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SUDBURY TIMMINS ALGOMA MINERAL PROGRAM

PROJECT 2

GEOCHEMISTRY OF SWAYZE BELT ESKER, NORTHERN ONTARIO

J.A. Richard

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SUDBURY, TIMMINS, ALGOMA MINERALS PROGRAM (STAMP)

The Sudbury, Timmins, Algoma Minerals Program was announced in Sudbury September 17, 1983, with the objective of stimulating mineral exploration and economic development in the region. It was initiated by the Department of Energy, Mines and Resources and supported by Employment and Immigration Canada. The program was designed and implemented by the Geological Survey of Canada in collaboration with Mineral Policy Sector. The individual projects were managed by the Department of Geology, Laurentian University, Sudbury, under the Chairman, Dr. A.E. Beswick. Field operations began in early October and continued into December. Following an eight-week extension, the Program terminated on May 25, 1984.

The Program comprised four projects with the following objectives:

Project 1 - Mineral Data Base (CANMINDEX)

- to collect, code and enter basic information on mineral occurrences in north-central Ontario into the Geological Survey of Canada data bank (CANMINDEX file); to provide information on these occurrences to the Ontario Geological Survey in their file format, and update information for the EMR (Mineral Policy Sector) National Mineral Inventory System; and to compile available rock geochemical data.

Project 2 - Swayze Belt Overburden Geochemistry

- to identify target areas for mineral exploration by geochemical sampling and analyses of overburden materials (eskers) in the Chapleau-Foyleyet-Gogama area.

Project 3 - Huronian Supergroup Geochemistry

- to define target areas with anomalous metal concentrations in Huronian sedimentary rocks in the Sault Ste. Marie-Sudbury region.

Project 4 - Rock Chemical Mineral Exploration Criteria

4A: to identify lithogeochemical criteria useful for mineral exploration in the Onaping Formation of the Sudbury Basin.

4B: to determine variations in rock geochemistry of major units of the Temagami Greenstone Belt and their relationships with mineralization.

The numbers and titles of the Geological Survey of Canada Open Files reporting results of these projects are listed on the back cover of this report. A description of the STAMP program, which includes overall co-ordination and administrative support, was published in Current Research, Part A, GSC Paper 85-1A, pages 723-725.

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GEOCHEMISTRY OF SWAYZE BELT ESKER, NORTHERN ONTARIO

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ABSTRACT

A reconnaissance geochemical survey of esker systems in the Swayze greenstone belt was completed under the mandate of the Sudbury-Timmins-Algoma Minerals Program (S.T.A.M.P), Project 2. The objectives of this study were (1) to aid and stimulate mineral exploration activity in the Swayze belt by detecting anomalous precious and base metal concentrations, (2) to provide jobs for unemployed personnel of the mining industry, and (3) to study trace element dispersal paths within the region's eskers and evaluate their use as an exploration tool.

A total of 700 esker clast and matrix samples were obtained over 2116 man-hours. Atomic absorption analyses for Au, Ag, Cu, Ni, Zn, Pb, Fe, and Mn are reported. Many multi-element anomalies are present throughout the survey area, but are particularly numerous in south-central and southeastern localities of the Swayze greenstone belt. Geochemical data are presented in (i) raw data listings and (ii) anomaly-sample location maps. Statistical summaries are given in a variety of formats, including (iii) univariate descriptions of log-transformed data, and (iv) correlation analyses.

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** This term is used here in its genetic sense rather than its stratigraphic sense

INTRODUCTION

During the period October – December 1983, staff of S.T.A.M.P. Project 2, Laurentian University, completed Phase I of a reconnaissance geochemical survey of the Swayze greenstone belt in northeastern Ontario. The primary objective of the project was to aid and stimulate mineral exploration in the Swayze Belt by detecting anomalous metal concentrations through the use of esker sediment geochemistry.

Sampling traverses were conducted by field personnel along esker systems in all but the extreme southwestern part of the Swayze belt. Field samples were preprocessed at S.T.A.M.P. laboratory facilities housed within the Department of Geology at Laurentian University, Sudbury, Ontario. Atomic absorption analyses were performed for Au on the minus 63 µm fraction by S.T.A.M.P. laboratory staff at Laurentian University. Analyses for Ag, Cu, Ni, Pb, Zn, Fe and Mn were completed using atomic absorption facilities at the Department of Geological Sciences, Queen's University in Kingston, Ontario.

The following report describes the methods and preliminary results of the esker sediment geochemical survey completed by S.T.A.M.P. Project 2. Background to the study area is first provided in an overview of the general geology and economic potential of the Swayze greenstone belt. Sampling methods and analytical procedures of the esker sediment survey are subsequently described, accompanied by a general listing of results. Geochemical data have been statistically summarized and are illustrated on anomaly-sample location maps which are enclosed. Preliminary technical conclusions and recommendations for further work are also presented.

Project Rationale

In recent years, drift prospecting has become increasingly popular through the relatively successful use of glacial till as a geochemical sampling medium. The theoretical basis of this approach is that till – a glacigenic sediment that is a direct or "first" derivative of bedrock – essentially consists of bedrock which has been comminuted by abrasion and mechanically dispersed 'down ice' in the direction of glacial flow. It follows that precious and base metal mineralization exposed at the bedrock surface would be similarly transported 'down ice' and concentrated in geochemical dispersal trains within till formations. Yet, while the sampling of 'basal'** till is ideally suited to the detection of geochemical dispersal trains under ideal conditions, a number of technical and logistical factors can adversely affect the method's overall cost-effectiveness when applied to areas where till is mantled by younger sediments or where forest cover is heavy and access is limited. These factors include (i) the discontinuity of till distribution, due either to rugged bedrock topography or overlying thicknesses of nonglacial sediments; (ii) intraformational genetic and stratigraphic inconsistencies which, over increasingly larger areas, go undetected, thus adding to the problem of data interpretation; (iii) the improbability of reconnaissance-scale till sampling detecting even the broadest of geochemical dispersion fans; and (iv) large logistical costs incurred by till sampling programs in remote and difficult terrain through the required use of heavy overburden drilling equipment.

In this study, esker sediment geochemistry has been employed as an alternative method of regional overburden geochemical exploration. Several advantages can be realized in using esker sediments as an overburden sampling medium over the Canadian Shield. Firstly, esker systems occur with remarkable regularity across the region, and many extend across large expanses of Archean metavolcanic terrane with some economic potential. Secondly, eskers afford maximum control if sampling is restricted to esker crest sediments. Over much of the Shield, esker crest facies generally reflect depositional characteristics of subglacial conduit flow; such consistency diminishes sampling error and increases control over data interpretation. Thirdly, in areas of extensive glacial drift and where outcrops are covered by late glacial lake sediments (e.g. Abitibi belt), the petrology and geochemistry of esker crest (subglacial conduit) sediments may be used to detect (i) favourable bedrock formations of economic potential, and/or (ii) geochemical dispersion fans within till formations that, buried at depth, have be en intersected and sampled by eskerine meltwater flow. Lastly, eskers can be sampled with a minimum of logistical effort and cost. Esker crests easily traversed on foot through otherwise inaccessible terrain. They are prominent landforms which are readily identified by field personnel having only minimal training. Relative morphological continuity enables sample extraction at regular intervals using simple hand tools. The size of sample obtained is limited only by the mode of sample transportation from field to laboratory.

Location and Access

The Swayze greenstone belt encompasses 7500 square kilometres and is bounded between 47 30'-48 16'N latitude and 81 55'-83 00'W longitude (Fig. 1, in pocket). This area is centrally located between the communities of Gogama and Sultan to the south, Chapleau to the west and by Foleyet and the city of Timmins to the north and northeast respectively.

Road access is readily gained to most of the Swayze belt except in the southwestern quadrant. Provincial Highway 101 runs east-west across the northern margin of the field area, while Highway 144 skirts across the extreme southeastern limits, immediately southwest of Gogama. From Highway 144, the Upper Spanish Forest access road maintained by E.B. Eddy Company Ltd. (informally known as the Sultan Road) extends along the southern periphery of the field area to Sultan. From that point westward, the road is known as Highway 667. Numerous dirt road s of variable quality penetrate the Swayze belt from the above-mentioned arterial roads; however, road coverage is sparse and in several of the west-central townships, is totally lacking.

Canadian National Railways operates a line through Foleyet which traverses Penhorwood, Keith, Muskego and Foleyet townships. Areas of the Swayze belt not accessible by land routes can generally be reached by waterways or aircraft.

During the final stages of the present survey, a Bell 206L helicopter was utilized to ferry field crews to remote esker systems in the central Swayze area.

Acknowledgments

Project 2 of the Sudbury Timmins Algoma Mineral Program (STAMP) was conceived and funded by the Federal Government of Canada under the auspices of the Geological Survey of Canada, Department of Energy, Mines and Resources (EMR). The overall program was sponsored and managed by Laurentian University, Sudbury, Ontario under the direction of Dr. A.E. Beswick, Department of Geology.

The author thanks W.W. Shilts of the Terrain Sciences Division, Geological Survey of Canada for early technical advice and helpful suggestions. Dr. I. Nichol and staff, Department of Geological Sciences at Queen's University, Kingston, Ontario, are gratefully acknowledged for their suggestions and considerable as sistance in the geochemical analyses and data processing.

M. Bozzo and J. Scott of Employment Canada (Sudbury and Timmins offices respectively) are acknowledged for their efforts in locating qualified geological field personnel. M. Sitts and staff at Gogama District, Ministry of Natural Resources are thanked for providing access to helicopter landing and fueling facilities in that community.

P. Lavoie and C. Miller, laboratory supervisors at Laurentian University, are acknowledged for co-ordinating the processing and archiving of field samples.

Finally, thanks go to G. Campbell – sampling supervisor, D. Church and P. Rohleder – field crew leaders, L. McGowan--pilot for Trans-Canada Helicopters Ltd., and the field personnel of Project 2 who endured the rigors of early winter to ensure successful completion of field work.

Previous Work

The bedrock geology of the Swayze belt was earlier mapped by numerous authors, all of whom are reviewed by Thurston et al (1977). More recent detailed works pertinent to this study include those by Goodwin (1965), Donovan (1965, 1968), Milne (1972), Breaks (1978) and Siragusa (1981, 1983). Thurston et al. (1977) presented a comprehensive review of the Swayze belt and surrounding environs.

Regional background on the Quaternary geology of the Swayze belt is provided by Boissonneau (1965, 1968), Prest (1970), Roed and Hallet (1979), and Lee and Scott (1980). Detailed mapping and field investigations to the immediate northeast of the Swayze area by Richard (1983) and Tucker and Richard (1983) serve as references to local glacial geology and history.

General aspects of esker sedimentology have been previously discussed by Banerjee and McDonald (1975) and Saunderson (1975). Esker sedimentology as applied to drift prospecting has been examined by Lee (1965, 1968), Cachau-Herreillat (1971), Shilts (1973, 1975), Shilts and McDonald (1975), Shilts in Boyle et al. (1975), and Baker (1981a,b).

GENERAL GEOLOGY OF THE SWAYZE BELT

Bedrock geology

The Swayze greenstone belt, more properly known as the Swayze-Deloro metavolcanic belt, lies within the Superior Province at the western end of the Abitibi sub-province. This Archean supracrustal assemblage is fault-bounded to the west by the Kapuskasing Structural zone while the remaider of its periphery is surrounded by extensive granitic and migmatitic terrain. The general geology of the Swayze belt is depicted in Figure 2 (in pocket). The following summary has been derived from Thurston et al. (1977).

Two volcanic complexes, the Swayze and Deloro, comprise what is collectively termed the "Swayze belt". The former complex occupies the southern half of the Swayze belt below the Raney-Dale tier of townships. Three centres of felsic volcanism and volcanogenic sediments have been recognized in this complex, namely the (i) Raney Township centre, (ii) the Denyes--Swayze Townships centre and (iii) the Benton-Marian Townships centre. Structural trends here are generally east-west changing to southeasterly in the Opeepeesway Lake area.

North of the Swayze volcanic complex, the remainder of the Swayze belt is underlain by rocks of the Deloro volcanic complex. This area is dominated by mafic metavolcanics and is distinguished from the Swayze complex by (i) the minor proportion of metasediments, (ii) a different type of felsic volcanism, and (iii) a greater occurrence of mafic and ultramafic rocks.

Mafic to intermediate metavolcanic predominate throughout the Swayze Belt. Compositions range from basaltic to latitic in Greenlaw, Tooms, Halcrow and Denyes Townships, basaltic to andesitic in Swayze and Dore Townships and andesitic in Heenan, Marian, Genoa and Horwood Townships. Texturally, rocks range from massive to pillowed, fragmental, porphrytic and foliated types. Greenschist metamorphism marked by extensive carbonitization, sericitization and chloritization, is pervasive, except in proximity to the metavolcanic-granite contact where amphibolite-grade metamorphism is usually apparent.

Felsic to intermediate metavolcanics are prominent in the Denyes, Swayze, Dore, Heenan, Marian and Benton Townships area. Rhyolitic to dacitic and trachytic rocks occur in flows and pyroclastic units, often in close association with iron formation and other metasediments. Stratigraphic thicknesses of 3000 m have been noted in the Heenan and Marian Townships area, while in other areas such as Swayze, Dore, Rollo, Coppell and Newton Townships, felsic rocks typically occur as thin lenticular units intercalated with metasediments and mafic metavolcanics. Across the northern part of the Swayze belt, felsic metavolcanics occur in thin but laterally continuous east-west striking formations.

Archean metasedimentary rocks comprise 10% of exposures in the Swayze belt. The largest of three major occurrences trend across the entire breadth of the southern Swayze area from Yeo Township in the east, west to Halcrow Township. This assemblage of greywackes, arkoses and conglomerates, together with a similiar band of metasediments in northern Halcrow-Denyės Townships, are collectively known as the Ridout series. Across the northern Swayze belt, an argillaceous metasedimentary band trends east-west through Keith and Penhorwood Townships.

Iron formation occuring as oxide, carbonate and silicate facies is located at the Radio Hill and Nat River in Penhorwood Township, in Halcrow, Greenlaw, Swayze and Dore Townships and in Woman River Iron Formation in Heenan-Marian Townships. In Cunningham and Garnet Townships, and in areas to the south, iron formation occurs principally as a sulphide facies.

Mafic to ultramafic intrusive rock which pre-date the emplacement granitic batholiths are found throughout the Swayze belt, but are particularly concentrated in the areas north of Horwood Township. Dioritic to gabbroic dykes and sills also outcrop in Newton, Heenan-Marian and Cunningham-Garnet Townships.

Early Precambrian felsic intrusive stocks are scattered throughout the area. Granite batholiths and migmatitic complexes define the boundaries of the Swayze belt except in the west where it is in fault contact with the Kapuskasing Structural Zone.

North-northwest trending, early to late Precambrian diabase dykes cut all the above rock formations. A dyke belonging to the Abitibi swarm bears northeasterly from Rollo to Hardiman Townships.

Lamprophyre dykes of Late Jurassic to Early Cretaceous age are known to occur at two locations. A 1.6 km long x 6 m wide dyke subcrops in Keith Township, while a 25 m wide dyke outcrops along the Denyes-Swayze township line. Also in Keith Township, Watson et al. (1978) describe a 0.4 m wide "kimberlitic dike" which subcrops in rhyolitic tuff.

Economic Geology

The Swayze greenstone belt has been actively prospected since the early 1900s during which time, several economic deposits of modest tonnage and innumerable mineral occurrences were discovered. Preliminary activities focussed on the search for iron but quickly turned to gold exploration in the 1930s. It was during this period that the majority of known gold occurrences were found and subsequently exploited. The Swayze belt experienced several decades of waning activity until the late 1970s when exploration resurged in the area. Precious and base metal prospecting is currently underway throughout the Swayze Belt at an unprecedented level.

The economic mineral potential of the region is reflected in Table 1 which lists significant deposits found to date. While no producers of major proportions have yet emerged, the ubiquitous distribution of mineral occurrences throughout the Swayze Belt suggests that its potential as host to precious and base metal deposits remains to be fully evaluated and realized.

The geological setting of economic mineralization in the Swayze belt has been described by Sage (in Thurston et al., 1977).

Native gold mineralization typically occurs in quartz-carbonate veins contained within sheared mafic metavolcanics. These shear zones are characterized by extensive carbonatization and silicification. Pyrite is generally associated with gold. A correlative relationship between gold and felsic porphrytic intrusions is also suggested, based on the occurrence of gold mineralization between felsic porphry and metasediments at the Jerome mine.

Base metal mineralization mainly occurs in metasedimentary units, iron formation in particular. Assemblages of pyrite-pyrrhotite-chalcopyrite and associated graphite are most abundant in sulphide-facies of iron formation, notably along brecciated zones.

Chrysotile asbestos fibre and talc have been produced from serpentinized dunite and peridotite altered to talc-magnesite.

Iron, mainly occurring as iron oxide and iron carbonate, is found at various locations throughout the Swayze belt in Algoma-type iron formation.

Table 1a. Significant Mineral Deposits of the Swayze Belt - Au

Property	Township	Tons Mined	Production	Known Reserves
Halcrow-Swayze Mines Ltd.	Halcrow	-	38.7 oz Au	127,000 tons, 0.11 oz/ton
Jerome Mines Ltd. (E.B. Eddy Forest Products Ltd.)	Osway	335,060	56,878 oz Au 15,104 oz Au	345,000 tons
Kenty Gold Mines Ltd. (Heron Resources Ltd.)*	Swayze	1,200	-	values obtained of 0.16 and 0.19 oz/ton
Lee Gold Mines Ltd.	Greenlaw	-	-	-
Murgold Resources Inc.	Chester	-	-	values obtained of 0.7 and 0.97 oz/ton
New Joburke Explorations Ltd. (Noranda Exploration Co. Ltd.)*	Keith	450,000 tons, 0.10 oz/ton	-	-
Orofino Mines Ltd. (Northgate Explorations Ltd.)*	Silk-Horwood	-	-	approx. 1 million tons, 0.18 oz/ton
Rundle Gold Mines Ltd. (Sulpetro Minerals Ltd.)	Newton-Dale	-	-	100,00 tons 0.29 oz/ton
Tionaga/Smith-Thorne Mine	Horwood	-	404 oz Au	-

*Indicates recent optioning company

Table 1b. Significant Mineral Deposits of the Swayze Belt: Other Minerals

Property	Township	Reserves	Production
Consolidate Shunsby Mines Ltd.	Cunningham	310,095 tons of 1.2% Cu, 1.3% Zn	None
Canadian Johns-Manville Ltd. Reeves Mine (Steetley Talc)	Reeves Penhorwood	-	Produced asbestos fibre from 1968 until 1976; production during 1978-present under Steetley Talc
Kukatush Mining Corp. Radio Hill	Penhorwood Kenogaming Keith	158,000,000 tons Fe at 27.8%	None
Stackpool Mining Co. Ltd., Woman River Iron Formation	Genoa, Heenan Marian	5,100,000 tons Fe at 40%	None

Quaternary geology

The distribution of Pleistocene deposits within the Swayze belt has been mapped at reconnaissance scales and discussed by several authors mentioned above. Their observations, together with those made during the course of this project's field season have been incorporated into the following summary.

Till

Glacial till is found throughout the Swayze belt in a diverse range of genetic types and morphologies. In the east-central townships where bedrock terrain predominates, till cover is generally thin and variable, to absent. Sandy silt till of the Matheson Formation (Hughes, 1965) prevails across townships north of Horwood Lake in the form of normally consolidated lodgement and basal melt out facies. Blanket accumulations exceeding 10 m in thickness have been observed in section here. These subglacial till types are indicative of active deposition by glacier ice, probably during the last glacial phase. In the southern half of the Swayze belt, Matheson Formaiton is a stony to bouldery sand till. It is associated with an end moraine complex. These coarse hummocky till accumulations characterize the 'dead-ice' terrain of the south-southwestern townships, indicating passive deposition from stagnant ice during the last deglaciation.

Glaciofluvial deposits

Large esker systems formed by glacial meltwaters during the last ice retreat constitute the major type of glaciofluvial deposit found in northern areas of the Swayze belt. They generally consist of prominent subglacial gravel cores (crests up to 45 m in height) and lesser flanking or superimposed outwash. Morphological continuity of these eskers is exemplified by the Penhorwood and Ivanhoe eskers in which individual segments attain lengths of 21 and 29 km respectively. Trains gravelly outwash are a significant surficial unit throughout the south-central townships of the Swayze belt. Esker systems in these localities typically consist of smaller segmented subglacial cores, crests of which are generally less than 15 m in height.

Glaciolacustrine deposits

Varved to massive clays, silts and sands record the presence of proglacial lake bodies which formed along the ice margin as it retreated through the Swayze area. Extensive sand plains south of the Eisenhower – Osway tier of townships were developed by a relatively short-lived proglacial Lake Sultan (Boissonneau, 1968). In the vicinity of Horwood Lake and areas to the north, thicker accumulations of silts, varved clays and minor reworked sands are present, recording the early phases of proglacial Lake Ojibway.

Eolian sediments

Post-glacial reworking of glaciofluvial and glaciolacustrine sediments by eolian processes have produced significant deposits of fine grained sand throughout the Swayze belt. In south-central localities, particularly Coppell, Benton and Esther Townships, parabolic and seif dunes are grouped in c onspicuous fields with individual features attaining heights of 5-8 metres. Elsewhere, eolian sands occur as extensive but discontinuous surface veneers to depths of 1 m or less.

GLACIAL HISTORY OF THE SWAYZE BELT

Striae, drumlinoids and other ice-flow directional indicators show that Late Wisconsinan ice moved across the Swayze belt along a south-southwesterly trend (180-200 azimuth). Studies by Tucker and Richard (1982) show that it was during this last phase of ice flow that lodgement and basal meltout tills of the Mathe son Formation were deposited in the area. Other striae trending to the southeast (130-165 azimuth) have also been recorded. Cross-cutting relationships apparently demonstrate these striae to be older than the south-southwesterly set (Boissonneau, 1968). However, no glacial sediments have yet been correlated with this earlier glaciation and its significance remains unknown. Localized deviations in striae orientations are attributed to the deflection of glacial ice around bedrock promontories.

Regional deglaciation of the Swayze belt commenced approximately 10 500-11 000 years before present. The northward withdrawal of the Laurentide ice sheet through the area is marked by the development of outwash, eskers and morainal deposits.

A major hiatus in ice retreat is indicated by the Sultan Scarp (Roed and Hallett, 1979), a north-facing, ice-contact 30-45 m high which strikes east-west across Eisenhower and Kaplan Townships. During this pause, large volumes of outwash sediment emanated from the static ice front, much of it supplied by the numerous eskers which had formed within the subglacial margin.

Concurrent with the emplacement of outwash south from the Sultan Scarp, glacial meltwaters became impounded between the ice front and the continental divide which lay farther to the south than presently because of isostatic depression. The early outlet of proglacial Lake Sultan (Boissonneau, 1968) flowed south to the Lake Huron basin through the Wenebegon and Mississigi River valleys. With the retreat of glacial ice away from the Sultan Scarp and subsequent isostatic uplift, the Wenebegon outlet closed and the later phases of Lake Sultan drained northward through a series of small spillways. Boissonneau (1968) places the Wenebegon outlet at approximately 549 m above sea level which suggests that the water depth near the Sultan ice front (presently 458 m a.s.l.) must have exceeded 91 metres.

In the central Swayze belt, north of the Sultan Scarp, deglaciation continued primarily by mass in situ ice wastage. This is reflected by the complex deposits of outwash and hummocky supraglacial till that are widespread in the area. In Denyes, Swayze and Dore Townships, Boissonneau (1968) identified a low relief moraine marking another recessional position of the retreating ice mass and named it the Chapleau I moraine. A few small, poorly developed eskers also occur sporadically in the same area.

Boissonneau (1968) suggested that following retreat to the Chapleau I moraine, ice then readvanced to the Chapleau II moraine (Sultan Scarp). This contention is rejected since during the course of this project's field work, no evidence of ice readvance over glaciolacustrine sediments could be found. It is suggested here that the Sultan Scarp (Boissonneau's Chapleau II) merely represents a recessional pause in the retreat of Laurentide ice. Subsequent to further northward ice retreat, a second recessional halt occurred, during which the so-called Chapleau I moraine was formed.

As the retreating ice front reached the Horwood Lake area, the style of deglaciation changed markedly. Glaciolacustrine clays, silts and sands were deposited on level surfaces situated below 360 m a.s.l.in a proglacial precursor of glacial Lake Ojibway. This waterbody probably began to form approximately 10 000 years before present (Prest, 1970) and continued to expand northward as the ice further retreated. Beach levels, wash limits and deltaic bodies in the northern Swayze area indicate that water levels of this Lake Ojibway precursor were stabilized at 360 m above sea level. It is evident from the general lack of outwash and supraglacial till deposits, and the predominance of glaciolacustrine sediments, that retreat occurred in this area primarily by ice calving. Esker systems here developed large continuous subglacial cores within the ice margin. They debouched into proglacial waters forming small subaqueous outwash fans which flanked and in some instances, buried the subglacial esker core. It is probable that this lake drained by 9000 years before present.

Upon subaerial exposure, the unvegetated glacial deposits of the Swayze belt were subjected to rigorous post-glacial winds. Fine sands derived from reworked glaciofluvial and glaciolacustrine sediments were redeposited as eolian surface veneers and as large dune fields. Orientation of parabolic and seif dunes indicate that post-glacial winds were predominantly from the northwest.

ESKER SEDIMENT GEOCHEMICAL SURVEY

Sampling methods

Ground sampling traverses were performed by 2 and 3-man crews along all esker systems labelled in Figure 1. Sample sites were located at 0.5 km intervals along esker crests previously determined to be of subglacial origin. In sampling the Crossley Lake and Garnet eskers, this interval was slightly modified to accomodate gaps in esker crest deposition.

At each site, pits were excavated by shovel to a depth which permitted sampling of C horizon material. Partial weathering of the highly permeable sands and gravels was clearly evident in the ubiquitous oxidation of sulphide-bearing sand grains and rock fragments. Pit depths ranged betweem 1.5-2 m on average. This was generally sufficient to penetrate cobble-boulder gravels (Fig. 3). Channel samples of interstitial sand matrix (less than 2.0 mm fraction) were collected, each averaging 5-6 kg in total weight. Clast samples containi ng more than 100 pebbles were concurrently extracted.

Within-site and between-site sampling error was minimized by several measures. Each sampling crew was supervised by geologically trained personnel who ensured proper sampling of esker crest sediments only. Non-metallic sampling scoops were used to avoid possible sample contamination. Further care was taken to avoid including plant roots and rootlets during sampling, although this sometimes proved quite difficult. Double samples were extracted from the same sampling pit at a number of sites as a measure of within-site geochemical variation.

Sample sizes were generally limited by the total weight which could be practically carried in backpacks during foot traverses. Typically, 6-8 matrix samples, plus an equal number of clast samples, were obtained during a normal work day under winter conditions. Snow cover to depths of 20-30 cm helped to insulate the ground, thus permitting easy excavation of sample pits even at temperatures of -15 degrees Celsius.

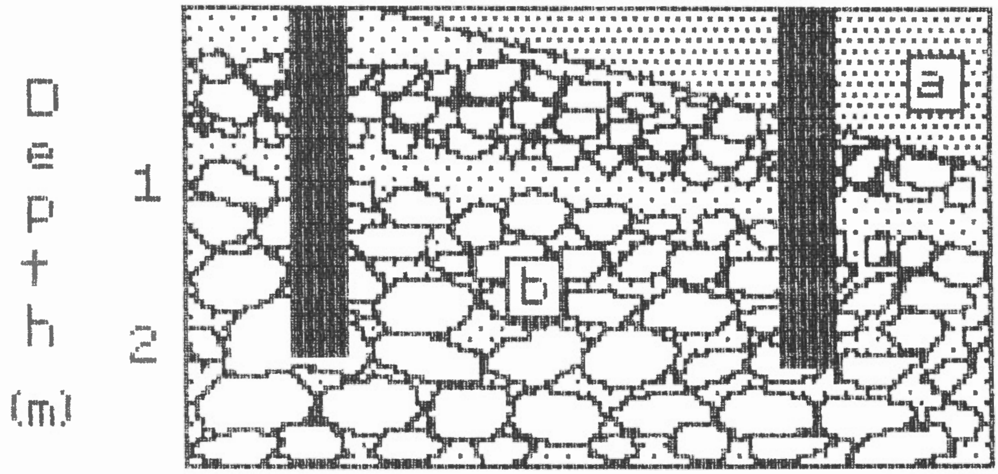


Figure 3. Composite sedimentology of esker crest sample sites.
(a) Planar laminated, medium to coarse grained sands, upper flow regime, sheet-flow facies.
(b) Crudely bedded to massive, cobble to boulder gravel with interstitial fines, upper flow regime, traction bedload facies.

Table 2. Anomaly thresholds of trace element data - Swayze belt eskers.

	Fe	Au	Ag	Cu	Zn	Pb	Ni	Co	Mn
Threshold									
(mean +	>6.5%	>70	>1.5%	>350	>250	>40	>140	>50	>1600
2 S.D.)		ppb							

All data expressed as ppm except where indicated.

Table 3. Inter-elemental correlations

Elements	Correlation coefficient
Cu - Co	0.899
Ni - Co	0.877
Ni - Cu	0.807
Zn - Cu	0.770
Zn - Co	0.756
Cu - Fe	0.749

A total of 398 esker sediment samples and 302 clast samples were obtained over 2116 man-hours. This translates to a total of 5.3 man-hours spent in obtaining each sample, including travel time to and from sample sites. In practice, 1 to 1.5 hours were spent excavating and sampling at each location.

Analytical methods

Esker sediment samples were shipped to laboratory facilities at Laurentian University where they were preprocessed by S.T.A.M.P. staff prior to geochemical analyses. During this stage, samples were dry-sieved using stainless steel equipment to avoid contamination. The minus 0.063 mm fraction was separated for analysis by atomic absorption while the 0.063-2.0 mm fraction was retained and archived for later heavy mineral separations.

Atomic absorption analyses for Au were performed at the Laurentian University laboratory while analyses for Cu, Ni, Pb, Zn, Ag, Co, Fe and Mn were conducted at Queen's University, Department of Geological Sciences. Analyses for Au utilized 2 g subsamples while analyses for the remaining elements utilized 0.25 g subsamples. In both laboratories, samples were subjected to partial digestions under aqua regia. Further details regarding laboratory procedures employed by STAMP personnel at Laurentian University are given by P. Lavoie (personal communication).

Analytical error control was maintained internally at both facilities through the regular insertion of blanks and standards. Further control was established externally through the covert submission of replicate samples. Analytical results for all elements except Au indicated a relatively small degree of within-site variability. In the case of Au results where small concentrations can yield erratic results ("nugget effect") was evident, anomalous samples were routinely subjected to several additional analyses in order to approximate the significance of the anomaly. Reported Au concentrations therefore reflect average values of all replicate analyses performed. A partial listing of replicate Au results is given in Appendix A.

Data processing

Geochemical data were entered into files on a (DEC) PDP 11/V03 computer at Queen's University, Department of Geological Sciences and statistically treated using the Q'Gas data processing system. Hardcopy output and magnetic tapes have been archived at Laurentian University, Department of Geology where they are available for examination upon request. Included in the data set are the following: (1) listings of esker sample numbers, A.A. results and sample locations; (2) univariate statistical descriptions of log-transformed elemental data, including histograms; (3) correlation analyses between elements with X-Y plots of correlated elements; (4) multiple linear regression analyses; and (5) geochemical profile plots of individual esker systems in the Swayze belt.

General results

Total trace element concentrations in esker sediment samples are detailed in Appendix B. The pattern of trace element concentrations along individual esker systems are portrayed on anomaly-sample location maps – Figures 4, 5, and 6 of this report

In the absence of geochemical background data, anomaly threshold values (Table 2) were established for each element using the mean concentration plus 2 standard deviation units. For the convenience of illustrating geochemical data on the anomaly-sample location maps, thresholds have been rounded off to class intervals of slightly higher value.

Trace element distributions are described in Appendix C. Histograms of log-transformed data are log-normal to slightly negatively skewed. Unimodality characterizes all trace element distributions except Pb which exhibits weak bimodality. Variations of individual distributions are measured by coefficients of variation. These values are very high for Fe and Mn while the remaining elements are uniformly low with coefficients ranging between 10 and 20.

A number of correlative relationships appear to exist between several of the elements analyzed. Trace elements showing the strongest correlations are listed below in Table 3 and X-Y plots of the same data are shown in Appendix D.

Gold

Shows no particular correlation with any other element, suggesting that it probably occurs as coarse, free gold of hydrothermal origin.

Anomaly summary

Penhorwood esker - Penhorwood Township

A single Au anomaly occurs at point 2035 in the northeastern part of the township. Anomalous levels of Ag are present at point 2037. Both sites are situated down-ice from a large ultramafic body intruding carbonatized mafic metavolcanics. A number of Ni anomalies occur in succession at points 2044, 2052, 2050, and 2054 to 2059 inclusive. These sample sites are between 3 to 10 km down-ice from the same ultramafic intrusion which is positioned on the Reeves-Penhorwood township boundary.

Groundhog esker - Horwood Township

Anomalous Au was detected in sample 6076 which lies immediately down-ice from a felsic-mafic metavolcanic contact. Since replicate analyses were not performed in this case, the significance of the anomaly is unknown.

Keith esker - Keith Township

Concentrations of Ni are elevated in samples 0026, 0028 and 0039 which were obtained in the southern part of the township. These may possibly be related to the numerous sulphide occurrences which are found in a felsic-mafic metavolcanic and metasediment assemblage situated to the northeast. Although an anomalous Au value was obtained in sample 0059, replicate analyses failed to reproduce the same results.

Ivanhoe esker - Ivanhoe Township

Anomalous Ni and Pb concentrations are present in samples 2001, 2003, and 2005. A number of sulphide occurrences are situated 8 km to the northeast up-ice in Foleyet Township.

Horwood esker - Horwood Township

Anomalous concentrations of Ni are evident in samples 0017 and 0020, and Cu is present in sample 0018. Copper mineralization is known only 2 km up-ice of the sample site. An apparent source of the Ni anomalies is the ultramafic intrusion situated 4 km to the north-northeast.

Coppell esker - Coppell Township

A single Ni anomaly occurs in sample 6036 which is positioned approximately 3 km south of the metavolcanic - granite contact.

Crossley Lake esker - Coppell and Dore Townships

Anomalous levels of Ni and Cu occur in samples 0117 and 0118 respectively. These sites are located down-ice of a large tract of mafic metavolcanics, although no mineralized zones are known to be present there.

Garnet esker - Garnet and Fawn Townships

Concentrations of Ag are anomalously high in samples 0110, 0111, 2101, 0113, and 0114. In addition, Cu is present in sample 2100. Numerous sulphide and iron formation occurrences are known to be situated in immediate proximity to the esker. All elements including Fe and Mn occur in anomalous concentrations in 0114. This may reflect an overall elevation in trace element levels due primarily to the extra adsorptive effects of Fe and Mn oxides present in the sample.

Mallard esker - Mallard, Osway and Esther Townships

Anomalous levels of Au of present in samples 0075, 0076, 0081, 0085, 4030, and 4031. Several replicate analyses equally proved to be anomalous. High levels of Cu, Co and Fe are present in 0075 and 0081. Sample 0085 also contains elevated levels of Pb, Co, Fe and Mn. Anomalous Cu, Zn and Co levels are contained in sample 5002 while a single Ni anomaly occurs in sample 6071. It is most likely that these values reflect the metavolcanic and metasedimentary formations of the Opeepeesway Lake area which are known to be well mineralized.

Jerome esker - Osway Township

In sample 0126, anomalous concentrations of Au , Ag, Cu, Pb, Co and Fe are present. High levels of Au, Ag, Pb, and Co are found in sample 0128. Zinc is found in 5010 and 2121 contains anomalous Ni and Co. All of these sites are within 5 km down-ice from the Jerome mine where both Au and Ag occur. The source of the remaining elements is unclear although all are known to occur within the mafic metavolcanics and metasediments of the Ridout series in the Opeepeesway Lake area.

Huffman esker - Huffman Township

Anomalous levels of Au are apparent within samples 4021, 4022, 4026, and 4028, with the latter also containing Pb. Sample 4025 was found to contain anomalous Cu, Zn and Pb. Once again, the sample sites lie within close proximity to known mineralized occurrences but the anomalies cannot be attributed to a specific source.

Osway esker - Osway Township

Samples 2073, 2074, 2077, 2078, and 2079 were all found to have elevated values of Zn concentration. Anomalous Pb also occurs in sample 2078. No specific mineralized zones of Zn are known which may account for these anomalies.

Northarm esker - Mallard and Osway Townships

In this esker, samples 0100, 0093, 0089, and 0088 are all anomalous in Cu concentrations. Sample 0087 shows elevated Pb, Co, Fe and Mn concentrations. None of these anomalies have an obvious source.

Mesomikenda esker - Neville and Chester Townships

Only Pb was found in anomalous quantity in samples 0124 and 4041. This element is known to occur in the immediate area of the Mesomikenda esker.

GUIDELINES TO ANOMALY INTERPRETATION

A broad range of trace element anomalies has been detected within the Swayze belt using the method of esker sediment geochemical reconnaissance. In advance of a comprehensive data evaluation in which the distribution of specific bedrock formations, lithogeochemical patterns, and mechanisms of glacial dispersion within the Swayze belt would be considered under an integrated format, the following technical conclusions are offered as guidelines to future follow-up studies.

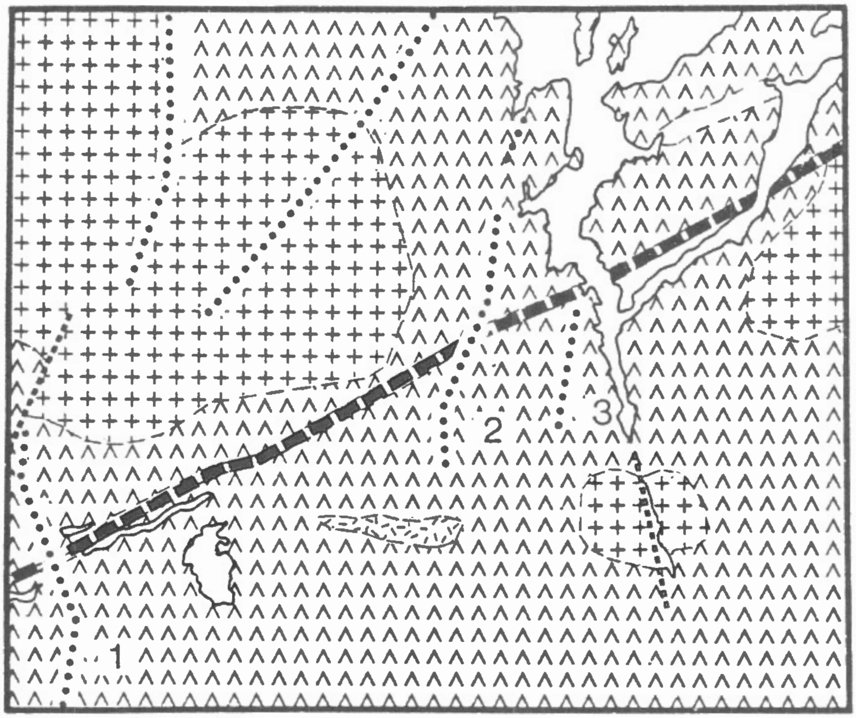
Anomaly significance, and the variability of geochemical data in general, must necessarily consider sources of (i) sampling error, both within-site and between-site; (ii) analytical errors introduced during laboratory processing; and (iii) natural variations due to geological factors. With respect to sampling and analytical error, it is felt that precautionary measures undertaken in this study (see Sampling and Analytical Methods) have been effective in minimizing potential error sources. Both anomalous and background trace element values detected in esker sediments are therefore considered to result from natural geochemical sources.

Anomaly sources

On the assumption that all eskers sampled during this survey are the sedimentation products of subglacial meltwater flow, it must be recognized that esker sediments represent an aggregate of several possible sources. These sources include (i) local bedrock lithologies that have been directly eroded by esker

Figure 7a

ESKER LOCATION MAP



1 COPPELL
2 NORTH NEWTON
3 HORWOOD

0 5km

HARDIMAN BAY Diabase Dyke

* for geology see Figure 2

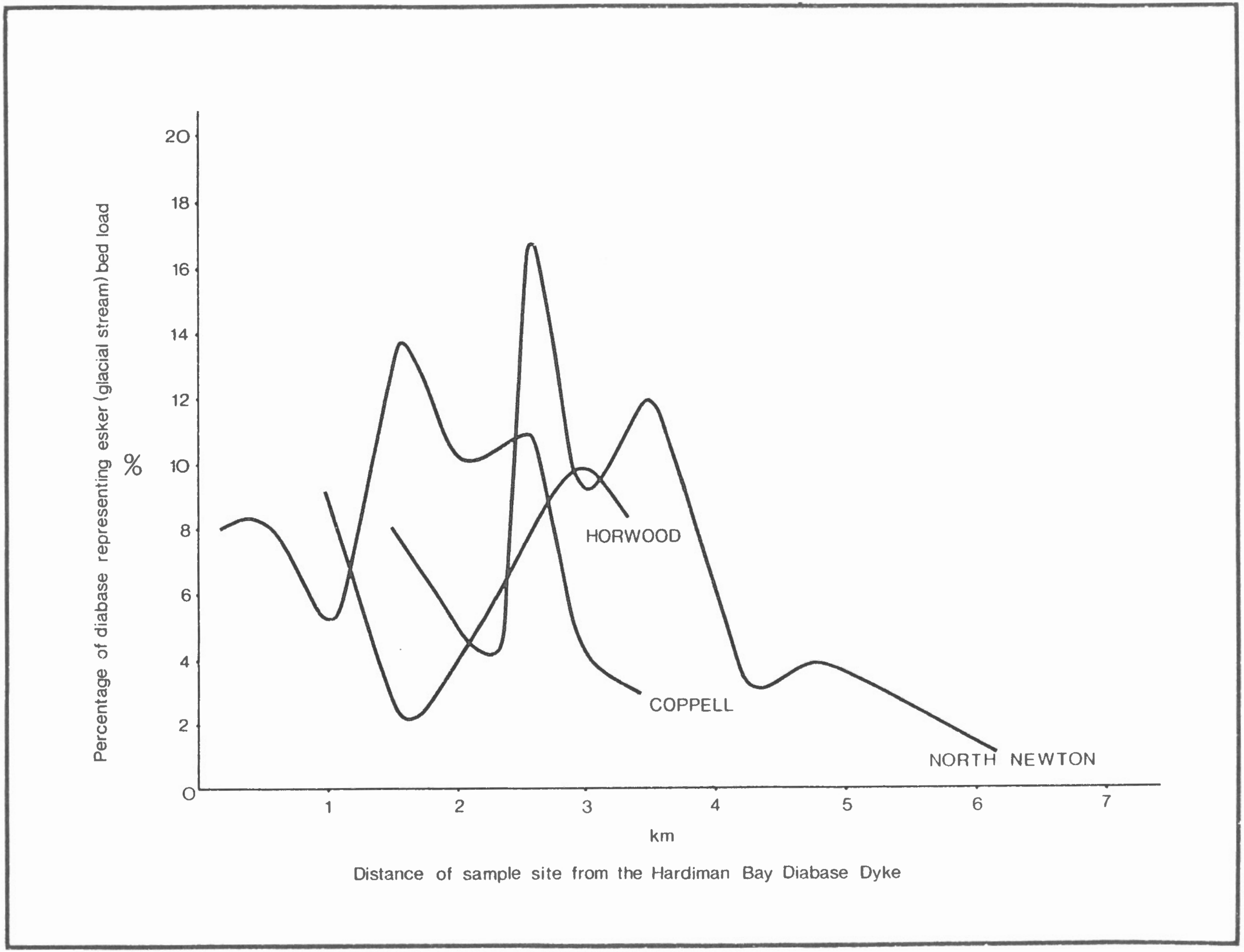

Percentage of diabase representing esker (glacial stream) bed load
%
20
18
16
14
12
10
8
6
4
2
0
1
2
3
4
5
6
7
km
Distance of sample site from the Hardiman Bay Diabase Dyke
HORWOOD
COPPELL
NORTH NEWTON

Figure 7b

meltwater flow, fragments of which are incorporated into the conduit, (ii) subglacial till deposits emplaced during prior ice advance which also undergo erosion by eskerine meltwater flow, and (iii) englacially transported debris released directly into the meltwater conduit during deglaciation. In areas of thin, discontinuous drift cover such as the Swayze belt, underlying till and bedrock formations contribute most significantly to the total geochemical composition of esker sediments, and therefore, represent the largest potential source of anomalous trace element concentration.

Direct dispersion of exhumed bedrock materials results in a simple one-stage phase of fluvial transport within the esker conduit. This requires some idea of eskerine transport distance which could permit an approximate 'upstream' target ting of the source (see below). Lack of an appropriate bedrock source at the designated 'upstream' target may indicate alternatively, that this represents the point of intersection between the esker and a till-hosted dispersal fan. In the case of such a two-stage dispersion, grid-based till sampling could then be undertaken in the up-ice direction adjacent to the esker target point.

Patterns of esker sediment transport

To determine the nature and distance of esker transport within the Swayze belt, petrographic counts were undertaken on clast samples (each containing over 100 clasts) extracted at each sample site. Results of petrographic counts from the Coppell, North Newton and Horwood eskers are of particular interest, and are discussed herein.

The above-mentioned eskers respectively traverse an east-northeasterly trending diabase dyke known as the Hardiman Bay dyke. Esker locations with respect to this feature are illustrated in Figure 7a. The Hardiman Bay dyke, measuring 180 m at maximum width, provides a lithologically distinct reference in the midst of predominantly mafic metavolcanic terrane.

In Figure 7b, the frequency of Hardiman diabase clasts expressed as a percentage of total clast content is plotted against distance of sample site 'downstream' of the Hardiman Bay dyke. Several common patterns are apparent. Within the first kilometre past the dyke, diabase clasts comprise about 8-10% of total clast content. The frequency curves sharply decline, then abruptly rise to peak values of 14-17%. In the Coppell and North Newton eskers, these peaks occur respectively at 1.5 and 2.5 km 'downstream' from the Hardiman Bay dyke. Following another sharp decrease, diabase clast frequencies rise within another 1 km to secondary peak values. Within 0.5 km of this secondary peak, frequencies drop to 4 % or less.

From these findings, a number of points regarding esker transport can be concluded that may be of use in targetting sources of geochemical anomalies in esker sediments of Swayze belt. The initial 8-10% diabase content suggests that sub-eskerine bedrock formations are detectable almost immediately 'downstream' of the esker/source intersection. Maximum concentrations occur at 'downstream' distances of between 1.6 and 2.6 kilometres, suggesting that this represents the average distance of esker bedload transport prior to its sedimentation as esker crest deposits. Secondary peaks may reflect the release of englacially held debris into the meltwater conduit. Within 3 to 6 km from the source point, most of the source material has been depositied as esker bedload, and comprises less than 4 % of total clast content.

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APPENDIX A

ANALYTICAL VARIABILITY OF GOLD (PPB)

EXAMPLES OF ANALYTICAL VARIABILITY - GOLD(PPB)

Internal replicates >>>	Orig.	1	2	3	4
Sample No.					
0018	51	8	27	-	-
0038	5	40	8	-	-
0075	70	82	72	-	-
0076	90	10	111	-	-
0081	296	152	116	217	100
0085	241	22	200	-	-
0109	41	26	39	-	-
0113	48	48	6	-	-
0128	157	79	230	157	150
2034	60	17	110	-	-
2035	142	40	60	-	-
4021	87	219	203	128	219
4026	137	124	-	-	-
4028	160	92	170	-	-
4030	24	266	26	644	-
4031	165	22	-	-	-

APPENDIX B

TRACE ELEMENT CONCENTRATIONS AND SAMPLE LISTINGS

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-0001	38810.000	53401.500	0.000	17.000	1.000	50.000	47.000	44.000	12.000	17.000	2.300	371.000	0.700	13.000	6.000	0.804
2S-0003	38775.000	53410.500	0.000	17.000	1.000	68.000	48.000	65.000	16.000	22.000	3.100	640.000	1.400	7.000	6.000	0.000
2S-0004	38860.000	53438.000	0.000	17.000	1.000	104.000	60.000	82.000	37.000	29.000	3.900	533.000	1.100	11.000	6.000	2.313
2S-0005	39605.000	53114.500	1.000	17.000	2.000	168.000	87.000	70.000	11.000	30.000	4.400	762.000	0.800	10.000	8.000	0.503
2S-0006	39630.000	53118.500	0.000	17.000	2.000	88.000	91.000	64.000	13.000	31.000	4.200	1190.000	0.700	5.000	8.000	0.000
2S-0007	39590.000	53110.000	0.000	17.000	2.000	177.000	90.000	82.000	9.000	34.000	4.500	655.000	0.800	6.000	8.000	0.804
2S-0008	39555.000	53106.500	0.000	17.000	2.000	83.000	98.000	67.000	4.000	23.000	3.300	608.000	0.500	6.000	8.000	1.207
2S-0009	39555.000	53102.500	0.000	17.000	2.000	160.000	66.000	70.000	8.000	28.000	3.600	545.000	0.900	6.000	8.000	1.567
2S-0010	39565.000	53097.500	0.000	17.000	2.000	114.000	57.000	69.000	9.000	22.000	3.200	775.000	0.700	5.000	8.000	2.070
2S-0011	39575.000	53092.500	0.000	17.000	2.000	124.000	90.000	96.000	10.000	33.000	4.100	778.000	0.600	5.000	8.000	2.472
2S-0012	39600.000	53090.500	0.000	17.000	2.000	125.000	44.000	56.000	2.000	20.000	3.000	520.000	0.600	6.000	8.000	2.874
2S-0013	39615.000	53085.000	1.000	17.000	2.000	124.000	88.000	99.000	15.000	33.000	4.600	830.000	0.700	11.000	8.000	3.678
2S-0014	39925.000	53125.500	0.000	17.000	2.000	146.000	62.000	78.000	10.000	31.000	5.000	1260.000	0.800	9.000	9.000	1.609
2S-0017	39980.000	53116.500	0.000	17.000	2.000	292.000	100.000	142.000	2.000	50.000	5.200	657.000	1.200	9.000	9.000	2.574
2S-0018	39995.000	53111.801	0.000	17.000	2.000	344.000	131.000	128.000	10.000	50.000	5.700	726.000	0.900	29.000	9.000	2.977
2S-0019	39975.000	53107.500	1.000	17.000	2.000	216.000	71.000	96.000	12.000	38.000	4.300	627.000	0.700	9.000	9.000	3.379
2S-0020	39945.000	53130.000	0.000	17.000	2.000	186.000	69.000	143.000	6.000	19.000	4.300	638.000	0.700	3.000	9.000	1.006
2S-0021	39955.000	53133.500	0.000	17.000	2.000	42.000	36.000	52.000	4.000	31.000	2.400	625.000	0.600	6.000	9.000	0.503
2S-0023	39905.000	53292.500	0.000	17.000	1.000	138.000	76.000	138.000	7.000	23.000	3.000	606.000	0.900	5.000	4.000	3.921
2S-0024	39915.000	53290.000	0.000	17.000	1.000	81.000	88.000	79.000	7.000	42.000	3.700	627.000	1.000	-1234.567	4.000	4.324
2S-0025	39905.000	53285.250	0.000	17.000	1.000	132.000	66.000	122.000	6.000	37.000	3.600	640.000	0.900	4.000	4.000	4.726
2S-0026	39880.000	53282.000	0.000	17.000	1.000	153.000	86.000	145.000	26.000	30.000	3.900	724.000	1.000	8.000	4.000	5.086
2S-0028	39830.000	53274.000	0.000	17.000	1.000	59.000	38.000	33.000	4.000	18.000	2.200	390.000	1.000	18.000	4.000	5.849
2S-0029	39782.500	53270.000	0.000	17.000	1.000	30.000	24.000	25.000	2.000	11.000	1.600	320.000	0.900	-1234.567	4.000	6.251
2S-0030	39660.000	53249.000	0.000	17.000	1.000	19.000	24.000	29.000	6.000	11.000	2.200	486.000	0.400	1.000	4.000	8.765
2S-0031	39662.500	53244.000	0.000	17.000	1.000	60.000	49.000	49.000	15.000	17.000	2.300	467.000	0.800	6.000	4.000	9.268
2S-0033	39540.000	53237.000	0.000	17.000	1.000	62.000	65.000	54.000	7.000	23.000	2.900	663.000	1.100	2.000	4.000	10.233
2S-0036	39960.000	53301.500	0.000	17.000	1.000	74.000	88.000	78.000	6.000	34.000	3.900	737.000	0.900	5.000	4.000	2.916
2S-0037	40020.000	53304.750	0.000	17.000	1.000	121.000	123.000	85.000	7.000	28.000	3.700	731.000	0.800	4.000	4.000	2.514
2S-0038	40060.000	53308.250	0.000	17.000	1.000	100.000	53.000	122.000	10.000	29.000	3.200	840.000	0.900	18.000	4.000	2.112
2S-0039	40100.000	53312.000	0.000	17.000	1.000	202.000	88.000	177.000	6.000	42.000	4.800	830.000	0.800	7.000	4.000	1.709
2S-0040	40090.000	53316.449	0.000	17.000	1.000	128.000	80.000	76.000	13.000	34.000	3.900	1170.000	1.200	5.000	4.000	1.307
2S-0043	40125.000	53330.121	0.000	17.000	1.000	97.000	115.000	65.000	15.000	29.000	4.400	461.000	1.000	6.000	4.000	0.000
2S-0044	39322.500	53202.500	0.000	17.000	1.000	90.000	64.000	46.000	9.000	28.000	3.100	570.000	1.100	6.000	7.000	0.000
2S-0045	39315.000	53206.750	0.000	17.000	1.000	76.000	85.000	51.000	2.000	22.000	3.000	2.000	1.000	7.000	7.000	0.402
2S-0046	39305.000	53195.500	1.000	17.000	1.000	51.000	34.000	29.000	11.000	16.000	2.300	613.000	0.700	16.000	7.000	1.569
2S-0047	39265.000	53192.750	0.000	17.000	1.000	105.000	53.000	43.000	12.000	22.000	3.500	735.000	0.800	5.000	7.000	2.172
2S-0048	39245.000	53189.000	0.000	17.000	1.000	134.000	86.000	48.000	4.000	29.000	4.000	879.000	1.000	8.000	7.000	2.574
2S-0049	39220.000	53186.000	0.000	17.000	1.000	74.000	56.000	48.000	4.000	16.000	2.800	453.000	0.900	7.000	7.000	2.977
2S-0050	39165.000	53180.250	0.000	17.000	1.000	8.000	13.000	10.000	2.000	4.000	1.100	249.000	0.500	-1234.567	7.000	4.083
2S-0051	39155.000	53175.250	0.000	17.000	1.000	7.000	12.000	8.000	2.000	4.000	2.200	356.000	0.600	43.000	7.000	4.586
2S-0052	38935.000	53149.000	0.000	17.000	2.000	6.000	13.000	10.000	4.000	2.000	2.400	345.000	0.400	-1234.567	7.000	7.703
2S-0053	38960.000	53152.500	0.000	17.000	2.000	123.000	72.000	56.000	28.000	39.000	3.700	617.000	1.000	9.000	7.000	7.200
2S-0054	38970.000	53156.500	0.000	17.000	2.000	66.000	39.000	38.000	12.000	19.000	2.100	434.000	1.000	2.000	7.000	6.798
2S-0055	39015.000	53162.000	0.000	17.000	2.000	39.000	51.000	34.000	10.000	18.000	2.700	461.000	1.000	-1234.567	7.000	6.396
2S-0056	38930.000	53147.000	0.000	17.000	2.000	101.000	90.000	50.000	16.000	28.000	4.300	619.000	1.300	4.000	7.000	7.944
2S-0057	38920.000	53142.500	0.000	17.000	2.000	100.000	76.000	68.000	18.000	32.000	8.900	984.000	1.000	16.000	7.000	8.346
2S-0058	38880.000	53141.449	0.000	17.000	2.000	16.000	20.000	15.000	4.000	8.000	1.900	326.000	0.700	4.000	7.000	8.749
2S-0059	38850.000	53137.000	0.000	17.000	2.000	22.000	26.000	19.000	7.000	13.000	2.600	653.000	0.600	115.000	7.000	9.392
2S-0060	39860.000	53410.000	0.000	17.000	1.000	44.000	43.000	35.000	24.000	20.000	2.700	781.000	0.700	2.000	5.000	0.000
2S-0061	39855.000	53405.250	0.000	17.000	1.000	87.000	67.000	57.000	12.000	21.000	3.700	785.000	1.100	-1234.567	5.000	0.402
2S-0062	39825.000	53401.250	0.000	17.000	1.000	85.000	77.000	56.000	13.000	24.000	3.600	879.000	1.500	1.000	5.000	1.006
2S-0063	39780.000	53344.500	0.000	17.000	1.000	38.000	43.000	27.000	8.000	15.000	2.600	526.000	0.900	1.000	5.000	1.408
2S-0064	39745.000	53398.500	0.000	17.000	1.000	319.000	158.000	39.000	10.000	21.000	2.800	461.000	1.200	1.000	5.000	1.911
2S-0074	40192.500	52805.000	0.000	17.000	2.000	79.000	56.000	75.000	20.000	45.000	4.600	700.000	1.600	28.000	15.000	3.701
2S-0075	40217.500	52811.000	0.000	17.000	2.000	379.000	152.000	113.000	41.000	59.000	8.700	864.000	2.000	75.000	15.000	2.896
2S-0076	40240.000	52816.000	0.000	17.000	2.000	115.000	48.000	52.000	13.000	23.000	4.900	927.000	1.100	73.000	15.000	2.092
2S-0077	40250.000	52820.500	0.000	17.000	2.000	23.000	19.000	19.000	4.000	8.000	2.400	358.000	0.700	3.000	15.000	1.448
2S-0078	39945.000	52752.000	0.000	17.000	2.000	176.000	74.000	117.000	17.000	43.000	6.700	3500.000	1.100	20.000	15.000	11.746
2S-0079	39922.500	52749.250	0.000	17.000	2.000	260.000	89.000	100.000	13.000	38.000	5.000	785.000	0.700	36.000	15.000	12.228

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-0080	39915.000	52745.000	0.000	17.000	2.000	201.000	123.000	82.000	19.000	36.000	5.500	879.000	1.400	1.000	15.000	12.872
2S-0081	39890.000	52742.250	1.000	17.000	2.000	406.000	176.000	122.000	35.000	62.000	7.400	3500.000	1.900	176.000	15.000	13.516
2S-0082	39872.500	52739.000	0.000	17.000	2.000	204.000	91.000	73.000	14.000	32.000	4.500	1370.000	0.800	13.000	15.000	14.159
2S-0083	39957.500	52757.000	0.000	17.000	2.000	216.000	75.000	74.000	12.000	33.000	5.000	1260.000	1.100	30.000	15.000	11.102
2S-0084	39980.000	52761.750	0.000	17.000	2.000	153.000	62.000	48.000	16.000	28.000	4.200	726.000	0.700	14.000	15.000	10.458
2S-0085	40000.000	52767.000	0.000	17.000	2.000	332.000	141.000	113.000	58.000	60.000	9.000	3500.000	1.800	154.000	15.000	9.815
2S-0086	40015.000	52770.000	0.000	17.000	2.000	212.000	77.000	61.000	33.000	37.000	5.300	1260.000	1.000	21.000	15.000	9.171
2S-0087	40825.000	52767.500	0.000	17.000	2.000	284.000	184.000	76.000	53.000	55.000	8.600	1850.000	1.100	10.000	18.000	8.367
2S-0088	40800.000	52772.500	0.000	17.000	2.000	401.000	154.000	67.000	33.000	39.000	5.000	619.000	1.000	4.000	18.000	7.723
2S-0089	40797.500	52775.000	0.000	17.000	2.000	361.000	321.000	76.000	46.000	44.000	5.000	686.000	1.000	8.000	18.000	7.080
2S-0090	40807.500	52778.250	0.000	17.000	2.000	53.000	32.000	25.000	9.000	12.000	2.600	309.000	0.500	3.000	18.000	6.436
2S-0091	40825.000	52783.500	0.000	17.000	2.000	18.000	16.000	14.000	2.000	5.000	1.900	227.000	0.300	3.000	18.000	5.792
2S-0092	40840.000	52788.000	0.000	17.000	2.000	299.000	95.000	63.000	12.000	24.000	3.600	486.000	0.600	3.000	18.000	5.149
2S-0093	40850.000	52793.750	0.000	17.000	2.000	411.000	129.000	76.000	27.000	44.000	6.400	535.000	1.200	8.000	18.000	4.344
2S-0094	40867.500	52797.250	0.000	17.000	2.000	175.000	89.000	59.000	32.000	28.000	4.300	524.000	0.800	13.000	18.000	3.701
2S-0095	41140.000	52705.500	1.000	17.000	2.000	154.000	90.000	62.000	22.000	24.000	3.800	661.000	0.700	11.000	20.000	8.286
2S-0096	39380.000	52775.500	0.000	17.000	2.000	25.000	20.000	21.000	2.000	8.000	1.800	328.000	0.200	3.000	14.000	3.218
2S-0097	39410.000	52770.000	0.000	17.000	2.000	85.000	51.000	53.000	8.000	24.000	4.400	872.000	0.500	26.000	14.000	4.183
2S-0098	39430.000	52765.000	0.000	17.000	2.000	225.000	88.000	108.000	14.000	49.000	5.900	1680.000	1.200	34.000	14.000	4.827
2S-0099	40810.000	52807.500	0.000	17.000	2.000	170.000	127.000	82.000	19.000	39.000	5.000	728.000	1.100	10.000	18.000	0.644
2S-0100	40790.000	52810.500	0.000	17.000	2.000	360.000	153.000	99.000	24.000	36.000	4.400	508.000	0.900	3.000	18.000	0.000
2S-0101	38227.500	52988.750	0.000	17.000	2.000	129.000	156.000	57.000	33.000	37.000	4.400	781.000	0.600	8.000	10.000	12.630
2S-0102	38237.500	52984.000	1.000	17.000	2.000	171.000	80.000	58.000	10.000	27.000	3.700	541.000	0.600	7.000	10.000	13.032
2S-0103	38270.000	52978.000	0.000	17.000	2.000	76.000	81.000	43.000	13.000	21.000	3.100	470.000	0.500	1.000	10.000	13.836
2S-0104	38272.500	52974.500	0.000	17.000	2.000	130.000	99.000	51.000	20.000	25.000	3.400	573.000	0.600	3.000	10.000	14.238
2S-0105	38180.000	52713.500	0.000	17.000	2.000	148.000	70.000	73.000	10.000	28.000	3.700	576.000	0.800	1.000	10.000	20.552
2S-0106	38167.500	52909.000	0.000	17.000	2.000	200.000	81.000	113.000	11.000	38.000	4.600	547.000	0.800	21.000	10.000	21.034
2S-0107	38160.000	52905.000	0.000	17.000	2.000	29.000	27.000	45.000	4.000	9.000	1.700	236.000	0.300	-1234.567	10.000	21.437
2S-0108	38170.000	52900.250	0.000	17.000	2.000	176.000	59.000	62.000	7.000	27.000	4.200	927.000	0.700	16.000	10.000	21.839
2S-0109	38152.500	52868.750	0.000	17.000	2.000	179.000	100.000	48.000	20.000	43.000	6.000	1780.000	0.500	41.000	10.000	24.939
2S-0110	38150.000	52863.500	0.000	17.000	2.000	159.000	135.000	70.000	14.000	34.000	5.000	1560.000	1.600	20.000	10.000	25.341
2S-0111	38135.000	52858.750	0.000	17.000	2.000	209.000	143.000	108.000	19.000	46.000	7.600	-1234.567	1.700	28.000	10.000	25.985
2S-0112	38115.000	52796.750	0.000	17.000	2.000	234.000	99.000	71.000	26.000	39.000	6.900	1510.000	1.400	17.000	10.000	34.478
2S-0113	38110.000	52791.750	0.000	17.000	2.000	283.000	151.000	106.000	31.000	59.000	10.000	-1234.567	1.600	34.000	10.000	36.121
2S-0114	38085.000	52786.750	0.000	17.000	2.000	491.000	331.000	154.000	36.000	84.000	17.000	3500.000	2.200	24.000	10.000	36.926
2S-0115	38060.000	52785.000	0.000	17.000	2.000	130.000	99.000	50.000	12.000	29.000	4.800	774.000	1.000	15.000	10.000	37.328
2S-0116	38850.000	53020.250	0.000	17.000	2.000	22.000	24.000	21.000	6.000	8.000	1.800	366.000	0.600	-1234.567	9.000	2.514
2S-0117	38880.000	53014.500	0.000	17.000	2.000	8.000	14.000	11.000	2.000	7.000	1.300	192.000	0.500	-1234.567	9.000	2.574
2S-0118	38860.000	53002.500	0.000	17.000	2.000	147.000	65.000	45.000	12.000	29.000	3.900	674.000	0.800	6.000	9.000	2.977
2S-0119	41627.500	52990.500	0.000	17.000	2.000	100.000	125.000	70.000	30.000	35.000	4.900	1300.000	1.100	6.000	13.000	0.000
2S-0120	41602.500	52985.500	0.000	17.000	2.000	50.000	69.000	35.000	24.000	20.000	2.400	476.000	0.900	1.000	13.000	0.483
2S-0121	41582.500	52981.250	0.000	17.000	2.000	45.000	38.000	20.000	9.000	9.000	2.000	246.000	0.700	-1234.567	13.000	1.126
2S-2001	38860.000	53374.500	0.000	17.000	1.000	123.000	77.000	178.000	51.000	33.000	4.400	731.000	1.100	6.000	6.000	3.318
2S-2002	38870.000	53369.000	0.000	17.000	1.000	135.000	60.000	106.000	27.000	29.000	2.600	470.000	1.200	1.000	6.000	3.720
2S-2003	38860.000	53365.500	0.000	17.000	1.000	91.000	71.000	207.000	36.000	34.000	4.400	432.000	1.200	3.000	6.000	4.123
2S-2004	38860.000	53361.500	0.000	17.000	1.000	22.000	32.000	33.000	22.000	9.000	1.900	312.000	0.700	5.000	6.000	4.525
2S-2005	38880.000	53347.000	0.000	17.000	1.000	97.000	89.000	82.000	94.000	30.000	3.900	587.000	1.100	3.000	6.000	5.732
2S-2006	38885.000	53341.500	0.000	17.000	1.000	117.000	67.000	80.000	34.000	27.000	3.100	561.000	1.000	5.000	6.000	6.335
2S-2007	38855.000	53338.500	0.000	17.000	1.000	27.000	31.000	41.000	7.000	14.000	2.100	274.000	0.500	-1234.567	6.000	6.838
2S-2008	38845 000	53335.000	0.000	17.000	1.000	61.000	54.000	83.000	20.000	27.000	3.500	451.000	1.000	1.000	6.000	7.240
2S-2009	38770.000	53331.500	0.000	17.000	1.000	16.000	44.000	37.000	5.000	9.000	2.000	249.000	0.700	-1234.567	6.000	7.642
2S-2010	38755.000	53328.000	0.000	17.000	1.000	45.000	32.000	35.000	13.000	13.000	2.000	151.000	1.100	1.000	6.000	8.044
2S-2011	38715.000	53324.500	0.000	17.000	1.000	45.000	65.000	83.000	9.000	21.000	2.700	408.000	0.900	10.000	6.000	8.446
2S-2012	38680.000	53321.500	0.000	17.000	1.000	35.000	45.000	40.000	8.000	15.000	2.500	396.000	0.700	-1234.567	6.000	8.849
2S-2013	38610.000	53306.000	0.000	17.000	1.000	81.000	57.000	58.000	40.000	27.000	2.800	3400.000	1.000	5.000	6.000	9.251
2S-2014	38600.000	53300.500	0.000	17.000	1.000	120.000	90.000	113.000	22.000	41.000	4.200	1750.000	1.000	1.000	6.000	10.960
2S-2015	38600.000	53244.500	0.000	17.000	1.000	81.000	68.000	57.000	14.000	26.000	3.100	707.000	1.500	12.000	6.000	11.463
2S-2016	38615.000	53270.500	0.000	17.000	1.000	82.000	80.000	73.000	25.000	28.000	4.200	845.000	0.900	14.000	6.000	11.865
2S-2017	38555.000	53276.500	0.000	17.000	1.000	102.000	92.000	54.000	12.000	30.000	2.800	579.000	1.000	5.000	6.000	13.474
2S-2018	42460.500	53440.551	1.000	17.000	1.000	101.000	55.000	37.000	10.000	24.000	3.200	479.000	1.200	4.000	2.000	9.704

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-2019	42470.500	53444.500	0.000	17.000	1.000	100.000	81.000	44.000	25.000	29.000	4.500	839.000	1.000	-1234.567	2.000	0.000
2S-2020	42400.000	53433.500	0.000	17.000	1.000	66.000	100.000	51.000	15.000	23.000	3.300	558.000	1.200	-1234.567	2.000	1.500
2S-2021	42360.000	53421.051	0.000	17.000	1.000	69.000	74.000	47.000	30.000	27.000	3.200	760.000	1.500	2.000	2.000	1.408
2S-2022	42320.000	53425.500	0.000	17.000	1.000	73.000	59.000	35.000	14.000	20.000	3.400	402.000	0.900	14.000	2.000	1.006
2S-2023	42285.500	53418.000	0.000	17.000	1.000	121.000	53.000	38.000	46.000	25.000	3.000	368.000	0.700	8.000	2.000	2.112
2S-2024	42230.500	53412.051	0.000	17.000	1.000	78.000	69.000	50.000	15.000	28.000	3.400	463.000	0.900	16.000	2.000	2.715
2S-2025	42235.000	53407.000	0.000	17.000	1.000	73.000	68.000	38.000	11.000	23.000	2.900	488.000	0.900	12.000	2.000	3.117
2S-2026	42230.000	53403.051	0.000	17.000	1.000	31.000	25.000	18.000	4.000	9.000	1.500	253.000	0.400	3.000	2.000	3.519
2S-2027	42200.500	53400.500	0.000	17.000	1.000	57.000	79.000	39.000	9.000	18.000	2.800	497.000	1.200	-1234.567	2.000	3.922
2S-2028	42175.500	53395.551	0.000	17.000	1.000	35.000	31.000	21.000	7.000	11.000	2.000	432.000	1.200	9.000	2.000	4.424
2S-2029	42100.500	53385.500	0.000	17.000	1.000	98.000	111.000	67.000	13.000	25.000	3.900	585.000	1.200	12.000	2.000	5.531
2S-2030	42060.000	53382.500	0.000	17.000	1.000	71.000	53.000	39.000	9.000	19.000	2.500	512.000	1.200	14.000	2.000	5.933
2S-2081	40985.000	52698.000	0.000	17.000	2.000	117.000	207.000	112.000	36.000	51.000	6.700	813.000	1.500	25.000	22.000	0.000
2S-2082	40950.000	52645.051	0.000	17.000	2.000	109.000	78.000	60.000	23.000	31.000	3.400	608.000	1.000	28.000	22.000	0.450
2S-2083	40930.000	52690.551	0.000	17.000	2.000	113.000	172.000	102.000	62.000	54.000	5.900	1930.000	1.100	16.000	22.000	0.950
2S-2084	40895.000	52685.551	0.000	17.000	2.000	184.000	81.000	47.000	36.000	22.000	3.400	735.000	0.800	12.000	22.000	1.500
2S-2085	39365.000	52779.500	0.000	17.000	2.000	53.000	36.000	53.000	2.000	15.000	2.700	495.000	0.700	2.000	14.000	2.414
2S-2086	39365.500	52785.000	0.000	17.000	2.000	87.000	66.000	61.000	5.000	27.000	3.000	672.000	0.800	15.000	14.000	1.609
2S-2087	39360.000	52789.000	0.000	17.000	2.000	71.000	37.000	56.000	2.000	16.000	2.700	529.000	0.600	8.000	14.000	0.805
2S-2088	39375.500	52794.051	0.000	17.000	2.000	154.000	70.000	103.000	13.000	27.000	3.200	768.000	0.800	9.000	14.000	0.000
2S-2089	39680.500	52713.051	0.000	17.000	2.000	210.000	50.000	130.000	11.000	45.000	5.000	940.000	1.200	8.000	16.000	2.655
2S-2090	39675.000	52708.500	0.000	17.000	2.000	112.000	51.000	36.000	4.000	18.000	2.600	375.000	0.600	1.000	16.000	3.459
2S-2091	39640.500	52703.551	0.000	17.000	2.000	161.000	154.000	81.000	16.000	43.000	5.000	1600.000	1.200	3.000	16.000	4.264
2S-2092	39610.500	52700.051	0.000	17.000	2.000	49.000	30.000	19.000	4.000	10.000	1.500	305.000	0.700	17.000	16.000	4.908
2S-2093	39610.500	52700.051	0.000	17.000	2.000	61.000	32.000	18.000	2.000	11.000	1.700	324.000	0.700	7.000	16.000	4.908
2S-2094	38270.000	52970.551	0.000	17.000	2.000	164.000	92.000	51.000	11.000	25.000	3.600	537.000	0.800	2.000	10.000	14.641
2S-2095	38260.500	52966.051	0.000	17.000	2.000	239.000	143.000	68.000	17.000	44.000	5.000	699.000	1.000	2.000	10.000	15.043
2S-2096	38265.500	52961.551	0.000	17.000	2.000	226.000	129.000	61.000	15.000	32.000	3.400	503.000	0.600	5.000	10.000	15.445
2S-2097	38300.500	52958.000	0.000	17.000	2.000	121.000	115.000	56.000	10.000	29.000	4.000	665.000	1.000	18.000	10.000	15.847
2S-2098	38325.000	52953.500	0.000	17.000	2.000	103.000	94.000	50.000	6.000	25.000	3.700	577.000	0.700	4.000	10.000	16.250
2S-2099	38350.500	52950.000	0.000	17.000	2.000	116.000	92.000	57.000	8.000	28.000	4.100	691.000	0.800	3.000	10.000	16.652
2S-2100	38135.000	52849.051	0.000	17.000	2.000	189.000	176.000	101.000	21.000	42.000	5.100	1760.000	1.100	12.000	10.000	27.194
2S-2101	38140.000	52843.051	0.000	17.000	2.000	309.000	137.000	114.000	27.000	51.000	8.700	1470.000	1.600	15.000	10.000	27.996
2S-2102	38145.000	52839.000	0.000	17.000	2.000	208.000	121.000	71.000	16.000	33.000	5.200	1240.000	1.200	9.000	10.000	28.800
2S-2103	38160.500	52834.000	1.000	17.000	2.000	327.000	149.000	131.000	15.000	46.000	6.200	1630.000	1.500	8.000	10.000	29.605
2S-2104	38155.000	52828.551	0.000	17.000	2.000	81.000	119.000	47.000	7.000	24.000	3.300	756.000	0.800	13.000	10.000	30.409
2S-2105	38135.500	52924.551	0.000	17.000	2.000	222.000	88.000	59.000	8.000	34.000	5.400	1350.000	1.500	10.000	10.000	31.053
2S-2106	38110.000	52819.500	0.000	17.000	2.000	80.000	56.000	44.000	11.000	25.000	4.500	596.000	1.200	4.000	10.000	31.857
2S-2107	39375.000	53022.000	0.000	17.000	2.000	233.000	70.000	116.000	8.000	39.000	3.700	1200.000	1.100	13.000	12.000	0.000
2S-2108	39355.000	53017.000	0.000	17.000	2.000	312.000	83.000	119.000	5.000	42.000	5.400	968.000	1.100	16.000	12.000	0.402
2S-2109	39355.500	53001.051	0.000	17.000	2.000	173.000	71.000	98.000	14.000	40.000	5.300	1680.000	1.100	13.000	12.000	0.804
2S-2110	39340.500	53007.551	0.000	17.000	2.000	51.000	39.000	38.000	5.000	15.000	2.300	600.000	0.900	10.000	12.000	1.207
2S-2111	38710.000	52946.500	0.000	17.000	2.000	266.000	94.000	75.000	11.000	34.000	4.000	739.000	0.900	3.000	11.000	4.313
2S-2112	38730.500	52951.000	0.000	17.000	2.000	73.000	46.000	49.000	2.000	18.000	2.300	356.000	0.800	2.000	11.000	3.509
2S-2113	38745.000	52954.000	0.000	17.000	2.000	94.000	59.000	56.000	5.000	17.000	2.300	369.000	0.700	13.000	11.000	3.107
2S-2114	40715.000	53250.551	0.000	17.000	1.000	67.000	33.000	26.000	4.000	13.000	1.700	295.000	0.900	-1234.567	3.000	15.704
2S-2115	40740.000	53254.500	0.000	17.000	1.000	120.000	51.000	54.000	6.000	22.000	2.600	411.000	1.100	3.000	3.000	15.202
2S-2116	40735.500	53257.551	1.000	17.000	1.000	90.000	59.000	43.000	10.000	30.000	3.200	1160.000	0.900	3.000	3.000	14.900
2S-6001	38592.500	53279.250	1.000	17.000	1.000	74.000	123.000	117.000	19.000	40.000	5.000	894.000	0.900	2.000	6.000	12.971
2S-6002	38602.500	53284.500	0.000	17.000	1.000	69.000	57.000	102.000	8.000	23.000	2.800	371.000	0.700	-1234.567	6.000	12.670
2S-6003	38572.500	53270.500	0.000	17.000	1.000	152.000	101.000	117.000	16.000	35.000	4.000	547.000	0.600	1.000	6.000	14.078
2S-6004	38592.500	53266.500	0.000	17.000	1.000	61.000	63.000	44.000	9.000	21.000	2.300	501.000	0.600	-1234.567	6.000	14.681
2S-6005	38631.000	53261.602	0.000	17.000	1.000	99.000	63.000	69.000	9.000	22.000	2.700	451.000	0.600	4.000	6.000	15.284
2S-6006	38621.000	53258.000	0.000	17.000	1.000	141.000	99.000	74.000	8.000	26.000	3.600	381.000	0.700	1.000	6.000	15.687
2S-6007	38623.500	53251.898	0.000	17.000	1.000	147.000	103.000	69.000	15.000	39.000	3.600	850.000	1.000	1.000	6.000	16.189
2S-6008	38647.500	53244.352	1.000	17.000	1.000	103.000	54.000	58.000	11.000	19.000	2.500	322.000	0.500	3.000	6.000	16.994
2S-6009	38633.500	53239.250	0.000	17.000	1.000	185.000	86.000	83.000	15.000	28.000	3.100	449.000	0.300	4.000	6.000	17.396
2S-6010	38647.500	53234.102	0.000	17.000	1.000	45.000	49.000	46.000	8.000	17.000	2.700	444.000	0.500	2.000	6.000	17.798
2S-6011	38647.500	53229.648	0.000	17.000	1.000	87.000	98.000	68.000	17.000	25.000	3.100	358.000	0.600	1.000	6.000	18.201
2S-6012	38626.000	53225.750	0.000	17.000	1.000	43.000	30.000	34.000	13.000	12.000	1.600	152.000	0.300	3.000	6.000	18.603

SAMPLE NO.	EASTING	NORTHING	SB	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-6013	38622.500	53220.301	0.000	17.000	1.000	126.000	141.000	74.000	12.000	25.000	3.000	418.000	0.500	8.000	6.000	19.105
2S-6014	38637.500	53216.250	0.000	17.000	1.000	45.000	68.000	39.000	16.000	18.000	2.600	326.000	0.600	3.000	6.000	19.608
2S-6015	38837.500	53396.250	0.000	17.000	1.000	27.000	30.000	35.000	10.000	12.000	2.000	171.000	0.500	3.000	6.000	1.408
2S-6016	38849.000	53391.750	1.000	17.000	1.000	31.000	38.000	46.000	12.000	16.000	2.500	531.000	0.400	2.000	6.000	1.810
2S-6017	38572.500	53167.898	0.000	17.000	2.000	54.000	36.000	35.000	11.000	17.000	2.400	358.000	0.400	4.000	6.000	24.514
2S-6018	38553.500	53164.500	0.000	17.000	2.000	28.000	30.000	23.000	8.000	10.000	1.400	232.000	0.500	-1234.567	6.000	24.916
2S-6019	38542.500	53160.250	0.000	17.000	2.000	32.000	20.000	19.000	5.000	8.000	1.300	201.000	0.400	1.000	6.000	25.318
2S-6020	38534.500	53156.648	0.000	17.000	2.000	42.000	31.000	33.000	17.000	12.000	2.400	156.000	0.600	4.000	6.000	25.720
2S-6021	38511.000	53143.449	0.000	17.000	2.000	54.000	57.000	46.000	14.000	20.000	2.700	335.000	0.700	2.000	6.000	28.134
2S-6022	38519.000	53147.949	0.000	17.000	2.000	92.000	69.000	81.000	9.000	32.000	3.500	328.000	0.700	2.000	6.000	27.329
2S-6023	38529.000	53152.250	0.000	17.000	2.000	54.000	48.000	38.000	7.000	19.000	2.100	472.000	0.600	2.000	6.000	26.525
2S-6024	38492.500	53140.301	0.000	17.000	2.000	78.000	69.000	60.000	10.000	26.000	3.500	513.000	0.700	2.000	6.000	28.938
2S-6025	38606.500	53182.352	0.000	17.000	2.000	27.000	29.000	25.000	5.000	11.000	1.600	181.000	0.400	-1234.567	6.000	22.947
2S-6026	38594.500	53178.000	0.000	17.000	2.000	68.000	51.000	64.000	12.000	24.000	2.800	303.000	0.500	-1234.567	6.000	23.307
2S-6027	38581.000	53171.699	0.000	17.000	2.000	22.000	16.000	21.000	4.000	8.000	1.200	137.000	0.600	-1234.567	6.000	24.111
2S-6028	38593.000	53174.352	0.000	17.000	2.000	28.000	52.000	25.000	6.000	11.000	1.600	196.000	0.500	1.000	6.000	23.907
2S-6029	38651.500	53210.352	0.000	17.000	2.000	46.000	38.000	36.000	7.000	14.000	1.800	251.000	0.500	-1234.567	6.000	20.031
2S-6030	38639.500	53195.648	0.000	17.000	2.000	49.000	39.000	38.000	13.000	13.000	1.700	343.000	0.700	2.000	6.000	21.438
2S-6031	38251.500	53049.750	0.000	17.000	2.000	30.000	41.000	35.000	14.000	14.000	1.900	219.000	0.700	8.000	10.000	6.033
2S-6032	38271.500	53046.000	0.000	17.000	2.000	80.000	78.000	70.000	18.000	26.000	3.500	488.000	0.800	1.000	10.000	6.435
2S-6033	38277.000	53040.449	0.000	17.000	2.000	27.000	24.000	51.000	7.000	13.000	1.500	175.000	0.300	1.000	10.000	7.079
2S-6034	38285.000	53035.500	0.000	17.000	2.000	39.000	30.000	44.000	6.000	12.000	1.600	166.000	0.600	1.000	10.000	7.481
2S-6035	38245.000	53055.148	0.000	17.000	2.000	23.000	24.000	18.000	9.000	7.000	1.400	149.000	0.300	1.000	10.000	5.631
2S-6036	38185.000	53086.648	0.000	17.000	2.000	158.000	98.000	145.000	17.000	40.000	3.900	558.000	0.800	4.000	10.000	3.620
2S-6037	38125.500	53080.148	0.000	17.000	2.000	25.000	19.000	17.000	6.000	7.000	1.200	238.000	0.100	-1234.567	10.000	2.413
2S-6038	38247.500	53058.699	0.000	17.000	2.000	123.000	48.000	79.000	32.000	24.000	2.900	421.000	0.900	-1234.567	10.000	5.229
2S-6039	38142.500	53076.250	0.000	17.000	2.000	81.000	73.000	73.000	17.000	25.000	3.100	381.000	0.800	-1234.567	10.000	2.816
2S-6040	38156.500	53073.102	0.000	17.000	2.000	54.000	51.000	53.000	20.000	19.000	2.500	611.000	0.900	8.000	10.000	3.218
2S-6041	38141.000	53084.500	0.000	17.000	2.000	23.000	37.000	25.000	10.000	8.000	1.800	209.000	0.500	34.000	10.000	2.011
2S-6042	38174.500	53087.148	0.000	17.000	2.000	31.000	24.000	21.000	14.000	10.000	1.800	192.000	0.500	-1234.567	-1234.567	-1234.567
2S-6043	38197.500	53090.301	0.000	17.000	2.000	23.000	24.000	22.000	10.000	8.000	1.500	189.000	0.600	-1234.567	-1234.567	-1234.567
2S-6044	38153.500	53046.449	0.000	17.000	2.000	25.000	18.000	21.000	14.000	6.000	1.200	223.000	0.400	-1234.567	10.000	0.804
2S-6045	38155.000	53092.250	0.000	17.000	2.000	26.000	23.000	23.000	12.000	7.000	1.400	169.000	0.600	-1234.567	10.000	1.207
2S-6046	38145.500	53104.750	0.000	17.000	2.000	34.000	30.000	25.000	25.000	9.000	1.900	240.000	0.600	-1234.567	10.000	0.000
2S-6047	38150.000	53099.750	0.000	17.000	2.000	55.000	38.000	62.000	20.000	14.000	2.000	307.000	0.400	-1234.567	10.000	0.402
2S-6048	38212.500	53064.750	0.000	17.000	2.000	154.000	84.000	69.000	21.000	25.000	3.400	602.000	0.800	2.000	10.000	4.424
2S-6049	38235.000	53062.648	0.000	17.000	2.000	133.000	59.000	100.000	19.000	25.000	3.100	364.000	0.700	1.000	10.000	4.827
2S-6050	38262.500	53036.250	0.000	17.000	2.000	124.000	41.000	81.000	11.000	24.000	2.500	350.000	0.700	20.000	10.000	8.125
2S-6051	38236.500	53000.250	0.000	17.000	2.000	32.000	36.000	25.000	10.000	10.000	1.900	173.000	0.700	1.000	10.000	11.825
2S-6052	38239.500	52995.801	0.000	17.000	2.000	66.000	73.000	38.000	15.000	19.000	2.600	417.000	0.800	2.000	10.000	12.227
2S-6053	38233.000	53005.250	1.000	17.000	2.000	46.000	42.000	28.000	9.000	13.000	1.900	284.000	0.800	-1234.567	10.000	11.423
2S-6054	38201.000	53014.750	0.000	17.000	2.000	163.000	100.000	54.000	17.000	26.000	3.800	501.000	0.800	-1234.567	10.000	9.975
2S-6055	38217.500	53020.250	0.000	17.000	2.000	87.000	91.000	38.000	20.000	19.000	2.700	331.000	0.600	1.000	10.000	9.331
2S-6056	38236.000	53025.250	0.000	17.000	2.000	77.000	51.000	58.000	14.000	17.000	2.400	301.000	0.800	1.000	10.000	8.929
2S-6057	38242.500	53030.199	0.000	17.000	2.000	161.000	94.000	62.000	19.000	28.000	3.500	493.000	0.900	1.000	10.000	8.527
2S-0065	39675.000	53394.000	1.000	17.000	1.000	49.000	77.000	51.000	14.000	18.000	2.900	670.000	1.500	1.000	5.000	2.815
2S-0066	39710.000	53346.000	0.000	17.000	1.000	41.000	37.000	37.000	6.000	12.000	2.300	341.000	0.800	5.000	5.000	2.413
2S-0067	38757.500	53355.500	0.000	17.000	1.000	9.000	24.000	19.000	6.000	2.000	1.900	302.000	0.500	-1234.567	6.000	5.028
2S-0068	38772.500	53351.000	0.000	17.000	1.000	5.000	18.000	12.000	2.000	2.000	1.200	244.000	0.600	-1234.567	6.000	5.430
2S-0069	38590.000	53310.500	0.000	17.000	1.000	4.000	16.000.	7.000	2.000	2.000	1.200	219.000	0.600	-1234.567	6.000	10.156
2S-0070	38630.000	53314.000	0.000	17.000	1.000	7.000	19.000	11.000	4.000	2.000	1.700	289.000	0.400	34.000	6.000	9.552
2S-0071	39697.500	53069.000	0.000	17.000	2.000	144.000	72.000	58.000	12.000	23.000	306.000	656.000	0.800	1.000	8.000	5.127
2S-0072	39585.000	53074.000	0.000	17.000	2.000	29.000	35.000	26.000	7.000	11.000	2.600	547.000	0.500	2.000	8.000	4.724
2S-0073	39562.500	53231.750	0.000	17.000	1.000	73.000	75.000	65.000	13.000	20.000	3.200	785.000	0.800	-1234.567	4.000	10.674
2S-0123	43490.000	52704.750	0.000	17.000	2.000	110.000	44.000	37.000	40.000	23.000	3.300	585.000	1.000	3.000	21.000	2.253
2S-0124	43452.500	52699.500	0.000	17.000	2.000	97.000	77.000	41.000	46.000	25.000	1.100	882.000	0.800	3.000	20.000	2.977
2S-0125	43410.000	52697.750	0.000	17.000	2.000	100.000	66.000	43.000	33.000	19.000	2.800	459.000	0.700	1.000	20.000	3.620
2S-0126	40540.000	52699.000	0.000	17.000	2.000	961.000	100.000	107.000	73.000	52.000	4.800	1360.000	1.900	94.000	19.000	5.310
2S-0127	40530.000	52694.500	0.000	17.000	2.000	218.000	91.000	81.000	30.000	38.000	5.700	253.000	1.100	23.000	19.000	6.758
2S-0128	40520.000	52690.000	0.000	17.000	2.000	899.000	99.000	80.000	54.000	57.000	4.100	1210.000	1.700	142.000	19.000	5.753

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-2031	42040.000	53376.551	0.000	17.000	1.000	72.000	71.000	51.000	6.000	22.000	2.700	658.000	1.200	6.000	2.000	6.536
2S-2032	42065.000	53369.500	0.000	17.000	1.000	77.000	75.000	51.000	13.000	25.000	2.900	891.000	1.300	12.000	2.000	7.240
2S-2033	42085.000	53362.000	0.000	17.000	1.000	278.000	90.000	57.000	34.000	31.000	3.700	543.000	1.000	4.000	2.000	7.944
2S-2034	42100.000	53356.551	0.000	17.000	1.000	128.000	60.000	56.000	9.000	28.000	3.300	638.000	0.600	62.000	2.000	8.346
2S-2035	42090.000	53350.500	0.000	17.000	1.000	87.000	76.000	50.000	19.000	29.000	4.100	759.000	0.800	81.000	2.000	8.950
2S-2036	42050.500	53343.000	0.000	17.000	1.000	110.000	93.000	75.000	12.000	35.000	4.000	619.000	1.400	7.000	2.000	9.754
2S-2037	42030.000	53337.500	0.000	17.000	1.000	160.000	89.000	64.000	21.000	28.000	4.600	593.000	1.900	7.000	2.000	10.358
2S-2038	42035.500	53332.551	0.000	17.000	1.000	135.000	101.000	70.000	14.000	32.000	4.800	649.000	1.400	7.000	2.000	10.659
2S-2039	42020.500	53328.051	0.000	17.000	1.000	177.000	1.200	100.000	15.000	14.000	6.200	678.000	1.000	33.000	2.000	11.061
2S-2040	42000.500	53324.500	0.000	17.000	1.000	127.000	88.000	72.000	16.000	36.000	5.200	1270.000	0.800	16.000	2.000	11.464
2S-2041	41980.500	53321.500	0.000	17.000	1.000	65.000	44.000	38.000	7.000	17.000	2.900	696.000	0.700	5.000	2.000	11.866
2S-2042	41955.500	53315.051	0.000	17.000	1.000	124.000	81.000	125.000	9.000	38.000	4.400	1410.000	0.900	1.000	2.000	12.469
2S-2043	41980.500	53318.000	0.000	17.000	1.000	87.000	82.000	66.000	5.000	31.000	4.600	605.000	0.800	1.000	2.000	12.167
2S-2044	41805.000	53301.051	0.000	17.000	1.000	132.000	97.000	149.000	14.000	40.000	5.600	1440.000	0.900	1.000	2.000	14.379
2S-2045	41765.000	53299.949	0.000	17.000	1.000	118.000	90.000	70.000	9.000	37.000	4.900	640.000	0.500	4.000	2.000	14.882
2S-2046	41840.500	53303.051	0.000	17.000	1.000	123.000	91.000	105.000	14.000	25.000	6.400	2030.000	0.600	5.000	2.000	13.977
2S-2047	41880.000	53305.500	0.000	17.000	1.000	125.000	82.000	110.000	16.000	39.000	5.600	1300.000	0.500	4.000	2.000	13.575
2S-2048	41910.000	53308.051	0.000	17.000	1.000	80.000	61.000	66.000	15.000	27.000	4.000	899.000	0.600	2.000	2.000	13.072
2S-2049	41690.000	53286.551	0.000	17.000	1.000	127.000	91.000	124.000	9.000	33.000	4.800	678.000	0.800	10.000	2.000	16.391
2S-2050	41705.500	53266.000	0.000	17.000	1.000	165.000	82.000	211.000	16.000	82.000	4.300	862.000	0.700	6.000	2.000	18.301
2S-2051	41695.500	53270.500	0.000	17.000	1.000	102.000	79.000	97.000	12.000	30.000	3.800	738.000	1.000	2.000	2.000	17.899
2S-2052	41680.500	53275.000	0.000	17.000	1.000	138.000	95.000	187.000	10.000	40.000	5.300	1400.000	0.600	8.000	2.000	17.597
2S-2053	41700.000	53261.051	0.000	17.000	1.000	82.000	69.000	89.000	9.000	27.000	3.900	793.000	0.800	8.000	2.000	18.703
2S-2054	41700.500	53256.051	0.000	17.000	1.000	164.000	101.000	203.000	13.000	47.000	5.600	1500.000	0.700	5.000	2.000	19.206
2S-2055	41710.000	53252.551	0.000	17.000	1.000	173.000	82.000	161.000	12.000	40.000	5.000	970.000	0.800	3.000	2.000	19.608
2S-2056	41750.500	53248.551	0.000	17.000	1.000	132.000	87.000	154.000	11.000	38.000	5.200	1120.000	0.700	15.000	2.000	20.111
2S-2057	41765.500	53244.551	0.000	17.000	1.000	170.000	86.000	215.000	12.000	45.000	5.400	1600.000	0.800	3.000	2.000	20.417
2S-2058	41785.500	53241.051	0.000	17.000	1.000	166.000	85.000	203.000	14.000	51.000	4.500	1950.000	0.600	9.000	2.000	20.815
2S-2059	41795.000	53236.500	0.000	17.000	1.000	82.000	59.000	143.000	4.000	29.000	3.900	775.000	0.400	-1234.567	2.000	21.318
2S-2061	41665.500	53282.500	1.000	17.000	1.000	93.000	83.000	57.000	15.000	25.000	4.200	791.000	1.100	3.000	2.000	16.793
2S-2062	41725.000	53289.051	1.000	17.000	1.000	72.000	77.000	53.000	11.000	25.000	3.400	619.000	1.000	4.000	2.000	15.888
2S-2063	40990.000	53415.500	1.000	17.000	1.000	101.000	91.000	61.000	9.000	26.000	4.100	730.000	0.800	2.000	3.000	0.000
2S-2064	40970.000	53411.000	1.000	17.000	1.000	68.000	68.000	47.000	8.000	23.000	3.000	517.000	0.800	1.000	3.000	0.302
2S-2065	40970.500	53405.051	1.000	17.000	1.000	54.000	42.000	32.000	7.000	14.000	2.700	519.000	1.200	-1234.567	3.000	0.603
2S-2066	40960.000	53400.500	0.000	17.000	1.000	21.000	34.000	20.000	2.000	8.000	2.000	307.000	0.300	-1234.567	3.000	1.005
2S-2067	40955.000	53397.051	0.000	17.000	1.000	11.000	20.000	11.000	2.000	4.000	1.300	250.000	0.400	-1234.567	3.000	1.408
2S-2068	40950.000	53393.051	0.000	17.000	1.000	133.000	66.000	47.000	15.000	20.000	3.000	513.000	0.900	-1234.567	3.000	1.709
2S-2069	40930.500	53389.000	0.000	17.000	1.000	55.000	38.000	36.000	9.000	16.000	2.700	402.000	1.000	-1234.567	3.000	2.011
2S-2071	40460.000	52778.500	0.000	17.000	2.000	68.000	67.000	61.000	15.000	17.000	3.000	567.000	0.900	4.000	17.000	0.000
2S-2072	40925.000	53385.000	0.000	17.000	1.000	39.000	38.000	28.000	7.000	13.000	2.400	307.000	0.200	13.000	3.000	2.413
2S-2073	40460.000	52777.000	0.000	17.000	2.000	316.000	250.000	81.000	16.000	31.000	4.600	656.000	1.000	4.000	17.000	0.241
2S-2074	40460.000	52760.551	0.000	17.000	2.000	283.000	240.000	76.000	38.000	37.000	5.700	888.000	0.700	7.000	17.000	1.046
2S-2075	40445.000	52765.000	0.000	17.000	2.000	242.000	230.000	80.000	34.000	40.000	6.800	1310.000	0.600	11.000	17.000	1.850
2S-2076	40430.000	52769.051	0.000	17.000	2.000	59.000	67.000	36.000	7.000	14.000	2.700	394.000	0.500	8.000	17.000	2.655
2S-2077	40415.000	52756.500	0.000	17.000	2.000	220.000	400.000	81.000	32.000	35.000	5.500	988.000	0.800	18.000	17.000	3.459
2S-2078	40390.000	52753.051	0.000	17.000	2.000	141.000	1020.000	74.000	143.000	33.000	5.200	740.000	0.600	13.000	17.000	45.103
2S-2079	40350.500	52749.051	0.000	17.000	2.000	230.000	270.000	93.000	29.000	42.000	5.100	716.000	1.300	13.000	17.000	4.747
2S-2080	40350.500	52749.051	0.000	17.000	2.000	227.000	290.000	95.000	38.000	41.000	5.000	763.000	1.100	16.000	17.000	4.747
2S-2129	43500.000	52714.500	0.000	17.000	2.000	44.000	43.000	37.000	7.000	12.000	2.200	301.000	0.400	1.000	-1234.567	-1234.567
2S-2130	43500.000	52719.051	0.000	17.000	2.000	25.000	32.000	18.000	4.000	6.000	1.800	190.000	0.200	16.000	-1234.567	-1234.567
2S-2131	43500.000	52710.000	0.000	17.000	2.000	70.000	41.000	27.000	15.000	10.000	2.300	258.000	0.100	-1234.567	-1234.567	-1234.567
2S-2132	40550.500	52714.051	0.000	17.000	2.000	168.000	58.000	72.000	4.000	20.000	3.300	388.000	0.500	6.000	-1234.567	-1234.567
2S-2133	40535.500	52710.000	0.000	17.000	2.000	93.000	56.000	61.000	6.000	19.000	2.500	303.000	0.900	2.000	-1234.567	-1234.567
2S-2134	40545.000	52705.500	0.000	17.000	2.000	31.000	35.000	24.000	9.000	9.000	3.000	439.000	0.200	5.000	-1234.567	-1234.567
2S-4001	42940.000	53447.500	0.000	17.000	1.000	16.000	22.000	11.000	2.000	2.000	0.900	202.000	0.200	1.000	1.000	0.000
2S-4002	42920.000	53441.000	0.000	17.000	1.000	38.000	32.000	22.000	5.000	7.000	1.800	335.000	0.600	1.000	1.000	0.704
2S-4003	42875.000	53434.000	0.000	17.000	1.000	82.000	40.000	25.000	38.000	15.000	2.700	297.000	0.700	19.000	1.000	1.508
2S-4004	42830.000	53431.500	0.000	17.000	1.000	24.000	25.000	15.000	5.000	4.000	1.300	240.000	0.400	-1234.567	1.000	2.011
2S-4005	42470.000	53393.500	0.000	17.000	1.000	94.000	53.000	45.000	10.000	20.000	2.200	497.000	0.800	32.000	1.000	2.614
2S-4006	42515.000	53395.500	0.000	17.000	1.000	63.000	44.000	36.000	5.000	16.000	1.800	392.000	0.800	1.000	1.000	2.715

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-4007	42570.000	53398.500	0.000	17.000	1.000	169.000	200.000	82.000	40.000	38.000	4.800	791.000	1.000	12.000	1.000	2.218
2S-4008	42623.000	53402.000	0.000	17.000	1.000	94.000	81.000	76.000	22.000	36.000	4.400	744.000	0.800	44.000	1.000	4.022
2S-4009	42685.000	53408.500	0.000	17.000	1.000	51.000	48.000	38.000	13.000	20.000	2.800	1150.000	0.700	2.000	1.000	4.726
2S-4010	38250.000	53051.000	0.000	17.000	2.000	79.000	81.000	58.000	19.000	17.000	2.700	561.000	1.100	1.000	-1234.567	-1234.567
2S-4011	38250.000	53051.000	0.000	17.000	2.000	99.000	98.000	76.000	20.000	23.000	3.200	597.000	1.200	1.000	-1234.567	-1234.567
2S-4012	38210.000	53067.000	0.000	17.000	2.000	101.000	60.000	46.000	21.000	14.000	3.000	623.000	0.500	11.000	10.000	3.970
2S-4013	38210.000	53067.000	0.000	17.000	2.000	35.000	35.000	19.000	8.000	10.000	1.000	242.000	0.600	-1234.567	10.000	4.250
2S-4014	39940.000	53119.000	0.000	17.000	2.000	132.000	71.000	71.000	12.000	32.000	3.800	970.000	0.400	14.000	9.000	2.212
2S-4015	39605.000	53114.000	0.000	17.000	2.000	96.000	90.000	64.000	20.000	33.000	3.500	1570.000	0.500	5.000	8.000	0.503
2S-4016	39605.000	53114.000	0.000	17.000	2.000	95.000	59.000	40.000	9.000	24.000	2.400	441.000	0.700	5.000	8.000	0.503
2S-4017	39605.000	53114.000	0.000	17.000	2.000	136.000	76.000	52.000	18.000	30.000	3.800	559.000	0.600	6.000	8.000	0.503
2S-4018	39620.000	53241.000	0.000	17.000	2.000	49.000	63.000	46.000	12.000	18.000	2.400	718.000	0.900	2.000	4.000	9.831
2S-4019	41370.000	52732.000	0.000	17.000	2.000	266.000	96.000	69.000	19.000	34.000	4.400	581.000	0.500	6.000	20.000	3.460
2S-4020	41390.000	52735.500	0.000	17.000	2.000	108.000	57.000	38.000	8.000	15.000	2.300	313.000	0.600	1.000	20.000	2.655
2S-4021	41390.000	52740.500	0.000	17.000	2.000	222.000	210.000	57.000	16.000	27.000	4.300	667.000	0.800	171.000	20.000	2.092
2S-4022	41390.000	52740.500	0.000	17.000	2.000	189.000	73.000	53.000	16.000	22.000	3.300	473.000	0.800	2.000	20.000	2.092
2S-4023	41390.000	52744.500	0.000	17.000	2.000	255.000	102.000	43.000	28.000	25.000	3.200	453.000	0.700	15.000	20.000	1.287
2S-4025	41360.000	52753.000	1.000	17.000	2.000	484.000	260.000	67.000	49.000	32.000	4.400	573.000	0.800	3.000	20.000	0.000
2S-4026	41385.000	52741.500	0.000	17.000	2.000	318.000	101.000	66.000	17.000	30.000	4.000	631.000	0.400	137.000	20.000	1.850
2S-4027	41170.000	52710.000	0.000	17.000	2.000	230.000	220.000	81.000	37.000	37.000	5.200	1120.000	0.900	45.000	20.000	7.321
2S-4028	41200.000	52710.000	0.000	17.000	2.000	260.000	230.000	80.000	46.000	48.000	6.300	1290.000	0.800	141.000	20.000	6.678
2S-4029	39755.000	52728.500	0.000	17.000	2.000	190.000	102.000	97.000	16.000	35.000	4.500	1700.000	0.800	21.000	16.000	0.000
2S-4030	39745.000	52723.500	0.000	17.000	2.000	160.000	82.000	69.000	20.000	34.000	6.300	1250.000	0.300	240.000	16.000	0.805
2S-4031	39745.000	52723.500	0.000	17.000	2.000	169.000	86.000	68.000	20.000	34.000	6.300	1260.000	0.500	94.000	16.000	0.805
2S-4032	39710.000	52720.500	0.000	17.000	2.000	216.000	370.000	112.000	46.000	42.000	4.800	1270.000	0.600	51.000	16.000	1.448
2S-4033	38850.000	52990.500	0.000	17.000	2.000	127.000	59.000	42.000	7.000	23.000	2.800	513.000	0.200	39.000	11.000	0.000
2S-4036	40680.000	53245.500	1.000	17.000	1.000	48.000	39.000	25.000	7.000	11.000	3.200	319.000	0.900	7.000	3.000	16.308
2S-4037	40680.000	53241.500	0.000	17.000	1.000	67.000	59.000	38.000	10.000	20.000	3.000	561.000	1.200	3.000	3.000	16.710
2S-4038	40468.000	53241.500	0.000	17.000	1.000	71.000	58.000	36.000	11.000	19.000	1.200	535.000	1.600	1.000	3.000	16.710
2S-4039	40695.000	53237.500	0.000	17.000	1.000	14.000	22.000	13.000	6.000	5.000	1.600	238.000	0.600	2.000	3.000	17.112
2S-4040	43410.000	52691.000	0.000	17.000	2.000	17.000	29.000	12.000	6.000	6.000	1.600	248.000	0.600	1.000	21.000	4.980
2S-4041	43390.000	52684.000	0.000	17.000	2.000	139.000	97.000	54.000	48.000	36.000	3.900	1170.000	1.100	24.000	21.000	5.580
2S-4042	43460.000	52669.000	0.000	17.000	2.000	110.000	47.000	36.000	33.000	23.000	2.400	672.000	0.600	1.000	21.000	7.401
2S-4043	43490.000	52663.000	0.000	17.000	2.000	142.000	60.000	27.000	27.000	29.000	3.000	640.000	0.600	1.000	21.000	8.206
2S-4044	43515.000	52656.000	0.000	17.000	2.000	117.000	63.000	39.000	21.000	20.000	2.800	469.000	0.700	1.000	21.000	9.332
2S-5001	40040.000	52774.000	0.000	17.000	2.000	241.000	184.000	69.000	41.000	41.000	4.700	1160.000	1.200	14.000	15.000	8.528
2S-5002	40042.500	52778.250	0.000	17.000	2.000	393.000	240.000	117.000	40.000	57.000	5.900	976.000	1.500	36.000	15.000	7.723
2S-5003	40065.000	52779.500	0.000	17.000	2.000	95.000	53.000	61.000	15.000	19.000	2.500	458.000	0.600	3.000	15.000	7.321
2S-5004	40085.000	52783.750	0.000	17.000	2.000	158.000	75.000	74.000	14.000	28.000	3.000	638.000	0.400	16.000	15.000	6.677
2S-5005	40147.500	52792.750	0.000	17.000	2.000	318.000	102.000	79.000	31.000	45.000	4.800	866.000	1.500	39.000	15.000	5.390
2S-5006	40157.500	52796.750	0.000	17.000	2.000	247.000	220.000	79.000	20.000	38.000	4.600	1200.000	0.600	17.000	15.000	4.908
2S-5007	40250.000	52826.500	0.000	17.000	2.000	232.000	85.000	81.000	30.000	47.000	5.500	1900.000	1.200	-1234.567	15.000	0.644
2S-5008	40232.500	52829.250	0.000	17.000	2.000	231.000	230.000	103.000	29.000	38.000	4.000	1620.000	1.000	13.000	15.000	0.000
2S-5009	40532.500	52727.000	0.000	17.000	2.000	102.000	70.000	47.000	19.000	27.000	4.300	650.000	1.000	-1234.567	19.000	1.287
1S-5010	40552.500	52731.250	0.000	17.000	2.000	201.000	510.000	58.000	40.000	39.000	5.900	567.000	0.800	17.000	19.000	0.644
2S-5011	40535.000	52735.500	0.000	17.000	2.000	41.000	53.000	34.000	10.000	16.000	3.200	477.000	0.500	5.000	19.000	0.000
2S-6058	38215.000	53013.500	0.000	17.000	2.000	49.000	62.000	31.000	13.000	13.000	2.000	335.000	0.400	2.000	10.000	10.377
2S-6059	38225.500	53003.352	0.000	17.000	2.000	144.000	96.000	46.000	30.000	27.000	3.900	449.000	0.900	28.000	10.000	10.779
2S-6073	40905.000	53382.500	0.000	17.000	1.000	54.000	43.000	34.000	6.000	15.000	2.300	374.000	0.800	-1234.567	3.000	2.916
2S-6074	40856.000	53380.352	0.000	17.000	1.000	91.000	58.000	24.000	13.000	34.000	3.000	513.000	0.700	5.000	3.000	3.318
2S-6075	40822.500	53379.750	0.000	17.000	1.000	37.000	42.000	25.000	8.000	16.000	2.100	491.000	0.500	1.000	3.000	3.620
2S-6076	40786.500	53375.148	0.000	17.000	1.000	17.000	30.000	14.000	7.000	9.000	2.100	384.000	0.400	124.000	3.000	4.022
2S-6077	40786.500	53371.250	0.000	17.000	1.000	65.000	45.000	28.000	10.000	19.000	2.500	378.000	1.000	4.000	3.000	4.424
2S-6078	40785.000	53368.500	0.000	17.000	1.000	75.000	52.000	33.000	7.000	22.000	2.300	513.000	1.100	2.000	3.000	4.826
2S-6079	40772.500	53364.750	0.000	17.000	1.000	201.000	80.000	55.000	13.000	29.000	3.500	754.000	1.000	3.000	3.000	5.228
2S-6080	40755.000	53361.500	0.000	17.000	1.000	18.000	22.000	9.000	5.000	5.000	1.400	222.000	0.200	-1234.567	3.000	5.550
2S-6081	40769.500	53317.750	0.000	17.000	1.000	134.000	79.000	55.000	15.000	37.000	3.800	971.000	1.000	2.000	3.000	9.369
2S-6082	40767.500	53321.648	1.000	17.000	1.000	44.000	34.000	17.000	5.000	14.000	1.800	333.000	0.800	2.000	3.000	9.068
2S-6083	40770.000	53324.500	0.000	17.000	1.000	158.000	81.000	68.000	13.000	49.000	4.300	682.000	0.900	6.000	3.000	8.766
2S-6084	40768.500	53328.250	0.000	17.000	1.000	33.000	3.900	20.000	6.000	11.000	1.700	370.000	1.000	-1234.567	3.000	8.364

SAMPLE NO.	EASTING	NORTHING	SD	ZONE	AREA	CU	ZN	NI	PB	CO	FE	MN	AG	AU	ESKER	DISTANCE
2S-6085	40748.500	53357.500	0.000	17.000	1.000	123.000	91.000	60.000	12.000	35.000	4.500	634.000	0.900	1.000	3.000	5.852
2S-6086	40751.000	53354.801	1.000	17.000	1.000	117.000	83.000	54.000	16.000	31.000	4.000	547.000	0.800	4.000	3.000	6.254
2S-6087	40776.500	53311.500	0.000	17.000	1.000	63.000	45.000	35.000	5.000	17.000	2.100	335.000	0.900	1.000	3.000	9.771
2S-6088	40761.500	53339.949	0.000	17.000	1.000	12.000	22.000	12.000	2.000	5.000	1.200	272.000	0.900	1.000	3.000	7.400
2S-6089	40751.500	53342.949	0.000	17.000	1.000	83.000	68.000	48.000	10.000	22.000	2.900	521.000	1.000	6.000	3.000	7.099
2S-6090	40746.500	53345.750	0.000	17.000	1.000	203.000	87.000	63.000	12.000	32.000	3.900	724.000	1.000	1.000	3.000	6.797
2S-6091	40744.000	53349.648	0.000	17.000	1.000	6.000	18.000	10.000	2.000	2.000	0.900	183.000	0.700	16.000	3.000	6.496
2S-6092	40772.000	53336.602	0.000	17.000	1.000	48.000	26.000	18.000	4.000	14.000	1.200	270.000	0.400	-1234.567	3.000	8.004
2S-6093	40789.500	53308.949	0.000	17.000	1.000	116.000	75.000	52.000	10.000	30.000	3.000	599.000	1.100	1.000	3.000	10.174
2S-6094	40787.500	53301.250	0.000	17.000	1.000	50.000	53.000	40.000	7.000	21.000	2.900	555.000	0.500	4.000	3.000	10.878
2S-6095	40797.500	53297.750	0.000	17.000	1.000	9.000	21.000	13.000	4.000	4.000	0.900	240.000	0.700	1.000	3.000	11.280

NUMBERS THAT ARE CODED -1234.567 REPRESENT 'SPECIAL VALUES'
THESE VALUES WILL BE EXCLUDED FROM ALL CALCUALTIONS IN THE
MICRO-GAS SYSTEM.

APPENDIX C

TRACE ELEMENT SUMMARIES-
UNIVARIATE STATISTICAL SUMMARIES
AND DISTRIBUTION HISTOGRAMS

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGAU

```
  LOWER                  PERCENT OF THE TOTAL SAMPLES
  BOUND
INCLUDED  !         5.0       10.0       15.0       20.0       25.0
          !---------+----------+----------+----------+----------+
     1.000!
          !**********************************
          !**********************************
     1.995+
          !**************************************
          !**************************************
     3.981+
          !*********************************************
          !*********************************************
     7.943+
          !****************************************
          !****************************************
    15.849+
          !***********************
          !***********************
    31.623+
          !**********
          !**********
    63.096+
          !****
          !****
   125.893+
          !****
          !****
   251.189+
          !---------+----------+----------+----------+----------+
 ANTILOG  !         5.0       10.0       15.0       20.0       25.0
  LOWER   !
  BOUND   !

                         PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.000
54	17.03	17.03	0.300
60	18.93	35.96	0.600
72	22.71	58.68	0.900
64	20.19	78.86	1.200
37	11.67	90.54	1.500
16	5.05	95.58	1.800
7	2.21	97.79	2.100
7	2.21	100.00	2.400

VARIABLE:	LOGAU	ANTILOG LOGAU
NUMBER OF OBSERVATIONS:	317	
MINIMUM:	0.000	1.000
MAXIMUM:	2.380	240.000
MEAN:	0.747	5.845
STANDARD ERROR OF MEAN:	0.030	
STANDARD DEVIATION:	0.543	
COEFFICIENT OF VARIATION:	70.821	
SKEWNESS:	0.436	
KURTOSIS:	-0.164	

DATA TITLE : S.I.A.M.F..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGAG

```
  LOWER                     PERCENT OF THE TOTAL SAMPLES
  BOUND
INCLUDED  !         10.0      20.0      30.0      40.0      50.0
          !---------+---------+---------+---------+---------+
    0.100!
          !I
          !I
    0.141+
          !
          !
    0.200+
          !**
          !**
    0.282+
          !**
          !**
    0.398+
          !**************
          !**************
    0.562+
          !*************************
          !*************************
    0.794+
          !*******************************************
          !*******************************************
    1.122+
          !***********
          !***********
    1.585+
          !****
          !****
    2.239+
          !---------+---------+---------+---------+---------+
 ANTILOG  !         10.0      20.0      30.0      40.0      50.0
  LOWER   !
  BOUND   !

                            PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	-1.000
2	0.54		
		0.54	-0.850
0	0.00		
		0.54	-0.700
7	1.89		
		2.43	-0.550
8	2.16		
		4.58	-0.400
51	13.75		
		18.33	-0.250
92	24.80		
		43.13	-0.100
158	42.59		
		85.71	0.050
40	10.78		
		96.50	0.200
13	3.50		
		100.00	0.350

VARIABLE:	LOGAG	ANTILOG LOGAG
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	-1.000	0.100
MAXIMUM:	0.342	2.200
MEAN:	-0.118	0.762
STANDARD ERROR OF MEAN:	0.010	
STANDARD DEVIATION:	0.193	
COEFFICIENT OF VARIATION:	-163.307	
SKEWNESS:	-0.963	
KURTOSIS:	2.434	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGCU

```
 LOWER                  PERCENT OF THE TOTAL SAMPLES
 BOUND
INCLUDED !      10.0      20.0      30.0      40.0      50.0
         !---------+---------+---------+---------+---------+
   3.981!
         !**
         !**
   7.943+
         !**
         !**
  15.849+
         !**********
         !**********
  31.623+
         !****************
         !****************
  63.096+
         !**********************************
         !**********************************
 125.893+
         !****************************
         !****************************
 251.189+
         !********
         !********
 501.187+
         !I
         !I
1000.001+
         !---------+---------+---------+---------+---------+
 ANTILOG !      10.0      20.0      30.0      40.0      50.0
  LOWER  !
  BOUND  !

                        PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.600
6	1.62		
		1.62	0.900
7	1.89		
		3.50	1.200
37	9.97		
		13.48	1.500
61	16.44		
		29.92	1.800
125	33.69		
		63.61	2.100
104	28.03		
		91.64	2.400
29	7.82		
		99.46	2.700
2	0.54		
		100.00	3.000

VARIABLE:	LOGCU	ANTILOG LOGCU
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	0.602	4.000
MAXIMUM:	2.983	961.000
MEAN:	1.941	87.390
STANDARD ERROR OF MEAN:	0.020	
STANDARD DEVIATION:	0.382	
COEFFICIENT OF VARIATION:	19.668	
SKEWNESS:	-0.666	
KURTOSIS:	0.773	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGCU

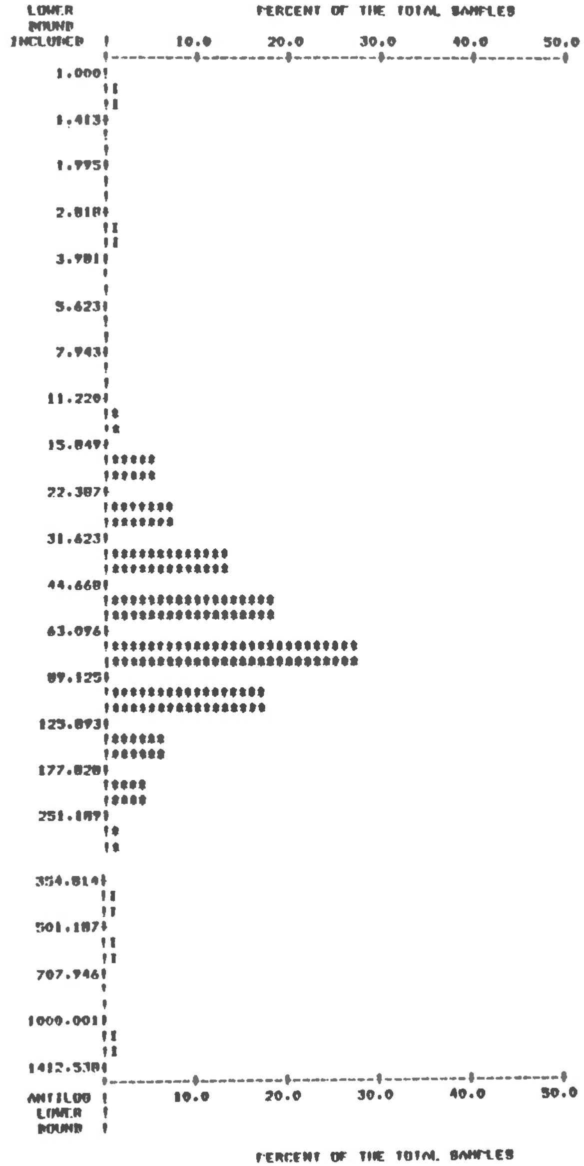
```
  LOWER                 PERCENT OF THE TOTAL SAMPLES
  BOUND
INCLUDED  !         5.0       10.0       15.0       20.0       25.0
          !---------+----------+----------+----------+----------+
   0.600  !
          !**
          !**
   0.800  !
          !***
          !***
   1.000  +
          !**
          !**
   1.200  +
          !************
          !************
   1.400  +
          !***************
          !***************
   1.600  +
          !**************************
          !**************************
   1.800  !
          !******************************************
          !******************************************
   2.000  +
          !************************************************
          !************************************************
   2.200  +
          !**********************************
          !**********************************
   2.400  +
          !*************
          !*************
   2.600  +
          !***
          !***
   2.800  +
          !*
          !*
   3.000  +
          !---------+----------+----------+----------+----------+
          !         5.0       10.0       15.0       20.0       25.0
          !

                        PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.600
4	1.08	1.08	0.800
6	1.62	2.70	1.000
3	0.81	3.50	1.200
22	5.93	9.43	1.400
28	7.55	16.98	1.600
48	12.94	29.92	1.800
77	20.75	50.67	2.000
89	23.99	74.66	2.200
63	16.98	91.64	2.400
24	6.47	98.11	2.600
5	1.35	99.46	2.800
2	0.54	100.00	3.000

VARIABLE:	LOGCU
NUMBER OF OBSERVATIONS:	371
MINIMUM:	0.602
MAXIMUM:	2.983
MEAN:	1.941
STANDARD ERROR OF MEAN:	0.020
STANDARD DEVIATION:	0.382
COEFFICIENT OF VARIATION:	19.668
SKEWNESS:	0.666
KURTOSIS:	0.773

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGZN



Antilog lower bound	Number of samples in this category	Percentage of the total samples	Cumulative percent below lower bound	Lower bound
1.000			0.00	0.000
	1	0.27		
1.413			0.27	0.150
	0	0.00		
1.995			0.27	0.300
	0	0.00		
2.818			0.27	0.450
	1	0.27		
3.981			0.54	0.600
	0	0.00		
5.623			0.54	0.750
	0	0.00		
7.943			0.54	0.900
	0	0.00		
11.220			0.54	1.050
	4	1.08		
15.849			1.62	1.200
	18	4.85		
22.387			6.47	1.350
	26	7.01		
31.623			13.48	1.500
	47	12.67		
44.668			26.15	1.650
	68	18.33		
63.096			44.47	1.800
	101	27.22		
89.125			71.70	1.950
	62	16.71		
125.893			88.41	2.100
	21	5.66		
177.828			94.07	2.250
	13	3.50		
251.189			97.57	2.400
	5	1.35		
354.814			98.92	2.550
	2	0.54		
501.187			99.46	2.700
	1	0.27		
707.946			99.73	2.850
	0	0.00		
1000.001			99.73	3.000
	1	0.27		
1412.538			100.00	3.150

VARIABLE:	LOGZN	ANTILOG LOGZN
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	0.079	1.200
MAXIMUM:	3.009	1020.000
MEAN:	1.808	64.274
STANDARD ERROR OF MEAN:	0.016	
STANDARD DEVIATION:	0.300	
COEFFICIENT OF VARIATION:	16.580	
SKEWNESS:	-0.474	
KURTOSIS:	3.744	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984

VARIABLE : LOGNI

```
LOWER
BOUND                    PERCENT OF THE TOTAL SAMPLES
INCLUDED  !        5.0       10.0       15.0       20.0       25.0
          !---------+----------+----------+----------+----------+
   1.000!
        !
        !
   1.413!
        !
        !
   1.995!
        !
        !
   2.818!
        !
        !
   3.981!
        !
        !
   5.623!
        !I
        !I
   7.943!
        !*****
        !*****
  11.220!
        !*****
        !*****
  15.849!
        !*************
        !*************
  22.387!
        !*************
        !*************
  31.623!
        !**********************************
        !**********************************
  44.668!
        !**************************************************
        !**************************************************
  63.096!
        !**********************************************
        !**********************************************
  89.125!
        !***********************
        !***********************
 125.893!
        !********
        !********
 177.828!
        !****
        !****
 251.189!
          !---------+----------+----------+----------+----------+
ANTILOG !          5.0       10.0       15.0       20.0       25.0
LOWER   !
BOUND   !
                         PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.000
0	0.00		
		0.00	0.150
0	0.00		
		0.00	0.300
0	0.00		
		0.00	0.450
0	0.00		
		0.00	0.600
0	0.00		
		0.00	0.750
1	0.27		
		0.27	0.900
9	2.43		
		2.70	1.050
9	2.43		
		5.12	1.200
24	6.47		
		11.59	1.350
25	6.74		
		18.33	1.500
62	16.71		
		35.04	1.650
92	24.80		
		59.84	1.800
86	23.18		
		83.02	1.950
42	11.32		
		94.34	2.100
14	3.77		
		98.11	2.250
7	1.89		
		100.00	2.400

VARIABLE:	LOGNI	ANTILOG LOGNI
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	0.845	7.000
MAXIMUM:	2.332	215.000
MEAN:	1.712	51.566
STANDARD ERROR OF MEAN:	0.014	
STANDARD DEVIATION:	0.276	
COEFFICIENT OF VARIATION:	16.139	
SKEWNESS:	-0.506	
KURTOSIS:	0.258	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGPB

```
  LOWER                PERCENT OF THE TOTAL SAMPLES
  BOUND
INCLUDED !        10.0      20.0      30.0      40.0      50.0
         !---------+---------+---------+---------+---------+
   1.995!
        !*****
        !*****
   3.162+
        !*********
        !*********
   5.012+
        !***********
        !***********
   7.943+
        !**************************
        !**************************
  12.589+
        !************************
        !************************
  19.953!
        !************
        !************
  31.623+
        !*********
        !*********
  50.119+
        !**
        !**
  79.433+
        !I
        !I
 125.893!
        !I
        !I
 199.526+
         !---------+---------+---------+---------+---------+
 ANTILOG !        10.0      20.0      30.0      40.0      50.0
  LOWER  !
  BOUND  !

                   PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.300
20	5.39		
		5.39	0.500
34	9.16		
		14.56	0.700
42	11.32		
		25.88	0.900
97	26.15		
		52.02	1.100
90	24.26		
		76.28	1.300
45	12.13		
		88.41	1.500
35	9.43		
		97.84	1.700
6	1.62		
		99.46	1.900
1	0.27		
		99.73	2.100
1	0.27		
		100.00	2.300

VARIABLE:	LOGPB	ANTILOG LOGPB
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	0.301	2.000
MAXIMUM:	2.155	143.000
MEAN:	1.071	11.773
STANDARD ERROR OF MEAN:	0.017	
STANDARD DEVIATION:	0.336	
COEFFICIENT OF VARIATION:	31.338	
SKEWNESS:	-0.160	
KURTOSIS:	0.192	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGCO

```
 LOWER                 PERCENT OF THE TOTAL SAMPLES
 BOUND
INCLUDED !       10.0      20.0      30.0      40.0      50.0
         !---------+---------+---------+---------+---------+
   1.000!
        !
        !
   1.413!
        !
        !
   1.995!
        !**
        !**
   2.818!
        !
        !
   3.981!
        !**
        !**
   5.623!
        !**
        !**
   7.943!
        !*********
        !*********
  11.220!
        !********
        !********
  15.849!
        !******************
        !******************
  22.387!
        !****************************
        !****************************
  31.623!
        !***********************
        !***********************
  44.668!
        !*******
        !*******
  63.096!
        !I
        !I
  89.125!
         !---------+---------+---------+---------+---------+
ANTILOG  !       10.0      20.0      30.0      40.0      50.0
 LOWER   !
 BOUND   !

                    PERCENT OF THE TOTAL SAMPLES
```

NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
		0.00	0.000
0	0.00	0.00	0.150
0	0.00	0.00	0.300
7	1.89	1.89	0.450
0	0.00	1.89	0.600
9	2.43	4.31	0.750
8	2.16	6.47	0.900
32	8.63	15.09	1.050
31	8.36	23.45	1.200
68	18.33	41.78	1.350
104	28.03	69.81	1.500
85	22.91	92.72	1.650
25	6.74	99.46	1.800
2	0.54	100.00	1.950

VARIABLE:	LOGCO	ANTILOG LOGCO
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	0.301	2.000
MAXIMUM:	1.924	84.000
MEAN:	1.336	21.672
STANDARD ERROR OF MEAN:	0.015	
STANDARD DEVIATION:	0.284	
COEFFICIENT OF VARIATION:	21.273	
SKEWNESS:	-1.272	
KURTOSIS:	2.154	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

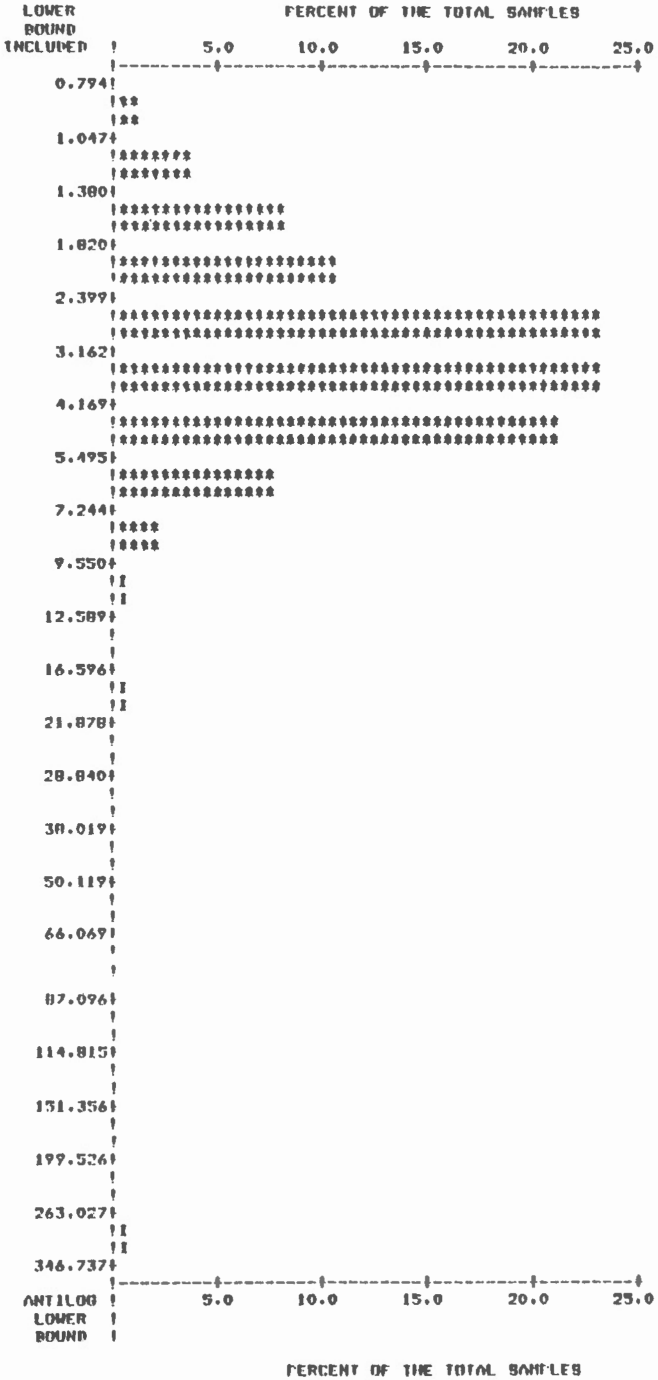
VARIABLE : LOGMN

```
                                                                   NUMBER OF    PERCENTAGE OF  CUMULATIVE     LOWER
                                                                   SAMPLES IN   THE TOTAL      PERCENT BELOW  BOUND
                                                                   THIS CATEGORY SAMPLES       LOWER BOUND
 LOWER            PERCENT OF THE TOTAL SAMPLES
 BOUND
INCLUDED !      10.0      20.0      30.0      40.0      50.0
         !---------+---------+---------+---------+---------+
   1.995!                                                                                      0.00        0.300
        !I
        !I                                                               1          0.27
   2.818!                                                                                      0.27        0.450
        !                                                                0          0.00
   3.981!                                                                                      0.27        0.600
        !                                                                0          0.00
   5.623!                                                                                      0.27        0.750
        !                                                                0          0.00
   7.943!                                                                                      0.27        0.900
        !                                                                0          0.00
  11.220!                                                                                      0.27        1.050
        !                                                                0          0.00
  15.849!                                                                                      0.27        1.200
        !                                                                0          0.00
  22.387!                                                                                      0.27        1.350
        !                                                                0          0.00
  31.623!                                                                                      0.27        1.500
        !                                                                0          0.00
  44.668!                                                                                      0.27        1.650
        !                                                                0          0.00
  63.096!                                                                                      0.27        1.800
        !                                                                0          0.00
  87.125!                                                                                      0.27        1.950
        !                                                                0          0.00
 125.893!                                                                                      0.27        2.100
        !**
        !**                                                              9          2.44
 177.828!                                                                                      2.71        2.250
        !********
        !********                                                       30          8.13
 251.189!                                                                                     10.84        2.400
        !**********
        !**********                                                     38         10.30
 354.813!                                                                                     21.14        2.550
        !******************
        !******************                                             67         18.16
 501.187!                                                                                     39.30        2.700
        !****************************
        !****************************                                  104         28.18

 707.946!                                                                                     67.48        2.850
        !******************
        !******************                                             66         17.89
1000.000!                                                                                     85.37        3.000
        !********
        !********                                                       28          7.59
1412.538!                                                                                     92.95        3.150
        !*****
        !*****                                                          20          5.42
1995.263!                                                                                     98.37        3.300
        !I
        !I                                                               1          0.27
2818.383!                                                                                     98.64        3.450
        !*
        !*                                                               5          1.36
3981.074!                                                                                    100.00        3.600
        !---------+---------+---------+---------+---------+
ANTILOG !      10.0      20.0      30.0      40.0      50.0
 LOWER  !
 BOUND  !

                  PERCENT OF THE TOTAL SAMPLES
```

VARIABLE:	LOGMN	ANTILOG LOGMN
NUMBER OF OBSERVATIONS:	369	
MINIMUM:	0.301	2.000
MAXIMUM:	3.544	3500.00?
MEAN:	2.749	561.000
STANDARD ERROR OF MEAN:	0.015	
STANDARD DEVIATION:	0.289	
COEFFICIENT OF VARIATION:	10.527	
SKEWNESS:	-1.416	
KURTOSIS:	12.999	

DATA TITLE : S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

VARIABLE : LOGFE



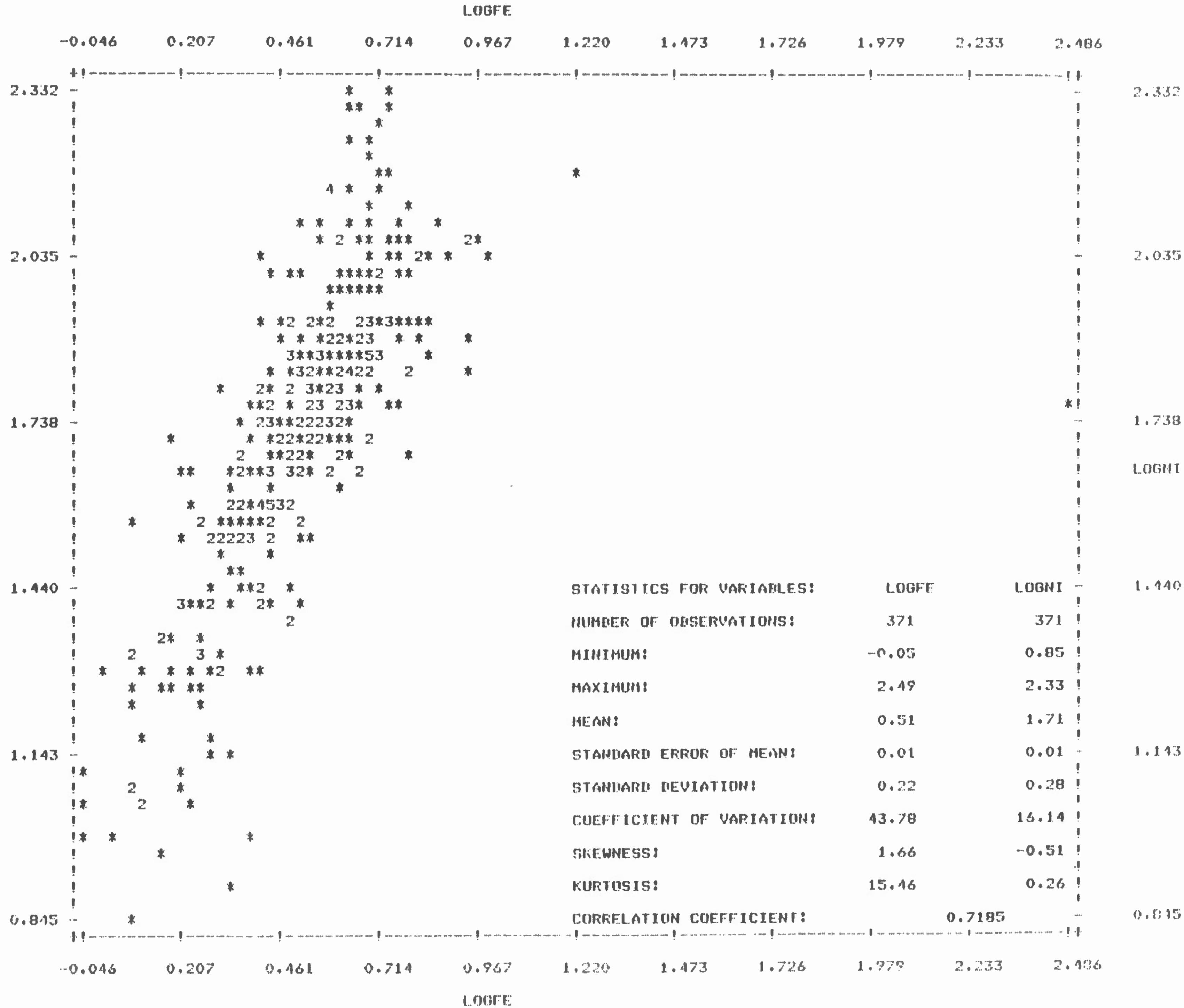
ANTILOG LOWER BOUND	NUMBER OF SAMPLES IN THIS CATEGORY	PERCENTAGE OF THE TOTAL SAMPLES	CUMULATIVE PERCENT BELOW LOWER BOUND	LOWER BOUND
0.794	4	1.08	0.00	-0.100
1.047	13	3.50	1.08	0.020
1.380	30	8.09	4.58	0.140
1.820	39	10.51	12.67	0.260
2.399	86	23.18	23.18	0.380
3.162	85	22.91	46.36	0.500
4.169	77	20.75	69.27	0.620
5.495	27	7.28	90.03	0.740
7.244	7	1.89	97.30	0.860
9.550	1	0.27	99.19	0.980
12.589	0	0.00	99.46	1.100
16.596	1	0.27	99.46	1.220
21.878	0	0.00	99.73	1.340
28.840	0	0.00	99.73	1.460
38.019	0	0.00	99.73	1.580
50.119	0	0.00	99.73	1.700
66.069	0	0.00	99.73	1.820
87.096	0	0.00	99.73	1.940
114.815	0	0.00	99.73	2.060
151.356	0	0.00	99.73	2.180
199.526	0	0.00	99.73	2.300
263.027	1	0.27	99.73	2.420
346.737			100.00	2.540

VARIABLE:	LOGFE	ANTILOG LOGFE
NUMBER OF OBSERVATIONS:	371	
MINIMUM:	-0.046	0.900
MAXIMUM:	2.486	306.000
MEAN:	0.510	3.240
STANDARD ERROR OF MEAN:	0.012	
STANDARD DEVIATION:	0.224	
COEFFICIENT OF VARIATION:	43.784	
SKEWNESS:	1.657	
KURTOSIS:	15.461	

APPENDIX D

X - Y PLOTS OF CORRELATED TRACE ELEMENTS

S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

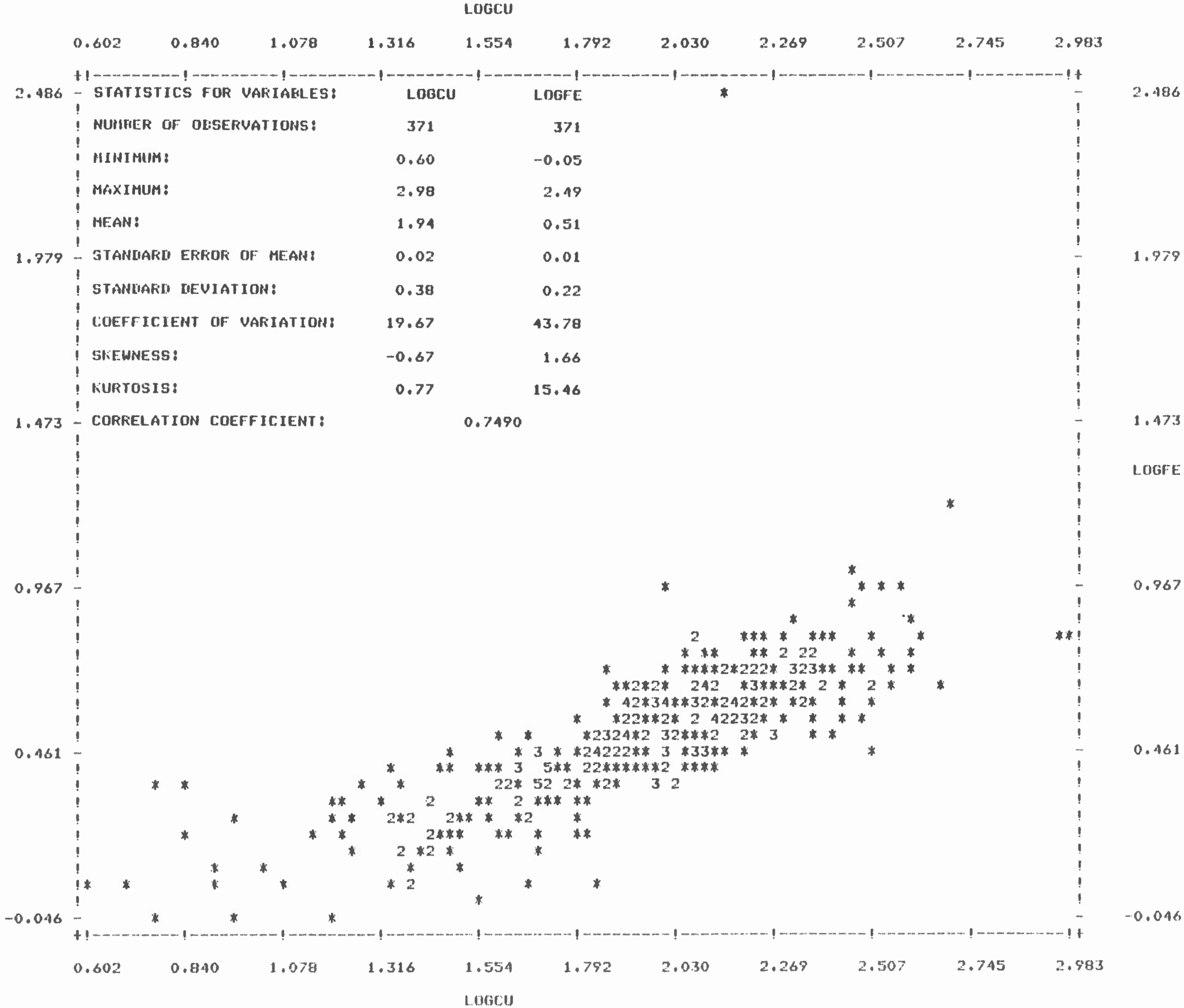


STATISTICS FOR VARIABLES:	LOGFE	LOGNI
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	-0.05	0.85
MAXIMUM:	2.49	2.33
MEAN:	0.51	1.71
STANDARD ERROR OF MEAN:	0.01	0.01
STANDARD DEVIATION:	0.22	0.28
COEFFICIENT OF VARIATION:	43.78	16.14
SKEWNESS:	1.66	-0.51
KURTOSIS:	15.46	0.26
CORRELATION COEFFICIENT:	0.7185	

0 POINTS OUT OF RANGE

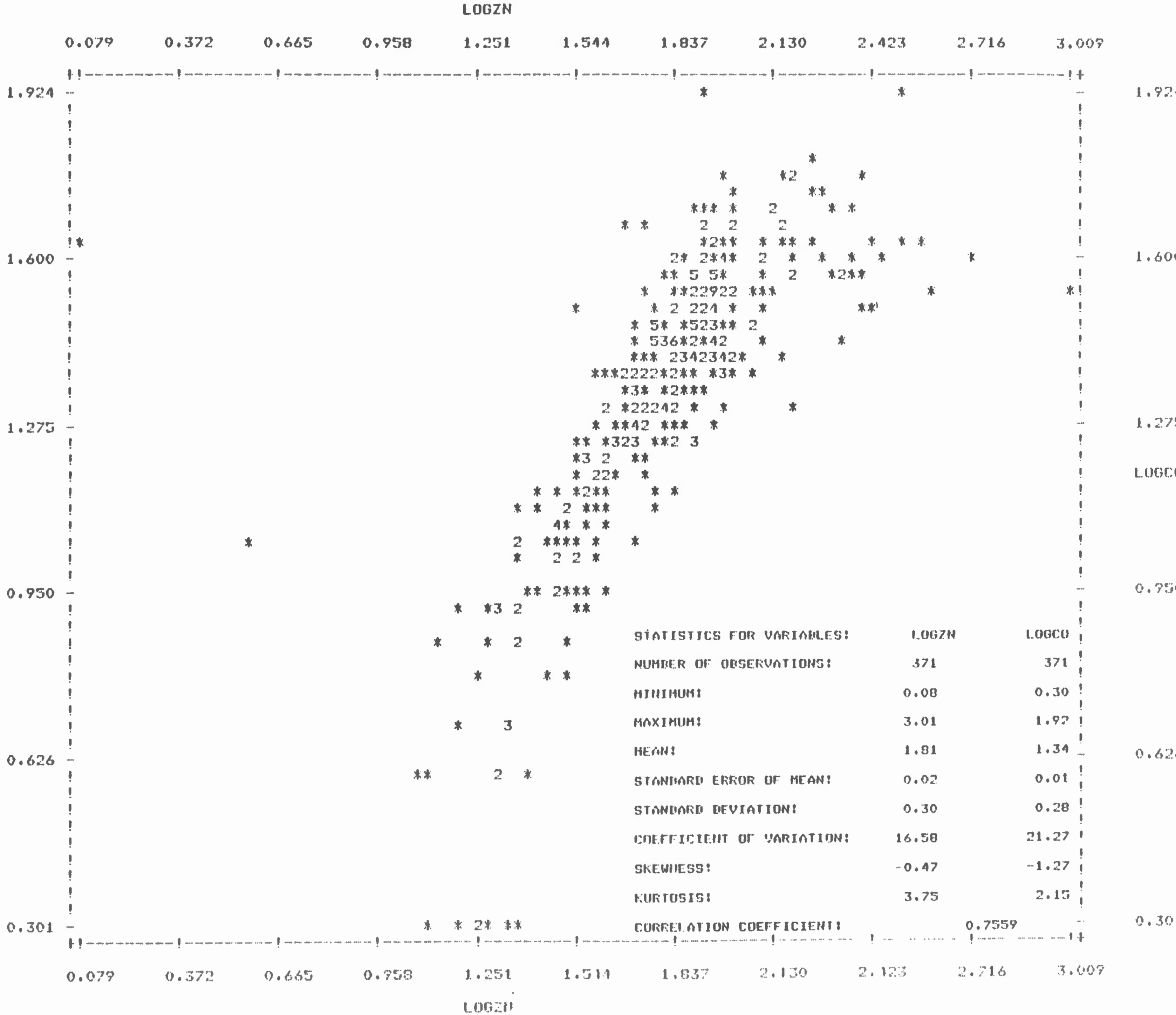
S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.

STATISTICS FOR VARIABLES:	LOGCU	LOGFE
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.60	-0.05
MAXIMUM:	2.98	2.49
MEAN:	1.94	0.51
STANDARD ERROR OF MEAN:	0.02	0.01
STANDARD DEVIATION:	0.38	0.22
COEFFICIENT OF VARIATION:	19.67	43.78
SKEWNESS:	-0.67	1.66
KURTOSIS:	0.77	15.46
CORRELATION COEFFICIENT:	0.7490	



0 POINTS OUT OF RANGE

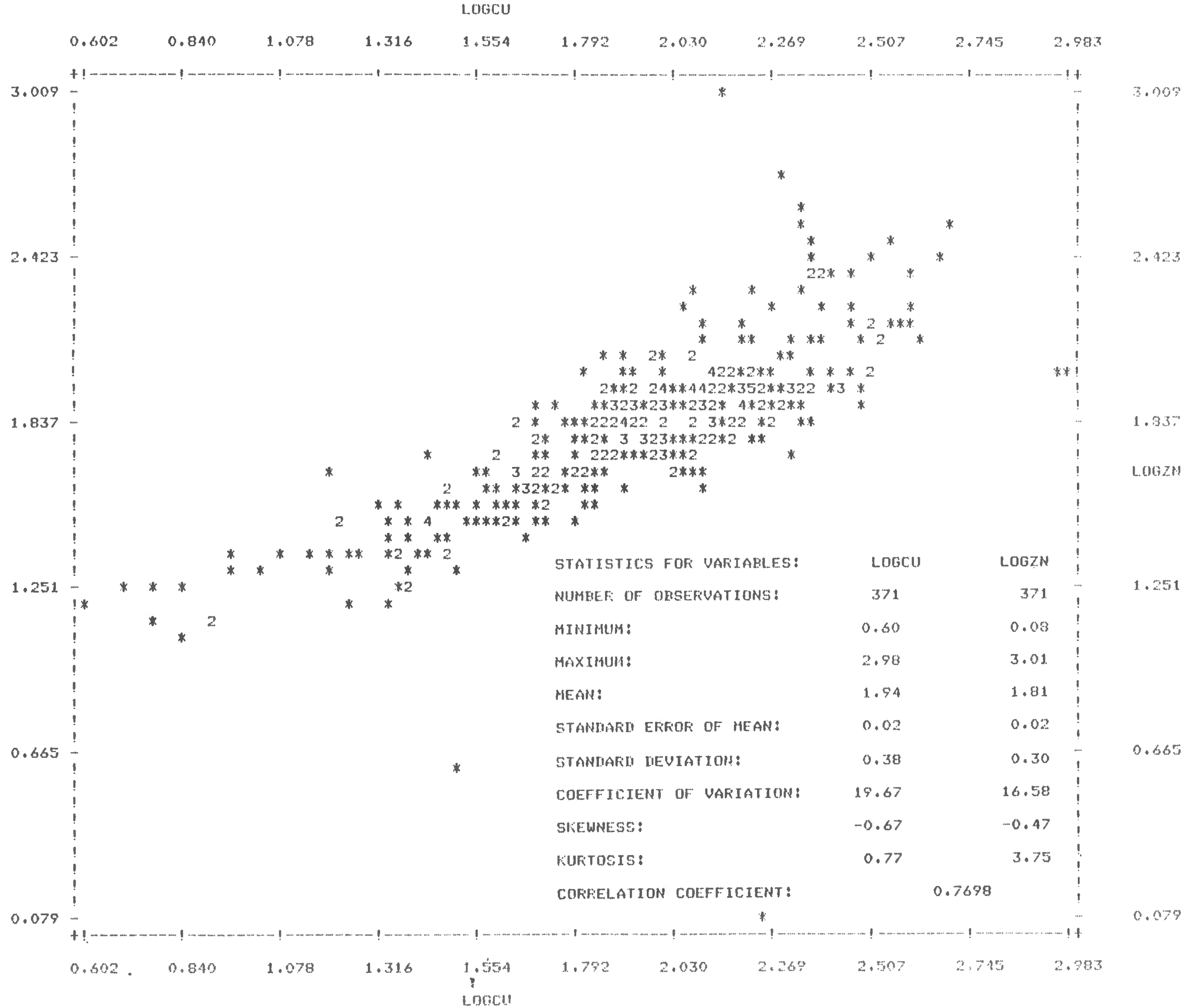
S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGZN	LOGCO
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.08	0.30
MAXIMUM:	3.01	1.92
MEAN:	1.81	1.34
STANDARD ERROR OF MEAN:	0.02	0.01
STANDARD DEVIATION:	0.30	0.28
COEFFICIENT OF VARIATION:	16.58	21.27
SKEWNESS:	-0.47	-1.27
KURTOSIS:	3.75	2.15
CORRELATION COEFFICIENT:	0.7559	

0 POINTS OUT OF RANGE

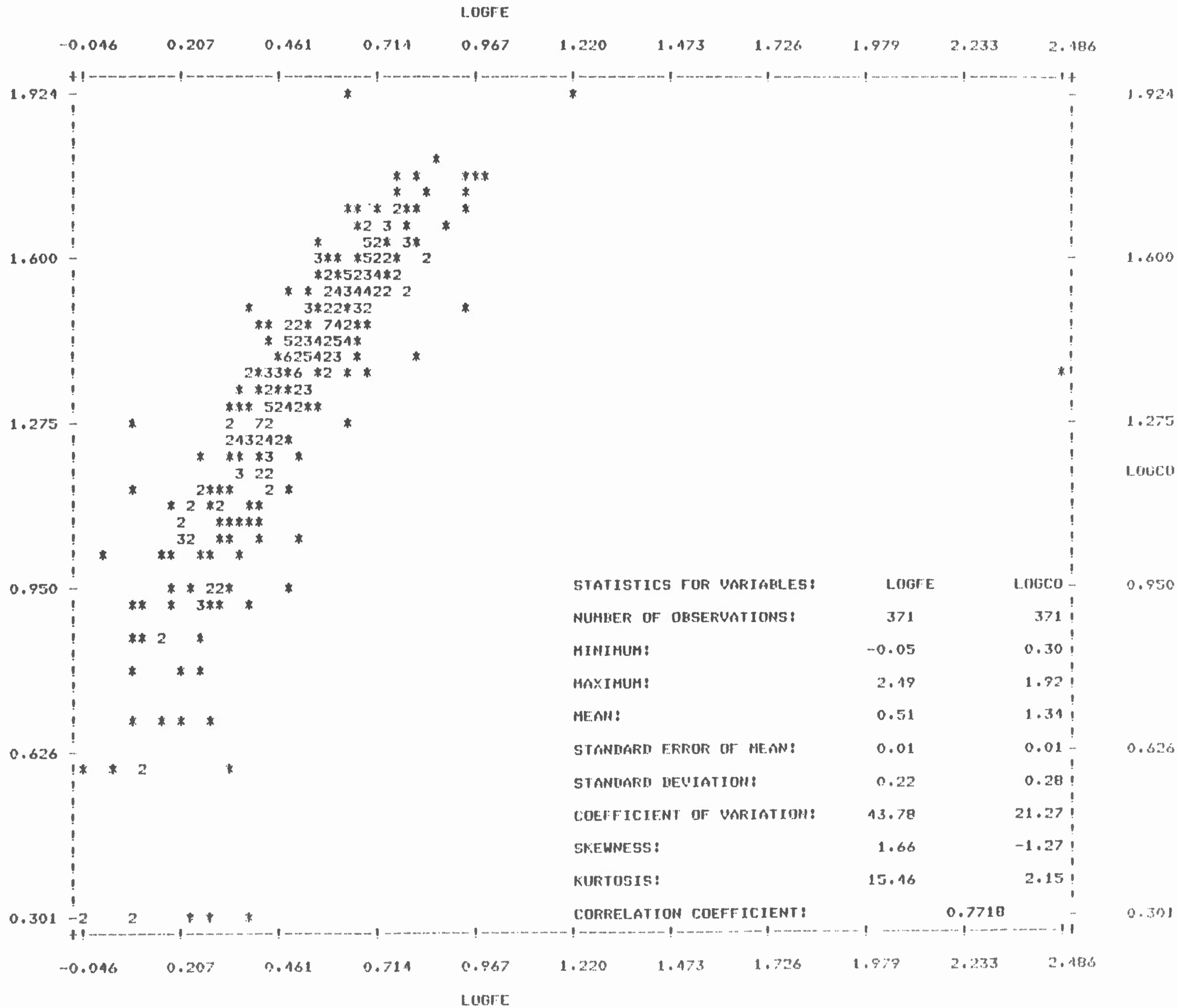
S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGCU	LOGZN
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.60	0.08
MAXIMUM:	2.98	3.01
MEAN:	1.94	1.81
STANDARD ERROR OF MEAN:	0.02	0.02
STANDARD DEVIATION:	0.38	0.30
COEFFICIENT OF VARIATION:	19.67	16.58
SKEWNESS:	-0.67	-0.47
KURTOSIS:	0.77	3.75
CORRELATION COEFFICIENT:	0.7698	

0 POINTS OUT OF RANGE

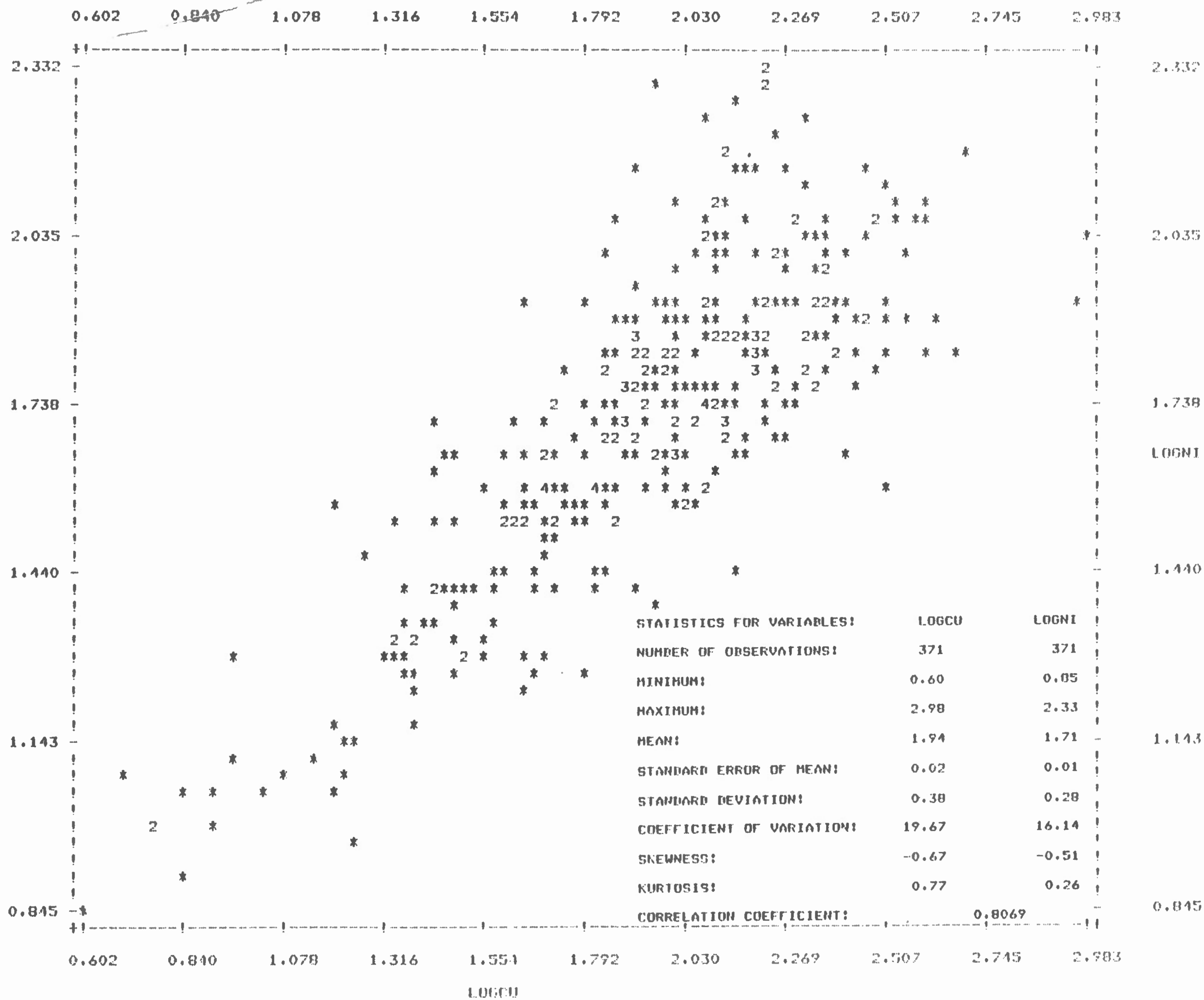
S.T.A.H.F..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGFE	LOGCO
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	-0.05	0.30
MAXIMUM:	2.49	1.92
MEAN:	0.51	1.34
STANDARD ERROR OF MEAN:	0.01	0.01
STANDARD DEVIATION:	0.22	0.28
COEFFICIENT OF VARIATION:	43.78	21.27
SKEWNESS:	1.66	-1.27
KURTOSIS:	15.46	2.15
CORRELATION COEFFICIENT:	0.7718	

0 POINTS OUT OF RANGE

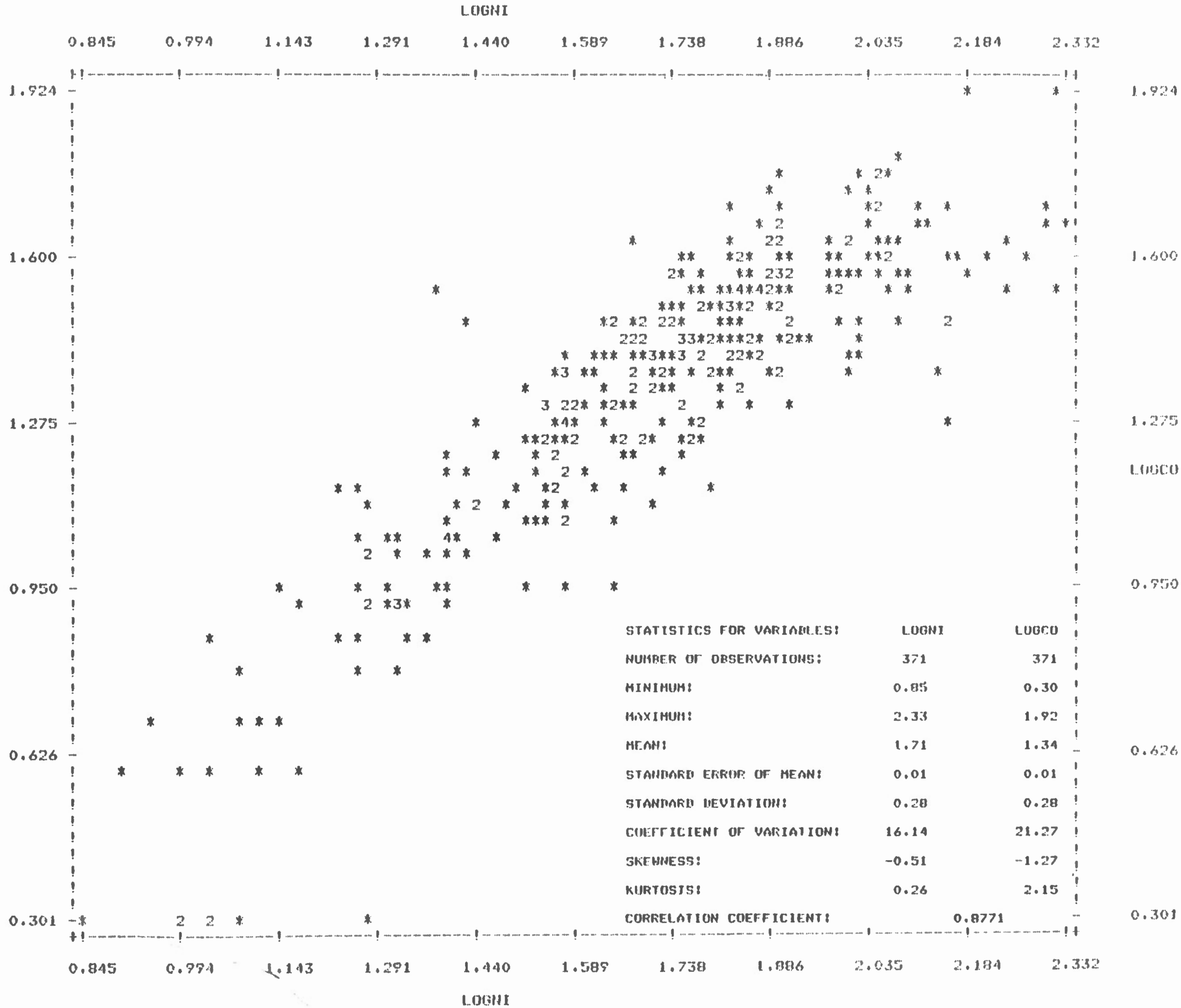
S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGCU	LOGNI
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.60	0.85
MAXIMUM:	2.98	2.33
MEAN:	1.94	1.71
STANDARD ERROR OF MEAN:	0.02	0.01
STANDARD DEVIATION:	0.38	0.28
COEFFICIENT OF VARIATION:	19.67	16.14
SKEWNESS:	-0.67	-0.51
KURTOSIS:	0.77	0.26
CORRELATION COEFFICIENT:	0.8069	

0 POINTS OUT OF RANGE

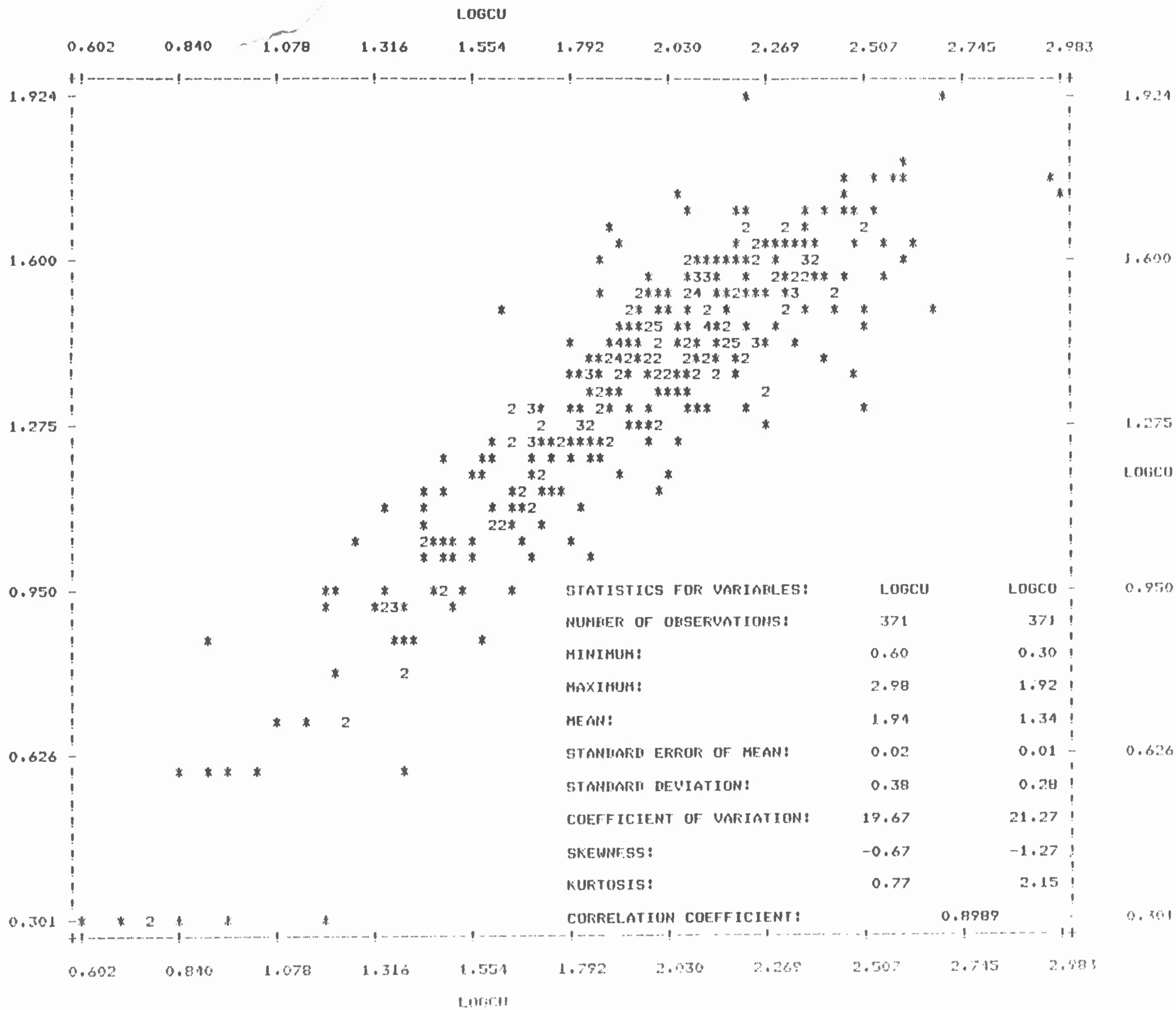
S.I.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGNI	LOGCO
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.85	0.30
MAXIMUM:	2.33	1.92
MEAN:	1.71	1.34
STANDARD ERROR OF MEAN:	0.01	0.01
STANDARD DEVIATION:	0.28	0.28
COEFFICIENT OF VARIATION:	16.14	21.27
SKEWNESS:	-0.51	-1.27
KURTOSIS:	0.26	2.15
CORRELATION COEFFICIENT:	0.8771	

0 POINTS OUT OF RANGE

S.T.A.M.P..TOTAL ESKER DATA - ANALYTICAL SUBSET MARCH 1984.



STATISTICS FOR VARIABLES:	LOGCU	LOGCO
NUMBER OF OBSERVATIONS:	371	371
MINIMUM:	0.60	0.30
MAXIMUM:	2.98	1.92
MEAN:	1.94	1.34
STANDARD ERROR OF MEAN:	0.02	0.01
STANDARD DEVIATION:	0.38	0.28
COEFFICIENT OF VARIATION:	19.67	21.27
SKEWNESS:	-0.67	-1.27
KURTOSIS:	0.77	2.15
CORRELATION COEFFICIENT:	0.8989	

0 POINTS OUT OF RANGE

Geological Survey of Canada Open File Reports

O.F. 1087	Mineral inventory of the Sudbury-Timmins-Sault Ste. Marie region, Ontario; D.G. Rose (Project 1)
O.F. 1088	Geochemistry of Swayze Belt esker, northern Ontario; J.A. Richard (Project 2)
O.F. 1089	Lithogeochemistry of Huronian Supergroup, Bruce Mines and Whitefish Falls areas, northern Ontario; D. Tortosa (Project 3)
O.F. 1090	Mineralization in the Onaping Formation, Sudbury Basin, Ontario; N. Bussolaro, D.H. Rousell, A.E. Beswick (Project 4A)
O.F. 1091	The metamorphic mineralogy and chemical alteration of the Temagami Greenstone Belt, northern Ontario; A.E. Beswick, R.S. James (Project 4B)

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