1	0.1	0.0132048	0.0161039
+0.25	429.2	429.4	0.2	0.3	0.0264096	0.0425195
+0.50	412.6	412.7	0.1	0.4	0.0132048	0.0557243
+0.75	414.1	414.4	0.3	0.7	0.0396144	0.0953387
+1.00	398.0	398.0	0.0	0.7	0.0	0.0953387
+1.25	307.4	307.7	0.3	1.0	0.0396144	0.134953
+1.50	339.6	342.8	3.2	4.2	0.422554	0.557507
+1.75	379.4	386.3	6.9	11.1	0.911132	1.46864
+2.00	324.6	352.3	27.7	38.8	3.65773	5.12637
+2.25	360.3	403.6	43.3	82.1	5.71768	10.844
+2.50	309.2	400.6	91.4	173.5	12.0692	22.9132
+2.75	353.2	503.9	150.7	324.2	19.8996	42.8128
+3.00	316.8	370.0	53.2	377.4	7.02496	49.8378
+3.25	255.3	451.9	196.6	574.0	25.9606	75.7984
+3.50	329.8	369.7	39.9	613.9	5.26872	81.0671
+3.75	338.9	408.7	69.8	683.7	9.21695	90.2841
+4.00	288.1	323.4	35.3	719.0	4.6613	94.9454
>4.00	296.5	334.8	38.3	757.3	5.05744	100.00
			757.3		0	100.00

Initial Weight = 3156.2g
Split Weight = 759.8g

Percent Loss = 0.33
Split Factor = 4.15

Summary Statistics: M_z = 2.80ϕ σ_I = 0.59ϕ

Sk_I = -0.11 K_G = 1.23

Sample 106 Hopeville Esker - Site 2 (Exposure E)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.0	505.0	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	567.6	567.6	0.00	0.00	0.00	0.00
-4.50	498.6	498.6	0.00	0.00	0.00	0.00
-4.25	607.4	607.4	0.00	0.00	0.00	0.00
-4.00	567.5	567.5	0.00	0.00	0.00	0.00
-3.75	576.4	576.4	0.00	0.00	0.00	0.00
-3.50	514.2	516.4	2.2	2.2	0.44337	0.444982
-3.25	501.3	501.3	0.0	2.2	0.0	0.444982
-3.00	524.2	524.2	0.0	2.2	0.0	0.444982
-2.75	464.6	464.6	0.0	2.2	0.0	0.444982
-2.50	473.9	473.9	0.0	2.2	0.0	0.444982
-2.25	454.5	454.5	0.0	2.2	0.0	0.444982
-2.00	453.4	453.6	0.2	2.4	0.0403063	0.485289
-1.75	443.6	443.6	0.0	2.4	0.0	0.485289
-1.50	468.2	468.3	0.1	2.5	0.0201532	0.505442
-1.25	408.7	408.7	0.0	2.5	0.0	0.505442
-1.00	473.4	473.7	0.3	2.8	0.0604595	0.565901
-0.75	452.4	452.5	0.1	2.9	0.0201532	0.586054
-0.50	364.9	364.9	0.0	2.9	0.0	0.586054
-0.25	452.2	452.4	0.2	3.1	0.0403063	0.626361
+0.00	342.3	342.4	0.1	3.2	0.0201532	0.646514
+0.25	429.2	429.5	0.3	3.5	0.0604595	0.706973
+0.50	412.7	413.1	0.4	3.9	0.0806127	0.787586
+0.75	414.3	414.7	0.4	4.3	0.0806127	0.868199
+1.00	398.0	398.8	0.8	5.1	0.161225	1.02942
+1.25	307.3	307.3	0.0	5.1	0.0	1.02942
+1.50	339.3	340.9	1.6	6.7	0.322451	1.35187
+1.75	379.6	380.7	1.1	7.8	0.221685	1.57356
+2.00	324.7	328.7	4.0	11.8	0.806127	2.37969
+2.25	360.3	365.9	5.6	17.4	1.12858	3.50827
+2.50	309.4	330.0	20.6	38.0	4.15155	7.65982
+2.75	353.3	437.4	84.1	122.1	16.9488	24.6086
+3.00	316.8	375.2	58.4	180.5	11.7694	36.378
+3.25	255.5	415.2	159.7	340.2	32.1846	68.5626
+3.50	329.8	370.2	40.4	380.6	8.14188	76.7045
+3.75	338.9	389.6	50.7	431.3	10.2177	86.9222
+4.00	288.4	317.9	29.5	460.8	5.94518	92.8674
>4.00	296.5	331.9	35.4	496.2	7.13422	100.00
			496.2		0	100.00

Initial Weight = 1943.3g
Split Weight = 499.1g

Percent Loss = 0.06
Split Factor = 3.89

Summary Statistics: M_z = 3.00ϕ

σ_i = 0.46ϕ

Sk_i = 0.08

K_G = 1.39

Sample 107 Hopeville Esker - Site 2 (Exposure E)

Mesh Size	Wt. of Sieve	Samp.& Sieve	Wt. of Sample	Cum. Wt. of Sample	Relative Percent	Cum. Percent
-6.50	548.7	548.7	0.00	0.00	0.00	0.00
-6.00	505.4	505.4	0.00	0.00	0.00	0.00
-5.50	557.5	557.5	0.00	0.00	0.00	0.00
-5.00	568.2	1028.0	459.8	459.8	11.0849	11.085
-4.50	498.8	898.3	399.5	859.3	9.63115	20.7161
-4.25	607.3	704.9	97 6	956.9	2.35294	23.0691
-4.00	568.3	718.7	150.4	1107.3	3.62584	26.6949
-3.75	576.6	859.1	282.5	1389.8	6.81051	33.5054
-3.50	514.3	750.0	235.7	1625.5	5.68226	39.1877
-3.25	501.7	712.1	210.4	1835.9	5.07232	44.26
-3.00	524.6	694.5	169.9	2005.8	4.09595	48.3559
-2.75	465.0	640.9	175.9	2181.7	4.2406	52.5965
-2.50	474.4	600.7	126.3	2308.0	3.04484	55.6414
-2.25	454.7	544.5	89.8	2397.8	2.1649	57.8063
-2.00	453.9	531.6	77.7	2475.5	1.87319	59.6795
-1.75	444.0	507.7	63.7	2539.2	1.53568	61.2152
-1.50	468.7	530.2	61.5	2600.7	1.48264	62.6978
-1.25	409.0	460.3	51.3	2652.0	1.23674	63.9345
-1.00	473.9	531.4	57.5	2709.5	1.38621	65.3207
-0.75	452.9	508.5	55.6	2765.1	1.34041	66.6612
-0.50	365.4	437.3	71.9	2837.0	1.73337	68.3945
-0.25	453.1	573.8	120.7	2957.7	2.90984	71.3044
+0.00	343.0	465.3	122.3	3080.0	2.94841	74.2528
+0.25	430.1	566.8	136.7	3216.7	3.29556	77.5483
+0.50	413.8	628.8	215.0	3431.7	5.18322	82.7316
+0.75	415.3	590.8	175.5	3607.2	4.23095	86.9625
+1.00	399.0	647.2	248.2	3855.4	5.98361	92.9461
+1.25	308.3	441.2	132.9	3988.3	3.20395	96.1501
+1.50	339.9	421.4	81.5	4069.8	1.9648	98.1149
+1.75	380.0	405.1	25.1	4094.9	0.605111	98.72
+2.00	324.9	344.1	19.2	4114.1	0.462874	99.1828
+2.25	360.6	367.7	7.1	4121.2	0.171167	99.354
+2.50	309.5	315.1	5.6	4126.8	0.135005	99.489
+2.75	353.9	357.7	3.8	4130.6	0.0916104	99.5806
+3.00	317.4	319.8	2.4	4133.0	0.0578592	99.6385
+3.25	255.6	258.4	2.8	4135.8	0.0675024	99.706
+3.50	298.3	299.3	1.0	4136.8	0.024108	99.7301
+3.75	339.1	340.8	1.7	4138.5	0.0409836	99.7711
+4.00	288.6	290.1	1.5	4140.0	0.036162	99.8072
>4.00	297.3	305.3	8.0	4148.0	0.192864	100
			4148.0		0	100

Initial Weight = 4151.9g

Percent Loss = 0.094

Summary Statistics: M_z = -2.36ϕ σ_1 = 2.25ϕ

Sk_1 = -0.27 K_G = 1.55

Appendix B

PALEOCURRENT DATA

MOUNT VIEW ESKER - SITE 4 Ripples

Azimuths:

230	190	220	225	230	180	080	265	315	180
185	195	135	180	150	160	285	185	190	175
185	170	130	185	185	110	095	120	090	130
110	140	085	105						

Number of Observations = 34

Vector Mean = 166.1°

Magnitude of Vector Mean = 21.2%

MOUNT VIEW ESKER - SITE 1 Ripples

Azimuths:

110	065	085	080	110	060	030	150	200	110
060	190	110	300	265	020	275	325	355	180
160	280	340	030	340	120	125	165	130	145
295	155	145	165	350	140	180	135	335	175
140	190	175	195	200	140	175	210	175	195
100	165	215	340	345	095	275	105	075	105
185	080	020	140	050	085	125	025	305	065
105	075	290	275	300	135	270	135	110	265
230	270	135	280	285	090	120	190	035	120
010	095								

Number of Observations = 92

Vector Mean = 129.6°

Magnitude of Vector Mean = 23.4%

MOUNT VIEW ESKER - SITE 3 (North) Ripples

Azimuths:

080	075	095	310	085	150	060	120	130	235
290	100	085	130	130	310				

Number of Observations = 16

Vector Mean = 101.0°

Magnitude of Vector Mean = 7.2%

MOUNT VIEW ESKER - SITE 3 (South) Ripples

Azimuths:

235	230	035	320	350	315	355	010	150	355
340	320	340	330	330	350				

Number of Observations = 16

Vector Mean = 334.5°

Magnitude of Vector Mean = 10.5%

EGERTON ESKER - SITE 6 Ripples

Azimuths:

330	040	090	025	015	210	250	050	255	010
170	185	120	280	130	030	030	150	350	150
340	165	260	010	060	360	130	350	120	320
240	170	140	230	265					

Number of Observations = 35

Vector Mean = 49.6°

Magnitude of Vector Mean = 2.5%

HOPEVILLE ESKER - SITE 2 Ripples

Azimuths:

105	100	115	140	355	330	100	165	230

Number of Observations = 9

Vector Mean = 114.4°

Magnitude of Vector Mean = 3.7%

MOUNT VIEW ESKER - SITE 7 Cross-Beds

Azimuths:

064	088	007	044	056	081	073	083	067	050
056	055	037	022	061	051	074	086	079	078
050									

Number of Observations = 21

Vector Mean = 60.4°

Magnitude of Vector Mean = 19.7%

MOUNT VIEW ESKER - SITE 3 (South) Cross-Beds

Azimuths:

184	174	170	208	137	128	165	194	211	170
205	189	200	262	240	211	204	212	223	216
241	282	279	313	077	139	076	075	149	158
066	091	077	180						

Number of Observations = 34

Vector Mean = 185.5°

Magnitude of Vector Mean = 17.6%

MOUNT VIEW ESKER -SITE 2 Cross-Beds

Azimuths:

210	229	192	231	219	244	267	204	189	194
214	169	062	164	206	164	206	208	215	176
294	260	255	299	037	024				

Number of Observations = 24

Vector Mean = 215.2°

Magnitude of Vector Mean = 15.7%

EGERTON ESKER -SITE 6 Cross-Beds

Azimuths:

062	036	017	015	014	019	255	356	046	050
062	055	047	342	118	091	092	026	070	014
070	326	314	045	041	014	017	034	343	129
092	098	090	199	221	012	034	064	029	208
068	060	191	054	097	197	214	328	327	118
127									

Number of Observations = 51

Vector Mean = 47.5°

Magnitude of Vector Mean = 25.9%

EGERTON ESKER - SITE 4 Cross-Beds

Azimuths:

065	035	052	055	060	066	082	057	071	052
071	056	051	058	066	069	062	068	065	068
070	063	043	053	044	082	068	064	058	071
040	046	039	056	050	040	051	076	062	086
054	048	048	062	068	099	096			

Number of Observations = 47

Vector Mean = 60.9°

Magnitude of Vector Mean = 45.6%

EGERTON ESKER - SITE 1 Cross-Beds

Azimuths:

150	132	159	188	176	176	117	132	348	266
287	272	263	233	229	266	263			

Number of Observations = 17

Vector Mean = 212.8°

Magnitude of Vector Mean = 8.2%

HOPEVILLE ESKER - SITE 7 Cross-Beds

Azimuths:

045	065	059	030	021	303	302	048	050	030
049	014	066	026	046	066	047			

Number of Observations = 17

Vector Mean = 36.2°

Magnitude of Vector Mean = 14.1%

HOPEVILLE ESKER - SITE 2 Cross-Beds

Azimuths:

006	215	231	028	020	015	035	014	085	357
061	065	100	100	056	041	092	085		

Number of Observations = 18

Vector Mean = 51.0°

Magnitude of Vector Mean = 11.3%

Appendix C

GLOSSARY

Cross-Bed - a layer of sediment, 1cm or more in thickness, which is inclined with respect to the principal surface of accumulation; direction of inclination (dip) is the paleocurrent direction.

> ***Tabular Cross-Beds*** - have planar foresets which are bounded above and below by subhorizontal, subparallel erosion surfaces.
>
> ***Trough Cross-Beds*** - have concave foresets, usually lie in erosional scours and are truncated downstream by other concave foresets.

Cross-Lamination - similar in description to a cross-bed, but is restricted to a maximum thickness of 1cm and thus created through lower energy currents.

Climbing Ripples - cross-laminations in the shape of ripples, either symmetrical or asymmetrical, created through rapid deposition of fine-grained sediment. The climbing description refers to a growing deposit in which the ripples migrate over one another.

Esker - a narrow, sinuous glaciofluvial/ice contact deposit which may be of subglacial, englacial or supraglacial origin. Eskers can be several hundred meters to tens of kilometers in length and the width can vary from meters to many hundreds of meters. Internal structures may be highly variable depending upon depositional processes which are in turn related to conditions in the glacier.

Fault - a fracture in which displacement is evident.

High-Angle Reverse Fault - a fault in which the hanging wall has been raised relative to the footwall with a dip greater than 45°.

Normal Fault - a fault where the hanging wall has moved downward relative to the footwall.

Transcurrent Fault - a fault along which the displacement is predominantly horizontal and parallel to the strike of the fault.

Fold - a bend or flexure of bedding.

Anticlinal Fold - is a convex upward fold.

Synclinal Fold - is a concave upward fold.

Interlobate Moraine - a stratified deposit created from meltwater of two converging glacial lobes.

Kame Moraine - is composed of a series of kames (a conical hill of stratified sediment) which marks the maximum extent of a glacial advance; a stratified end moraine.

Lodgement Till - sediment deposited from the base of a glacier by pressure melting or other mechanical processes.

Melt-Out Till - sediment deposited through a gradual release from melting ice which is stagnant. The ice may be a stagnant glacier or a block of debris-rich ice which has broken off the main glacier.

Paleocurrent - the ancient direction of a water current determined from sedimentary structures, especially cross-beds and climbing ripples which were created by the current.

Progradation - net deposition in the direction of flow as frequently seen in deltas advancing into a standing water body.

Stratigraphic Record of the Late Wisconsinan Stage

Approx. Time (yrs. B.P.)	*Stadial*	*Interstadial*	*Tills -found in or near study area*
8000			
		North Bay	
	Greatlakean		
		Two Creeks	
11500			
	Port Huron		Wentworth (east)
13000			
		Mackinaw	
13500			
			Elma
	Port Bruce		Tavistock / Port Stanley
			Stirton (west)
15000			
		Erie	
16000			
	Nissouri		Catfish Creek
23000			