DISCRIMINATION AMONG DEPOSITIONAL ENVIRONMENTS BASED ON ELEMENT ABUNDANCE IN UPPER CRETACEOUS ROCKS OF SOUTHERN ALBERTA

A Dissertation

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RICHARD MELVIN PAWLOWICZ

ABSTRACT

The major elements Si, Al, Fe, Mg, Ca, Na, K, Ti and Mn, and the trace elements Ba, Co, Cu, Ga, Li, Mo, Pb, Rb, S, Sr, Zn, Zr, V and Ni were studied in 776 samples from a single continuous core of Upper Cretaceous, dominantly argillaceous, rocks in Southern Alberta. The approximate amount of carbon plus free water was also determined. The environment of deposition (continental, brackish or marine) was known for one hundred and eight of the samples on the basis of fossil evidence. These 108 samples were used to formulate discriminant-functions which identify the environment of deposition of a sample based on its element abundances.

A two step, pairwise approach was used to separate the three environments. In the first step, marine samples were isolated from a composite continental-brackish group. In the second step, the composite group was separated into continental and brackish groups. Of the 24 elements determined, Ti, Mn, Ba, Co, Cu, Ga, Li, Sr, Zn, Zr, V and volatiles were found to be useful discriminators for the marine vs. continental brackish groups. For the continental vs. brackish groups the elements Mg, Na, K, Ti, Mn, Ba, Co, Cu, Ga, Li, Rb, Sr, Zr, Zn, V and volatiles were found to be the most useful environmental discriminators.

The formulated discriminant-functions permit complete separation of the continental, brackish and marine environments. The functions were used to classify the remaining core samples, which permitted the local depositional history of the Upper Cretaceous to be interpreted.

CHAPTER I: INTRODUCTION

GENERAL STATEMENT

Over the past few years there has been increasing interest in the study of the distribution of elements in sedimentary rocks from different environments of deposition. The literature suggests that different environments may well be characterized by different concentrations of major and trace elements. However, there is little agreement on which elements are relatively concentrated in marine deposits compared to continental or brackish environments. In fact, in most cases the brackish water environment has been ignored in geochemical facies analyses.

Methods of study have also been variable. Some workers have approached the problem from a theoretical standpoint, others have studied modern sediments, while still others have studied ancient sediments. Sampling methods are also quite diversified. Some have used outcrop samples, others have used core samples, while others have used a combination of outcrop and core samples. Many different sampling plans are used. They may be areally extensive or very restrictive. No set approach to the problem has been established.

Very few studies have used statistical techniques to measure the significance of their results or to construct a classification tool. Most conclusions are based purely on observation and comparison without statistical testing. The need is apparent, for a model which is statistically valid for the environmental classification of sediments based on element concentrations.

PURPOSE AND SCOPE OF THE INVESTIGATION

Geologists assume that sediments from different depositional environments can be characterized by different mineralogical assemblages. Therefore, the abundances of certain elements or associations of elements, should reflect their mode of deposition. It should then be possible to apply discriminant-functions for identifying continental, brackish and marine environments of deposition, based on elemental abundances in sediments. In order to use discriminant analysis, however, a standard must be established. The availability of a complete core for which lithologic, biostratigraphic and paleoecologic studies have been completed, for a portion of the core, provides an unusual opportunity to test this hypothesis.

One thousand nine hundred and forty feet of continuous core (from the 600 to 2540 foot depth), from the Canadian Pacific Oil and Gas EV Strathmore Well (Fig. 1) in southern Alberta, 30 miles east of Calgary (Lsd. 7, Sec. 12, Tp, 25, R. 25, W. 4 Mer.) are used in this study. The sediments in the core are dominantly argillaceous and are Late Cretaceous in age. A detailed paleoecologic study by Wall et al. (1971) and a lithologic description by Havard (1971), provide an environmental classification (ranging from continental through brackish to marine) for a 410 foot section of this core (from the 1350 to 1760 foot depth).

In this study, 776 samples, from known depths in the core are analyzed for the abundance of nine major (Si, Al, Fe, Mg, Ca, Na, K, Ti and Mn), fourteen ttace (Ba, Co, Cu, Ga, Li, Mo, Pb, Rb, S, Sr, Zn, Ar, V and Ni) elements and volatiles (C plus H_2O). The environment of deposition, for one hundred and eight of these samples, is known on the basis of the work of Wall et al. (1971) and Havard (1971).

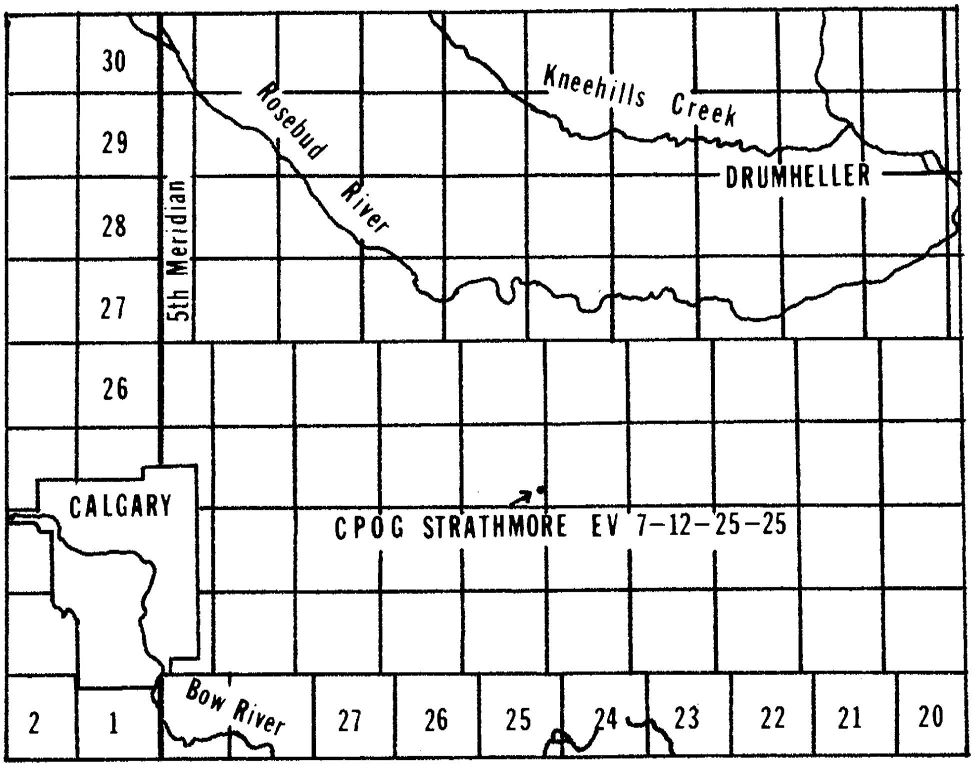

Fig. 1. Location of well CPOG Strathmore EV 7-12-25-25W4 (from Havard, 1971).

The purpose of this study is two-fold. First, to develop discriminant-functions based on the element abundances, using the 108 samples from known depositional environments. Second, to apply the formulated discriminant-functions to classify the environment of deposition of the remaining 668 samples. From these data, the Late Cretaceous depositional history of southern Alberta is interpreted.

PREVIOUS WORK

Element abundances and factors affecting element abundances in sediments and sedimentary rocks have been the subject of many investigations. Shaw (1954a,b, 1956) analyzed for 11 major oxides and 12 trace elements in pelitic rocks. Others who dealt with the abundance of elements and their mode of occurance in sediments, include Horstman (1957) on the distribution of Li, Rb and Cs in igneous and sedimentary rocks, Greensmith (1958) on chemical data from some Upper Carboniferous shales in Great Britain and Mohr (1959) who studied the high Mn shales of the Halech dome, North Wales.

Research into geochemical facies analysis began with the work of Bishof (1847-1851) who first attempted to recognize sediments of different origin by geochemical means. Most of the data published before 1945 was, however, of questionable value for the recognition of depositional environments due to imprecise analytical techniques. After the development of modern geochemical techniques, many articles were published on geochemical facies analysis. Table 1 lists a few of the more important articles.

From Table 1 it is apparent that there is little agreement as to the usefulness of specific elements as environmental discriminators. Only a few of the elements have been studied by more than three workers. In many cases their results differ. This is not surprising, because geochemical facies analysis involves numerous variables which affect the mineralogic and, therefore, elemental composition of sediments. For example; sedimentation rates, grain size distributions, biologic influence, climatic influence, paleontologic control and sufficient sample size to make a study statistically valid.

Table 1

ELEMENT AND RELATIVE ABUNDANCE IN MARINE VS. CONTINENTAL DEPOSITS

		Major Elements									Trace Elements																				
Author (See Below)	No. of Samples	Si	Al	Fe	Mg	Ca	Na	K	Ti	Mn	Li	Be	B	F	V	Cr	Ni	Cu	Zn	Ga	As	Se	Rb	Sr	Zr	Mo	Sn	Ba	Pb	Nd	Th
1.	-										H																				
2.	35					H		H		L													H	L	H						
3.	113	L		H	H	H		H																							
4.	60												H		H		H	L	L	L			H				L		L		
5.	75												H							L			H								
6.	-														H			H													
7.	374					L	H		H	H					L	L	L								L						
8.	54					L				H						H	H	H			L			L	H			H			
9.	-								L	H	H		H	H	L	L	H			L			H	H	L					L	L
10.	-												H																		
11.	240								H	H		H						H							H						
12.	90									L			H		H	H	H	L													
13.	66												H		H	H	H	H		H								H			
14.	15,264									H																					
15.	107												H		H	H	H	H	H	L	H	H			L	H					
16.	-														H	H	H	H													
17.	45	L	L		H	H									H													L			

H = High
L = Low

Table 1 (continued)

1. Ataman, G., (1964), Clay, based on theoretical geochemical considerations.

2. Campbell, F.A., and Lerbekmo, J.F., (1963), 35 outcrop samples all shales.

3. Campbell, F.A., and Williams, G.D., (1965), 113 core samples, all shales.

4. Degens, E.T., Williams, E.G., and Keith, M.L., (1957), 33 outcrop samples, Ni, V, Pb, Zn, Cu, Sn determined on organic material, sampled over a wide area.

5. Degens, E.T., Williams, E.G., and Keith, M.L., (1958), 75 outcrop samples, 7 shale samples, 20 limestone samples and 20 clay samples.

6. Goldschmidt, V.M., (1937), Based on theoretical geochemical considerations.

7. Katchenkov, S.M., (1952), 374 outcrop and core samples, anhydrites, dolomites, carbonates, terrigenous rocks and limestones.

8. Katchenkov, S.M., (1960, 12 recent marine muds, 19 continental clays, 23 marine clays, only 0.001 mm fraction studies, outcrop and recent samples.

9. Keith, M.L., and Degens, E.T., (1959), Literature review.

10. Landergren, S., (1944), sediments, iron ores.

Table 1 continued

11. Litvin, S.V., (1962), 240 outcrop samples, 78 sandstones, 43 siltstones, 32 argillites, 32 clays, 19 limestones, 14 marls, 22 argillaceous limestones, samples over a wide area.

12. Macpherson, H.G., (1958), 91 outcrop samples, graywackes, argillites and low-grade schists.

13. Potter, P.E., Shimp, N.F. and Witters, J., (1963), Argillaceous sediments, 14 modern marine, 19 modern fresh water, 20 ancient marine, 13 ancient fresh-water, sampled over wide area.

14. Ronov, A.B., and Ermishkina, A.S., (1959), 15,264 cuttings, 6381 sands and silts, 8883 clays.

15. Tourtelot, H.A., (1964) 107 outcrop samples: 8 noncarbonaceous, nonmarine claystones, 14 carbonaceous, nonmarine shales, 32 nearshore marine shales and claystones, 53 marine shales and claystones, sampled over wide area.

16. Van Houten, F.B., (1965), outcrop samples, arkose, mudstone, siltstone, shale, sampled over wide area.

17. Weber, J.N., and Williams, E.G., (1965), 45 siderite nodules, outcrop samples, 24 fresh-water, 12 brackish, 9 marine.

Many different approaches to geochemical facies analysis have been attempted. In most cases numerous rock types have been studied (Table 1). This only adds to the confusion. A more realistic approach is used by some of the workers (Degens et al., 1957, Potter et al., 1963, Weber and Williams, 1965). In these studies, sampling was limited to argillaceous sediments or specific rock types and a definite approach to sampling was used. Degens et al. (1957) and Weber and Williams (1965) use plans in which the number of outside variables is limited. In both cases, ancient sediments from one source area, within a single basin, with a variety of repetitive environments of deposition were studied. Potter et al. (1963) used a sampling plan which included as many variables as possible. Recent sediments from known environments of deposition were used as standards. Factors such as source area, climate, geologic age and sample locations, were allowed to vary to the greatest degree possible. Both plans have merit, and all three of the studies arrive at significant results.

Degens et al. (1957) conclude that continental and marine shales can be separated using B, Ga, and Rb. From their work they found B and Rb to be concentrated in marine samples, while Ga is concentrated in continental samples. They construct a triangular diagram Fig. 2 based on the relationship between the three elements. Using the diagram they show that continental and marine samples can be classified on the basis of the three trace elements (B, Rb and Ga). Only three of the marine samples overlap into the fresh water group, and one fresh-water sample falls into the marine group. No method for separating brackish water samples was established.

Potter et al. (1963) studied the abundance of B, Co, Cr, Cu, Ga, Ni, Pb, V and Zn in argillaceous sediments. In their study, they use the

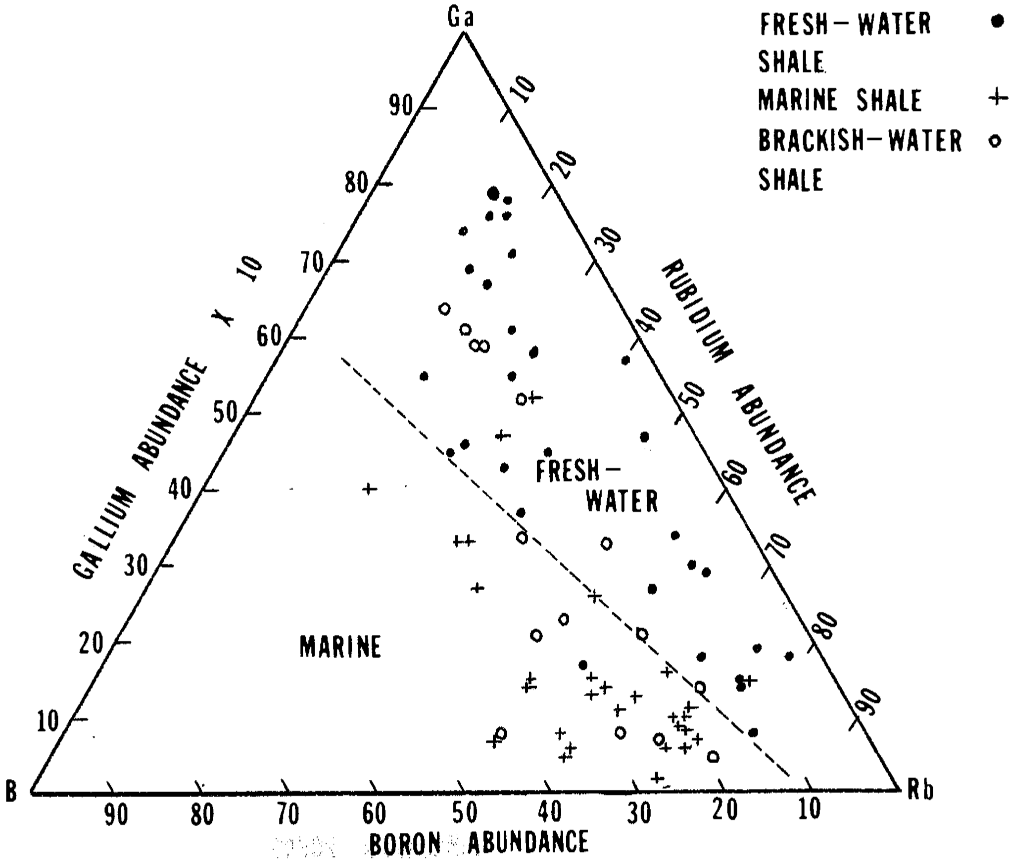

Figure 2. Triangular Diagram Showing Abundance of Gallium, Rubidium and Boron (from Degens et al., 1957).

sample plan previously mentioned. They found B, Cr, Cu, Ga, Ni, and V to be concentrated in marine sediments. Two schemes for the classification of sediments were used. First they used graphical methods and secondly they tried discriminant analysis. In both instances, their conclusions were similar. Figures 3 and 4 give their graphical results. After performing a number of statistical tests for significance and elimination of variables, they concluded that a discriminant-function based on two variables (B and V) can be used to classify unknown samples. The function used is $X = 5.3415\ X_1 + 5.6928\ X_7$ where X_1 is the logarithm of the boron concentration and X_7 is the logarithm of the vanadium concentration. Using this function, 85% of the ancient samples were correctly classified. By using the graphical method, 88% of the samples were correctly classified. No attempt was made to classify brackish-water samples.

Weber and Williams (1965) used the same sample plan as Degens et al. (1957) but instead of using whole rock analysis they studied only siderite nodules. In their study the environments of deposition were established by paleontologic evidence. Three categories were used; fresh-water, brackish and marine. A three group discriminant-function was used. In this study major oxides and trace element concentrations were considered. They conclude that based on a six variable (SiO_2, Al_2O_3, MgO, CaO, Ba, and V) discriminant-function, marine and fresh-water environments can be effectively separated, but that a brackish-water group could not be distinguished. The final functions used for classification or method were not given.

Considering geochemical facies analysis, and by studying Table 1, some elements do appear to be of some use. Boron and rubidium for example, both seem to be accepted as useful discriminators. There are

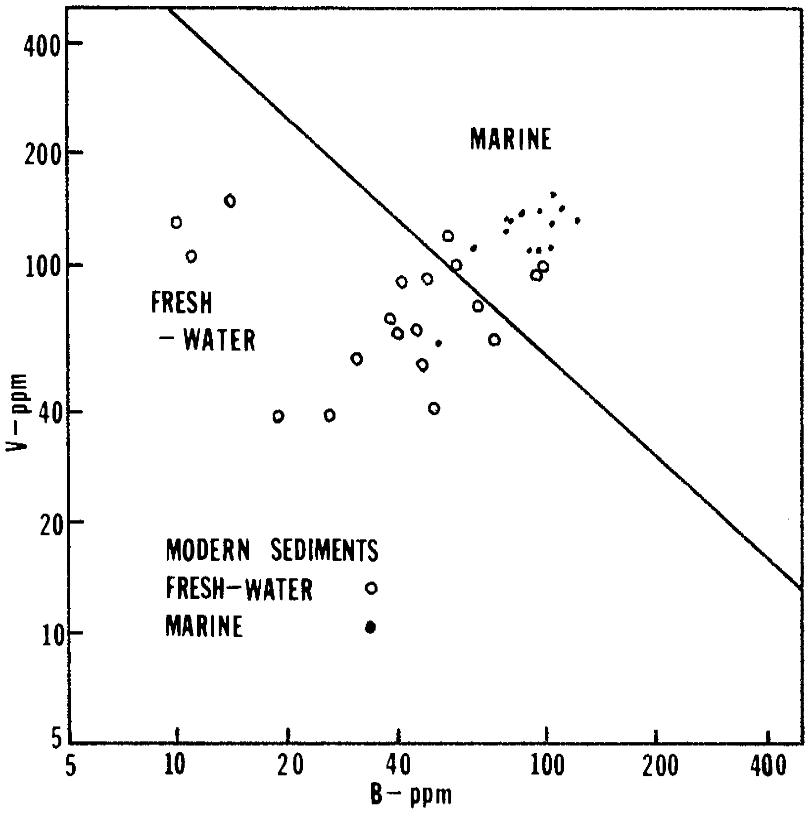

Figure 3. Plot of B and V concentrations in 33 modern sediments and estimated line of separation between marine and fresh-water fields (from Potter et al. 1963).

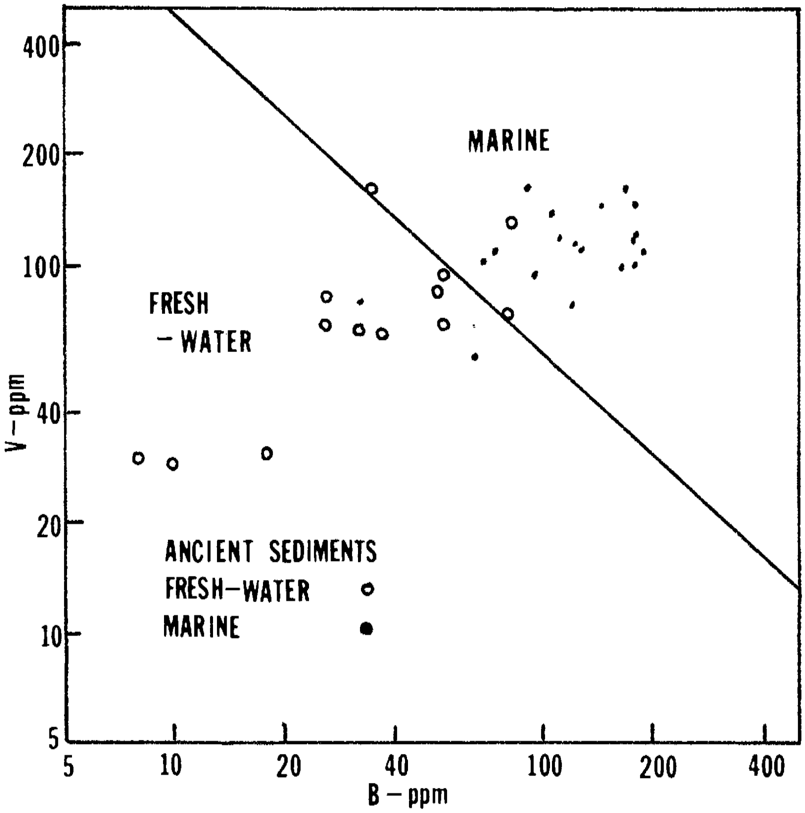

Figure 4. Plot of B and V concentrations in 33 ancient sediments and estimated line of separation between marine and fresh-water fields (from Potter et al., 1963).

also other elements which may prove useful, such as V, Cr, Ni and Cu. Their relative concentration appears to be higher in marine environments compared to continental environments. There is also some agreement that Ga is concentrated in continental sediments. An approach using a specific sampling plan utilizing most of the elements listed in Table 1 and others, appears to be a most promising way to handle geochemical facies analysis.

GENERAL GEOLOGY

Geologic Setting

During Cretaceous time a broad seaway extended northward from the Gulf of Mexico to the Arctic along the eastern side of the Cordilleran region, covering most of the area of the Eastern Ranges and Plateaus and overlapping the Interior Lowlands. As the Cordillera on the west developed in later Mesozoic time, a series of clastic wedges were laid down in this seaway. The growth of the Rocky Mountains provided a source for the terrigenous and volcanic debris which was shed eastward into the epicontinental sea.

The continental buildup of sediments along the margins of the seas resulted in thick accumulations of alternating continental and marine deposits (Williams and Burk, 1964). During the Late Cretaceous, the plains area of western Alberta was always at or near sea level. Transgressions and regressions of the epicontinental sea were frequent. Westward transgressions were due to regional subsidence and/or a low rate of supply of detritus from the west. Regressions to the east were caused by regional emergence and/or a high rate of supply of detritus from the west.

Environments of deposition over the area were highly variable. Continental deposits, largely fluvial and associated floodplain deposits, produced a broad lowlying coastal plain. At times, swamp conditions, where coals developed, were prevalent. Eastward prograding deltas produced a sinuous coastline. Brackish-water deposits accumulated in estuaries, bays, lagoons and swamps. Fine grained detritus deposited in the epicontinental sea formed shales and the rate of shale deposition was generally high enough to prevent the formation of carbonates.

CORE STRATIGRAPHY

The following is a brief description of the stratigraphic units sampled for this study. A correlation chart for the very Late Cretaceous and Paleocene is given in Figure 5.

Belly River Group

Dawson (1883) first introduced the name Belly River Series into the literature. All beds between the underlying Alberta Formation and the overlying Bearpaw Formation (outcropping along the Belly and Bow rivers in southern Alberta), were included in the series. Dawson (1883) believed that the beds were non-marine, and predominantly sandstones. Dowling (1917) redefined the series to include shales of the Pakowki Formation, as well as the sandy formations above and below them. Williams and Dyer (1930) restricted the term to include only the beds overlying the Pakowki Formation and underlying the Bearpaw Formation. Following their usage, the Foremost Formation and "Pale" beds of Dowling (1917) were included in the series. The Belly River Series was formally raised to group status by Russell and Landes (1940), and subdivided into the Foremost and Oldman Formation (previously "Pale" beds). The Belly River Group is correlative with the Judith River Formation, in the western United States.

Foremost Formation 2165' - 2540'

Before the deposition of the Foremost Formation, beds of the marine Pakowki Formation (Clagget Formation) were deposited by the Clagget sea. Foremost time began with the gradual recession of the sea. The oscillatory nature of the withdrawal is shown by the presence of coals, brackish-water molluscs and beach sands (Powers, 1931; Hale and Addison, 1931; Russell and Landes, 1940).

Figure 5. Correlation of the uppermost Cretaceous and Paleocene formations of the southern Alberta Plains and central Foothills.

Age / Group	WESTERN UNITED STATES	CENTRAL FOOTHILLS REGION	OLDMAN RIVER REGION	LITTLE BOW RIVER REGION	BOW RIVER-RED DEER RIVER REGION	CYPRESS HILLS, ALBERTA REGION
PALEOCENE	FORT UNION	PASKAPOO FORMATION	PORCUPINE HILLS FM	PASKAPOO FORMATION	PASKAPOO FORMATION	RAVENSCRAG FORMATION
PALEOCENE	FORT UNION	ENTRANCE CONG	UPPER PART WILLOW CR FM	PASKAPOO FORMATION	PASKAPOO FORMATION	RAVENSCRAG FORMATION
UPPER CRETACEOUS	LANCE	BRAZEAU FORMATION	LOWER PART WILLOW CREEK FORMATION	WILLOW CREEK FACIES	PASKAPOO FORMATION	FRENCHMAN FORMATION
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	BATTLE FM	ST. MARY RIVER FACIES	BATTLE FM (EDMONTON GROUP)	BATTLE FM
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	WHITEMUD FM	ST. MARY RIVER FACIES	WHITEMUD FM (EDMONTON GROUP)	WHITEMUD FM
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	ST. MARY RIVER FORMATION	ST. MARY RIVER FACIES	HORSESHOE CANYON FORMATION (EDMONTON GROUP)	EASTEND FM
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	ST. MARY RIVER FORMATION	HORSESHOE CANYON FACIES	HORSESHOE CANYON FORMATION (EDMONTON GROUP)	BEARPAW FORMATION
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	BLOOD RESERVE FM	BEARPAW FORMATION	BEARPAW FORMATION	BEARPAW FORMATION
UPPER CRETACEOUS, MONTANA GROUP, PIERRE	BEARPAW	BRAZEAU FORMATION	BEARPAW FM	BEARPAW FORMATION	BEARPAW FORMATION	BEARPAW FORMATION
UPPER CRETACEOUS, MONTANA GROUP	JUDITH RIVER	BRAZEAU FORMATION	BELLY RIVER GROUP: OLDMAN FORMATION	OLDMAN FORMATION	OLDMAN FORMATION	OLDMAN FORMATION
UPPER CRETACEOUS, MONTANA GROUP	JUDITH RIVER	BRAZEAU FORMATION	BELLY RIVER GROUP: FOREMOST FORMATION	FOREMOST FORMATION	FOREMOST FORMATION	FOREMOST FORMATION
UPPER CRETACEOUS, MONTANA GROUP	CLAGGET EAGLE	ALBERTA GROUP	PAKOWKI FM	PAKOWKI FM	LEA PARK FORMATION	PAKOWKI FM
UPPER CRETACEOUS, MONTANA GROUP	CLAGGET EAGLE	ALBERTA GROUP	MILK RIVER RM	MILK RIVER FM	LEA PARK FORMATION	

The formation was named by Dowling (1917) and is equivalent to Dawson's (1883) lower portion of the Belly River series. The Foremost Formation is incomplete in the Strathmore core (Havard, 1971), where it attains a thickness of 375 feet. The top of the formation is chosen as the highest occurance of carbonaceous shale and coal within the Belly River Group (Havard, 1971).

According to Powers (1931) and Russell and Landes (1940) the formation consists chiefly of brackish-water and lagoonal deposits. A general description of the unit is difficult because the lithology varies greatly from place to place. The section contains dark grey and brown shales, silty shales, and subordinate amounts of grey, buff or tawny brown sandstones. Russell and Landes (1940) believe that the diagnostic feature of the formation is the presence of numerous beds of brackish-water molluscs and coal seams.

Oldman Formation 1732' - 2165'

With the subsequent regression of the sea to the east, beds of the dominantly continental Oldman Formation were deposited. Erratic conditions of deposition, however, persisted as shown by the alternations of shale and sandstone. During Late Oldman time the land was well drained so that organic matter was oxidized rather than carbonized (Hale and Addison, 1931).

The Oldman Formation was formally named by Russell and Landes (1940). The thickness of the formation within the cored interval is 433 feet (Havard, 1971) and is overlain by the Bearpaw Formation. Lithologically, the beds consist of brown, grey and green sandstones, siltstones, mudstones and shales. Some coals and coaly shales are also present in the section.

According to Powers (1931) and Russell and Landes (1940), the formation consists mainly of continental deposits. However, Wall et al. (1971)

recognize, by the presence of brackish-water microflora and microfauna, that the uppermost 20 feet of the Oldman Formation marks the initial transgressive phase of the Bearpaw sea.

Bearpaw Formation 1640' - 1732'

At the beginning of the Bearpaw time, a major transgression of the Bearpaw sea occurred. Powers (1931), Hake and Addison (1931) and Williams and Burk (1964) suggest that this transgression is related to subsidence within the basin. The Bearpaw shale records remarkably uniform marine deposition during a considerable time.

This formation was named by Stanton and Hatcher (1905) for the dark-grey shale occurring along the margins of the Bearpaw Mountains, in Montana. The formation is also present in central and southern Alberta and southwestern Saskatchewan, where it is overlain by the Edmonton Group (Shepheard and Hills, 1970). To the west, the formation wedges out, whereas the Edmonton Group thickens, and in combination with the Belly River Group, is defined as the Brazeau Formation.

In the Strathmore core, Havard (1971) recognized 92 feet of the Bearpaw Formation, composed of grey-brown to grey shale with interstratified thin beds of sandstones, siltstones, mudstones and abundant ironstone. Link and Childerhose (1931), Shepheard and Hills (1970) and Wall et al. (1971) classify the formation as being mainly marine.

"Transition Zone" 1362' - 1640'

Shepheard and Hills (1970) and Wall et al. (1971) informally recognize a "transition zone" between the marine Bearpaw and continental Horseshoe Canyon Formation. The interval consists of light to dark grey to brown sandstones, siltstones, mudstones and shales; locally containing coal and coaly shales. On the basis of foraminiferal and megaspore evidence, Wall et al. (1971) believe that this zone represents a mainly brackish-water environment, although it also contains some continental and marine units.

Edmonton Group

Tyrrell (1887) designated a lithologically variable unit, located in the North Saskatchewan River Valley in the vicinity of Edmonton, the Edmonton Formation. This unit was formally redefined by Irish (1970) as the Edmonton Group. The group consists of all nonmarine strata (Irish, 1970) overlying the Bearpaw Formation, and overlain by the Paskapoo Formation. In descending order, the group consists of:

Battle Formation

Whitemud Formation

Horseshoe Canyon Formation

The Horseshoe Canyon Formation is the only formation of this group which was cored.

Horseshoe Canyon Formation 600' - 1362'

Horseshoe Canyon time is marked by an increase in tectonic activity in the Cordillera (Irish, 1970). Laramide Mountain building was at a maximum at this time (Irish, 1970). Erosion of the mountains to the west resulted in vast quantities of sediment being transported into the Bearpaw sea. Considerable volcanic activity is also shown by the abundance of bentonitic material in most beds of the Horseshoe Canyon Formation. The increased supply of sediments into the basin, with probable regional uplift (Irish, 1970), caused the final withdrawal of the Bearpaw sea. This marked the end of marine conditions in western Canada.

The Horseshoe Canyon Formation (Irish, 1970) is comprised of strata overlying the Bearpaw Formation and underlying the Whitemud Formation. The "transition zone" recognized by Shepheard and Hills (1970) and Wall et al. (1971) is placed within the lowest strata of the Horseshoe Canyon Formation by both Irish (1970) and Havard (1971). The formation consists of deltaic and fluvial deposits (Irish, 1970), of interstratified, fresh and brackish-water sandstones, mudstones and shales. Typically the beds consist of light grey and greenish-grey, grey and white weathering, fine grained, bentonitic, feldspathic, sandstones; silty, grey, green and brown bentonitic shales; beds of carbonaceous shale and coal seams. Beds of hard, brown weathering, calcareous sandstones, thin nodular beds of red to brown weathering ironstone; thin beds of bentonite; and concretions are found less commonly in this portion of the section.

CHAPTER II: SAMPLE ANALYSIS

GENERAL ANALYTICAL METHODS

Introduction

Analysis of 776 argillaceous rocks was performed by a combination of X-ray fluorescence, neutron activation, atomic absorption and ashing. Twenty four element concentrations were determined on each sample. The major elements, determined were: Si, Al, Fe, Mg, Ca, Na, K, Ti and Mn. Fourteen trace elements: Ba, Co, Cu, Ga, Li, Mo, Pb, Rb, S, Sr, Zn, Ar, V and Ni were also determined. The amount of carbon plus free water was estimated during the ashing procedure.

Explanation of Statistical Terms

This section presents definitions of the statistical terms used in describing the results of analytical procedures.

Mean ($\overline{X}$): the summation of a set of results (X_1, X_2, . . . , X_n) divided by the number of observations.

$$\overline{X} = \frac{1}{n} \sum_{i=1}^{n} X_i$$

Maximum (MAX.): the maximum observed value in a set of results.

Minimum (Min.): the minimum observed value in a set of results.

Range: the difference between the maximum and minimum observed values.

Standard Deviation (S): the root-mean-square deviation of a set of observations from their mean. For a finite number (n) of measurements with a mean $\overline{X}$ the standard deviation is:

$$S = \sqrt{\frac{\sum_{i=1}^{n} (X_i - \overline{X})^2}{n - 1}} .$$

Upper Bound (U.B.): The upper bound is defined as the mean for a set of observations plus the standard deviation divided by two.

$$U.B. = \overline{X} + {}^{S}/2$$

Lower Bound (L.B.): The lower bound is defined as the mean for a set of observations minus the standard deviation divided by two.

$$L.B. = \overline{X} - {}^{S}/2$$

Coefficient of Variation (C.V.): The coefficient of variation is defined as the standard deviation expressed as a percentage of the mean.

$$C.V. = {}^{S}/\overline{X} \cdot 100\%$$

Precision: Precision is defined as the closeness of agreement among replicate results obtained under a definite set of conditions.

Accuracy: Accuracy can be defined as the nearness of the mean ($\overline{X}$) of a number (n) of results to the "true" result.

X-ray Fluorescence Analysis

Before analysis, the samples were prepared using the method described by Leake et al. (1969). A Philips 8-position vacuum spectograph equipped with a simultaneous teletype was used to obtain the X-ray fluorescence data. The X-ray fluorescence methods described by Condie (1967a,b) were used for the analysis of the major elements: Si, Al, Fe, Ca, K, Ti, Mn and the trace elements: Cu, Ga, Mo, Pb, Rb, S, Sr, Zn and Zr. The major and trace element calibration curves were constructed using U.S. Geological

Survey standard rocks: W-1, BCR-1, AGV-1, GSP-1, and PCC-1. Instrumental parameters are listed in Table 2.

The precision of the X-ray analysis is given in Tables 3, 4, 5 and 6. The major oxide values are given in percent, while the trace element values are given in part per million. Fifteen separate replicate pellets from four different samples were used in the check of precision.

The results for the test of accuracy are given in Table 7. The accuracy was determined by treating BL 3571, the analyzed amphibolite, Leake et al. (1969), as an unknown. The analyses were then compared with the known values. The test results indicate that the method is highly accurate for most elements, and adequate for the remaining elements.

Appendix 1 contains the results of the X-ray analysis on the 776 argillaceous rocks. All values are reported in parts per million, to facilitate statistical handling of the data. In order to obtain the percent oxide contained in the sample, the following conversion must be made.

$$\text{Oxide Percent} = \text{ppm } (.0001) \text{ X } \frac{\text{Formula Weight Oxide}}{\text{Atomic Weight of Element}}$$

For example:

sample no.1 contains 298630 ppm Si

formula weight oxide (SiO_2) = 60.09

atomic weight of element (Si) = 28.09

$$\text{Oxide Percent} = 29860 \ (.0001) \text{ X } \frac{60.09}{28.09}$$

$$= 63.88\%.$$

Table 2

X-RAY FLUORESCENCE INSTRUMENTAL PARAMETERS

ELEMENT	PEAK	TARGET	CRYSTAL	DETECTOR	GAS	COLLIMATOR	PATH	KV	MA	FT[1]
Si	Kα	Cr	EDDT	FPC	P-10	Coarse	VAC	45	25	10
Al	Kα	Cr	EDDT	FPC	P-10	Coarse	VAC	45	25	10
Fe	Kα	W	LiF (200)	SCIN	----	Fine	AIR	50	35	10
Ca	Kβ	Cr	EDDT	FPC	P-10	Coarse	VAC	45	25	10
K	Kα	Cr	EDDT	FPC	P-10	Coarse	VAC	45	25	10
Ti	Kα	W	LiF (200)	SCIN	----	Coarse	VAC	50	37	20
Mn	Kα	Mo	LiF (200)	SCIN	----	Coarse	AIR	50	38	10
Cu	Kα	Mo	LiF (200)	SCIN[2]	----	Coarse	AIR	50	37	20
Ga	Kα	Mo	LiF (220)	SCIN[2]	----	Coarse	AIR	45	35	20
Mo	Kα	W	LiF (220)	SCIN	----	Coarse	AIR	45	35	10
Pb	Lα	W	LiF (200)	SCIN	----	Coarse	AIR	50	35	20
Rb	Kα	Mo	LiF (200)	SCIN	----	Coarse	AIR	45	35	10
S	Kα	Cr	QTZ	FPC	P-10	Coarse	VAC	50	25	10
Sr	Kα	Mo	LiF (200)	SCIN	----	Coarse	AIR	45	35	10
Zn	Kα	Mo	LiF (200)	SCIN	----	Coarse	AIR	45	35	10
Zr	Kα	Zr	LiF (220)	SCIN	----	Coarse	AIR	50	35	10

[1] FT = Fixed Time in Seconds. Each sample was counted seven times, for the number of seconds indicated.

[2] 0.0005" Ti Filter used

Table 3

X-RAY FLUORESCENCE
INSTRUMENTAL PRECISION

SAMPLE NO. 212

OXIDE OR ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S.	C.V. %	NO. OF ANALYSIS
SiO_2	61.28	62.60	59.79	2.81	60.89	61.76	0.96	1.56	9
Al_2O_3	16.13	16.86	15.61	1.25	15.90	16.36	0.45	2.77	12
Fe_2O_3	5.00	5.33	4.86	0.47	4.91	5.08	0.17	3.34	12
CaO	2.26	2.50	2.11	0.39	2.21	2.32	0.10	4.60	12
K_2O	2.33	2.64	2.06	0.58	2.25	2.41	0.17	7.09	13
TiO_2	0.510	.519	.499	.02	0.506	0.514	0.01	1.42	10
MnO	0.107	.101	.117	0.016	0.104	0.11	0.01	4.83	10
Cu	21.	25.	13.	12.	19.	22.	3.48	16.87	13
Ga	24.	31.	20.	11.	22.	26.	3.33	13.95	12
Mo	.59	1.95	0.	1.95	.29	.90	0.64	108.4	13
Pb	17.	25.	11.	14.	15.	19.	4.33	25.39	15
Rb	52.	57.	47.	10.	51.	54.	3.33	6.38	12
S	98.	133.	71.	62.	90.	106.	17.7	18.0	15
Sr	215.	221.	201.	20.	212.	217.	5.15	2.40	15
Zn	59.	64.	49.	15.	56.	62.	5.07	8.57	10
Zr	130.	136.	124.	12.	128.	131.	3.89	3.00	13

Table 4

X-RAY FLUORESCENCE
INSTRUMENTAL PRECISION

SAMPLE NO. 386

OXIDE OR ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S.	C.V. %	NO. OF ANALYSIS
SiO_2	61.18	61.66	60.48	1.18	60.99	61.38	0.37	0.61	12
Al_2O_3	15.99	16.68	15.51	1.17	15.79	16.19	0.37	2.31	11
Fe_2O_3	2.52	2.58	2.45	0.13	2.49	2.55	0.05	2.05	13
CaO	1.35	1.39	1.33	0.06	1.34	1.36	0.02	1.57	12
K_2O	0.75	.80	.72	0.08	0.74	0.77	0.03	3.58	10
TiO_2	0.486	.506	.468	.038	0.481	0.492	0.01	2.30	15
MnO	0.058	.060	.056	.004	0.057	0.058	0.00	1.94	15
Cu	14	18.	12.	6.	13	15	2.04	14.39	11
Ga	19	22.	17.	5.	18	20	1.53	8.11	12
Mo	.51	1.26	0.	1.26	.28	.74	.51	100.4	15
Pb	9	15.	2.	13.	7	10	3.68	42.79	15
Rb	19	25.	14.	11.	17	20	3.56	19.12	14
S	84	117.	52.	65.	76	93	19.06	22.64	15
Sr	227	253.	214.	39.	223	232	9.25	4.07	14
Zn	49	55.	40.	15.	46	52	4.96	10.17	10
Zr	119	127.	111.	15.	116	121	4.47	3.77	14

Table 5

X-RAY FLUORESCENCE
INSTRUMENTAL PRECISION

SAMPLE NO. 392

OXIDE OR ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S.	C.V. %	NO. OF ANALYSIS
SiO_2	60.91	61.62	60.11	1.51	60.62	61.2	0.50	0.83	10
Al_2O_3	14.91	15.38	14.49	0.89	14.73	15.08	0.34	2.29	12
Fe_2O_3	7.13	7.25	7.02	0.23	7.08	7.17	0.08	1.18	12
CaO	1.56	1.60	1.55	0.05	1.55	1.57	0.01	0.82	12
K_2O	1.42	1.47	1.38	0.09	1.41	1.44	0.03	1.87	11
TiO_2	0.803	.823	.779	.054	0.798	0.809	0.01	1.50	15
MnO	0.12	.123	.118	.005	0.119	0.121	0.00	1.11	14
Cu	33.	42.	26.	13.	31.	35.	4.32	13.17	14
Ga	24.	29.	20.	9.	22.	26.	3.56	14.90	11
Mo	.80	2.049	.015	2.034	.54	1.05	0.80	69.80	15
Pb	20.	27.	13.	14.	19.	22.	9.92	15.54	15
Rb	87.	99.	80.	19.	83.	91.	6.92	7.95	11
S	502.	559.	430.	129.	477.	528.	41.78	8.32	9
Zn	93.	99.	84.	15.	90.	95.	5.05	5.45	11
Zr	149.	160.	138.	22.	146.	152.	5.98	4.02	14

Table 6

X-RAY FLUORESCENCE
INSTRUMENTAL PRECISION

SAMPLE NO. 810

OXIDE OR ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S.	C.V. %	NO. OF ANALYSIS
SiO_2	57.09	58.31	56.15	2.16	56.75	57.43	0.65	1.14	12
Al_2O_3	15.57	15.98	15.38	0.60	14.46	15.68	0.20	1.27	11
Fe_2O_3	8.01	8.15	7.92	0.23	7.97	8.05	0.08	0.97	13
CaO	1.71	1.75	1.69	0.06	1.70	1.72	0.02	1.04	12
K_2O	1.24	1.29	1.18	0.11	1.22	1.26	0.03	2.62	11
TiO_2	0.839	.858	.816	.042	0.833	0.845	0.01	1.60	15
MnO	0.097	.100	.093	.007	0.096	0.097	0.00	2.00	15
Cu	31	35.	23.	12.	29	34	3.50	11.14	9
Ga	22	26.	18.	8.	21	23	2.45	11.13	12
Mo	.17	.41	0	.41	.05	.28	.17	104.0	8
Pb	13	19.	7.	12.	11	14	2.92	23.33	15
Rb	42	51.	36.	15.	40	44	4.70	11.17	14
S	80	96.	67.	29.	75	85	8.90	11.16	10
Sr	302	308	294.	14.	300	304	4.52	1.49	15
Zn	91	99.	84.	15.	89	94	4.75	5.20	12
Zr	135	143.	130.	13.	133	138	4.68	3.46	13

X-RAY FLUORESCENCE
INSTRUMENTAL ACCURACY

SAMPLE NO. BL 3571

OXIDE OR ELEMENT	ACCEPTED VALUE	OBSERVED VALUE	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
SiO_2	47.23	47.45	47.534	47.368	.166	47.43	47.47	0.04	0.09	14
Al_2O_3	14.71	11.80	11.808	11.742	.066	11.79	11.81	0.02	0.15	14
Fe_2O_3	11.19	10.686	10.688	10.686	.002	10.685	10.687	0.00	0.01	14
CaO	8.40	9.53	9.601	9.501	0.10	9.52	9.54	0.02	0.25	14
K_2O	0.96	0.973	0.973	0.973	0.000	.973	.973	0.00	0.00	14
TiO_2	0.54	0.685	0.685	0.684	0.001	.684	.685	0.00	0.00	14
MnO	0.178	0.143	0.143	0.143	0.000	.143	.143	0.00	0.00	14
Cu	85.7	63.6	64.1	63.0	1.10	63.5	63.7	0.24	0.38	14
Ga	13.0	17.53	17.7	17.4	0.30	17.49	17.57	0.09	0.52	14
Pb	5.9	7.11	7.2	6.9	0.30	7.05	7.16	0.12	1.70	14
Rb	20.4	28.	31.	25.	6.	27.	28.	1.49	5.38	14
S	137.7	238.	248.	232.	16.	236.	240.	4.08	1.71	14
Sr	267.4	496.	496.	495.	1.	495.	496.	0.51	0.10	14
Zn	85.1	76.31	76.7	75.6	1.10	76.18	76.45	0.29	0.37	14
Zr	62.3	100.46	100.8	100.3	0.50	100.49	100.63	0.14	0.14	14

Table 8

NEUTRON ACTIVATION INSTRUMENTAL ACCURACY

SAMPLE NO. G-2

Na_2O	4.10	4.10	4.258	3.9	.358	3.92	4.27	0.15	3.62	

Neutron Activation Analysis

Sodium was the only element determined by neutron activation analysis. The sample preparation and analytic method used is described in Condie and Lo (1971). Analyses were performed on a Canberra 4,096 channel gamma ray spectrometer, with a Li drifted Ge detector system. A fixed time mode was used for counting. Instrument parameters are given in Table 9.

The results of the test of precision for the neutron activation analysis are given in Table 11. In this case replicates of standards G-2 and BCR-1 were used as a check.

The accuracy of the neutron activation data is given in Table 8. The accuracy was determined by treating U.S. Geological Survey G-2 as an unknown. The test results indicate that the method is highly accurate for sodium.

Appendix 1 contains the Na analysis. All values are reported in parts per million. To convert to oxide percent the same method previously described is used.

Ashing

The approximate amount of free water plus carbon is obtained from the ashing procedure. The difference in weight of the sample, before and after ashing, is attributed to loss of carbon and free water. The weight loss was divided by the initial total weight and multiplied by 100% to calculate the approximate percentage of free water plus carbon. Results are given in Appendix 1. All values are listed in parts per million, that is, the percentage values were converted to ppm. The precision of the ashing technique was determined by using five replicate samples. The results of the test are given in Table 12. No tests of accuracy were made for the ashing techniques.

Table 9

NEUTRON ACTIVATION ANALYTICAL PARAMETERS

ELEMENT	IRRADIATION FLUX	LENGTH OF IRRADIATION (MIN)	COOLING PERIOD (DAYS)	PEAK (KEV)	COUNTING TIME (SEC)
Na	1×10^{14} n/cm^2	3.33	0.5	1369	6.0×10^2

Table 10

ATOMIC ABSORPTION INSTRUMENTAL PARAMETERS

ELEMENT	WAVE-LENGTH (nm)	CATHOD CURRENT (MA)	RANGE	SLIT (mm)	FUEL	OXIDANT
Mg	285.2	20	UV	4	C_2H_2	Air
Ba	553.6	20	Vis	2	C_2H_2	N_2O
Co	240.7	30	UV	3	C_2H_2	Air
Li	670.8	20	Vis	4	C_2H_2	Air
V	318	30	UV	4	C_2H_2	Air
Ni	232	25	UV	3	C_2H_2	Air

Table 11

NEUTRON ACTIVATION INSTRUMENTAL PRECISION

SAMPLE NO. G-2

OXIDE	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
Na_2O	4.13	4.24	4.04	0.20	4.08	4.18	0.08	1.90	9

SAMPLE NO. BCR-1

Na_2O	2.99	3.28	2.86	0.32	2.88	3.10	0.16	5.49	8

Table 12

PRECISION TEST FOR ASHING

SAMPLE NO. 202

C & H_2O	7.67	7.98	7.38	0.60	7.46	7.87	0.22	2.81	5

SAMPLE NO. 441

C & H_2O	8.09	8.6	7.89	0.71	7.82	8.37	0.29	3.58	5

SAMPLE NO. 533

C & H_2O	4.63	4.79	4.5	.29	4.52	4.75	0.12	2.54	5

SAMPLE NO. 827

C & H_2O	4.36	4.54	4.19	0.35	4.23	4.50	0.15	3.37	5

Atomic Absorption Analysis

The concentrations of Mg, Ba, Co, Li, V and Ni were determined by Atomic Absorption Analysis. The technique used for sample preparation and analysis were adapted from the Atomic Absorption Newsletter, as well as from information in Angino and Billings (1967).

The results of the tests for the precision of the atomic absorption analysis are given in Tables 13 and 14. Four replicates of eight different samples were used in the test.

Appendix 1 lists the results obtained from atomic absorption analysis for Mg, Ga, Co, Li, V and Ni. The values are reported in parts per million. The method used under X-ray fluorescence can be used to convert these values to oxide percent.

Table 13

ATOMIC ABSORPTION INSTRUMENTAL PRECISION

SAMPLE NO. 243

ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
Mg	.431	.446	.418	.028	.417	.445	0.01	2.67	4
Ba	830.	860.	800.	60.	800.	860.	25.82	3.11	4
Ni	89.	94.	84.	10.	83.	94.	4.43	5.01	4
Co	45.	46.	44.	2.	44.	46.	1.15	2.57	4
V	160.	160.	160.	0.	160.	160.	0.00	0.00	4
Li	12.	11.	12.	1.	11.	12.	.5	4.26	4

SAMPLE NO. 404

ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
Mg	1.15	1.136	1.052	.084	1.03	1.27	0.10	8.88	4
Ba	640.	740.	580.	160.	556.	724.	71.18	11.12	4
Ni	109.	112.	106.	6.	106.	112.	2.58	2.37	4
Co	41.	44.	36.	8.	37.	45.	3.42	8.43	4
V	255.	260.	240.	20.	243.	267.	10.0	3.92	4
Li	23.	22.	24.	2.	21.	24.	1.00	4.44	4

SAMPLE NO. 586

ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
Mg	.785	.872	.718	.154	.707	.862	0.07	8.37	4
Ba	640.	680.	580.	100.	589.	691.	43.20	6.75	4
Ni	157.	168.	140.	28.	141.	172.	13.10	8.37	4
Co	94.	96.	90.	6.	91.	97.	2.83	3.01	4
V	115.	120.	100.	20.	103.	127.	10.0	8.70	4
Li	16.	17.	16.	1.	16.	17.	0.50	3.08	4

SAMPLE NO. 202

ELEMENT	$\overline{X}$	MAX.	MIN.	RANGE	L.B.	U.B.	S	C.V. %	NO. OF ANALYSIS
Mg	.728	.774	.692	.082	.687	.768	0.03	4.69	4
Ba	600.	620.	580.	40.	581.	619.	16.33	2.72	4
Ni	40.	36.	46.	10.	34.	45.	4.43	11.23	4
Co	54.	56.	52.	4.	51.	56.	1.91	3.58	4
V	115.	120.	100.	20.	103.	127.	10.0	8.70	4
Li	16.	17.	16.	1.	16.	17.	0.50	3.08	4

Table 14

ATOMIC ABSORPTION INSTRUMENTAL PRECISION (CONT.)

SAMPLE NO. 441

ELEMENT									
Mg	.982	1.026	.958	.068	.946	1.017	0.03	3.08	4
Ba	560.	580.	540.	40.	541.	579.	16.33	2.91	4
Ni	64.	62.	66.	4.	61.	66.	1.91	3.02	4
Co	58.	58.	58.	0.	58.	58.	0.00	0.00	4
V	170.	180.	160.	20.	156.	184.	11.55	6.79	4
Li	27.	28.	27.	1.	27.	28.	0.50	1.83	4

SAMPLE NO. 533

Mg	0.93	1.386	.708	.878	.559	1.30	0.93	33.86	4
Ba	745.	860.	620.	240.	611.	879.	113.58	15.24	4
Ni	54.	56.	50.	6.	51.	57.	2.83	5.24	4
Co	51.	54.	48.	6.	47.	54.	3.00	5.94	4
V	105.	120.	100.	20.	93.	117.	10.00	9.52	4
Li	15.	15.	14.	1.	14.	15.	0.50	3.39	4

SAMPLE NO. 827

Mg	.698	.714	.678	.036	.680	.715	0.02	2.15	4
Ba	490.	500.	480.	20.	476.	504.	11.55	2.36	4
Ni	34.	36.	32.	4.	32.	36.	1.63	4.80	4
Co	42.	42.	42.	0.	42.	42.	0.00	0.00	4
V	175.	180.	160.	20.	163.	187.	10.00	5.71	4
Li	10.	10.	9.	1.	9.	10.	0.50	5.13	4

SAMPLE NO. 838

Mg	1.43	1.680	1.224	.456	1.20	1.65	0.19	13.26	4
Ba	780.	840.	740.	100.	722.	838.	48.99	6.28	4
Ni	69.	72.	64.	8.	65.	73.	3.42	4.99	4
Co	45.	50.	40.	10.	39.	51.	4.76	10.58	4
V	245.	260.	240.	20.	233.	257.	10.00	4.08	4
Li	17.	17.	16.	1.	16.	17.	0.50	2.99	4

CHAPTER III: DATA ANALYSIS

DISCRIMINANT-FUNCTION ANALYSIS

Introduction

Many problems in geology are concerned with classification. One approach to handling such problems is the "best" linear function of the form:

$$Y = C + a_1X_1 + a_2X_2 + . . . + a_i \cdot X_n$$

C = constant

a_i = discriminant coefficient for variable i

X_n = element concentrations

which can be used to separate categories of individuals. Rao (1952) and Anderson (1958) give good accounts of the theory behind the method. Miller and Kahn (1962), Klovan and Billings (1967) and Krumbein and Graybill (1965) summarize some geologic applications of discriminant-functions.

Qualitative Example

Before entering into the specific problem involved, a brief explanation of the method is in order. Consider a study by Campbell and Lerbekmo (1963), in which the concentrations of a number of major oxide and trace elements were determined. Their study involved shales from the marine Wapiabi Formation (I in Fig. 6a,b, and c) and the continental Belly River Group (II in Fig. 6a b and c). The frequency distributions of CaO and Sr concentrations (Campbell and Lerbekmo, 1963, p. 22, Fig. 7, and p. 224, Fig. 8) are considered in the example. Both the oxide and the element concentrations appear to be normally distributed. On

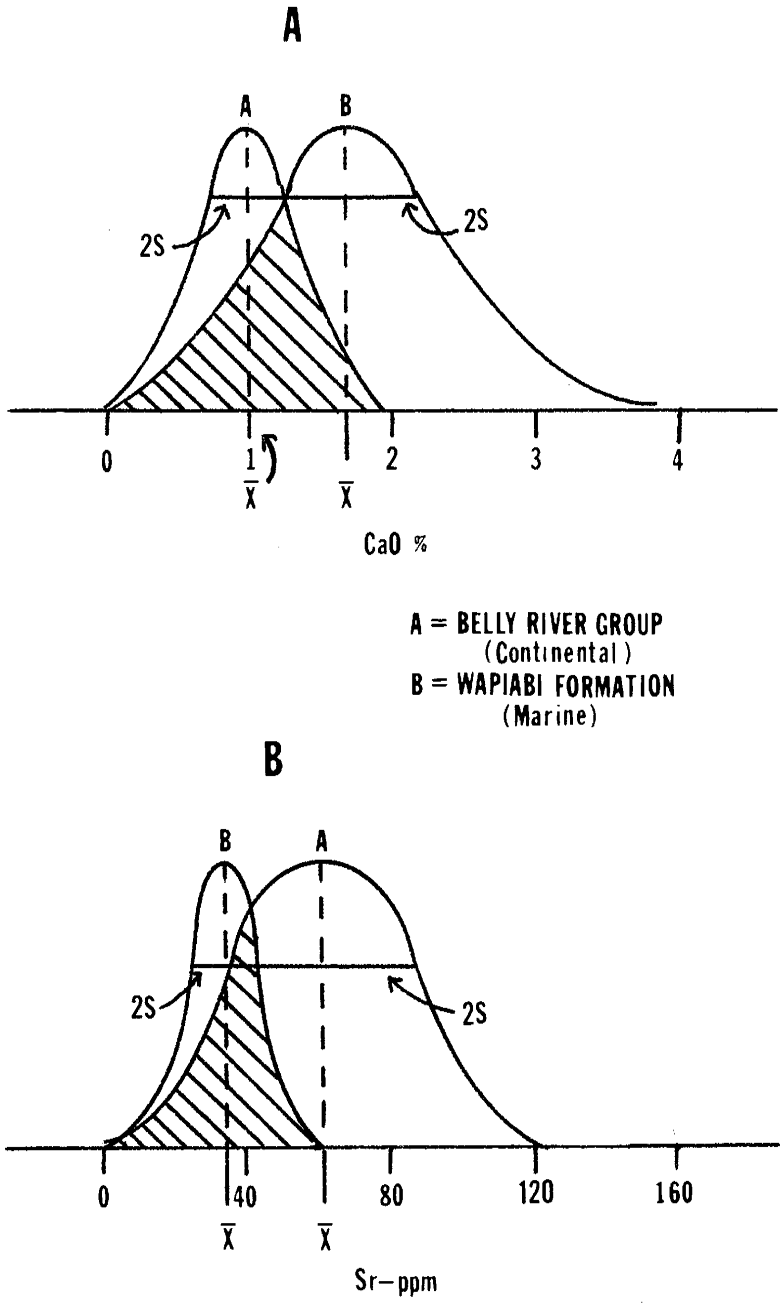

Figure 6. A: Frequency distribution of CaO %

B: Frequency distribution of Sr ppm.

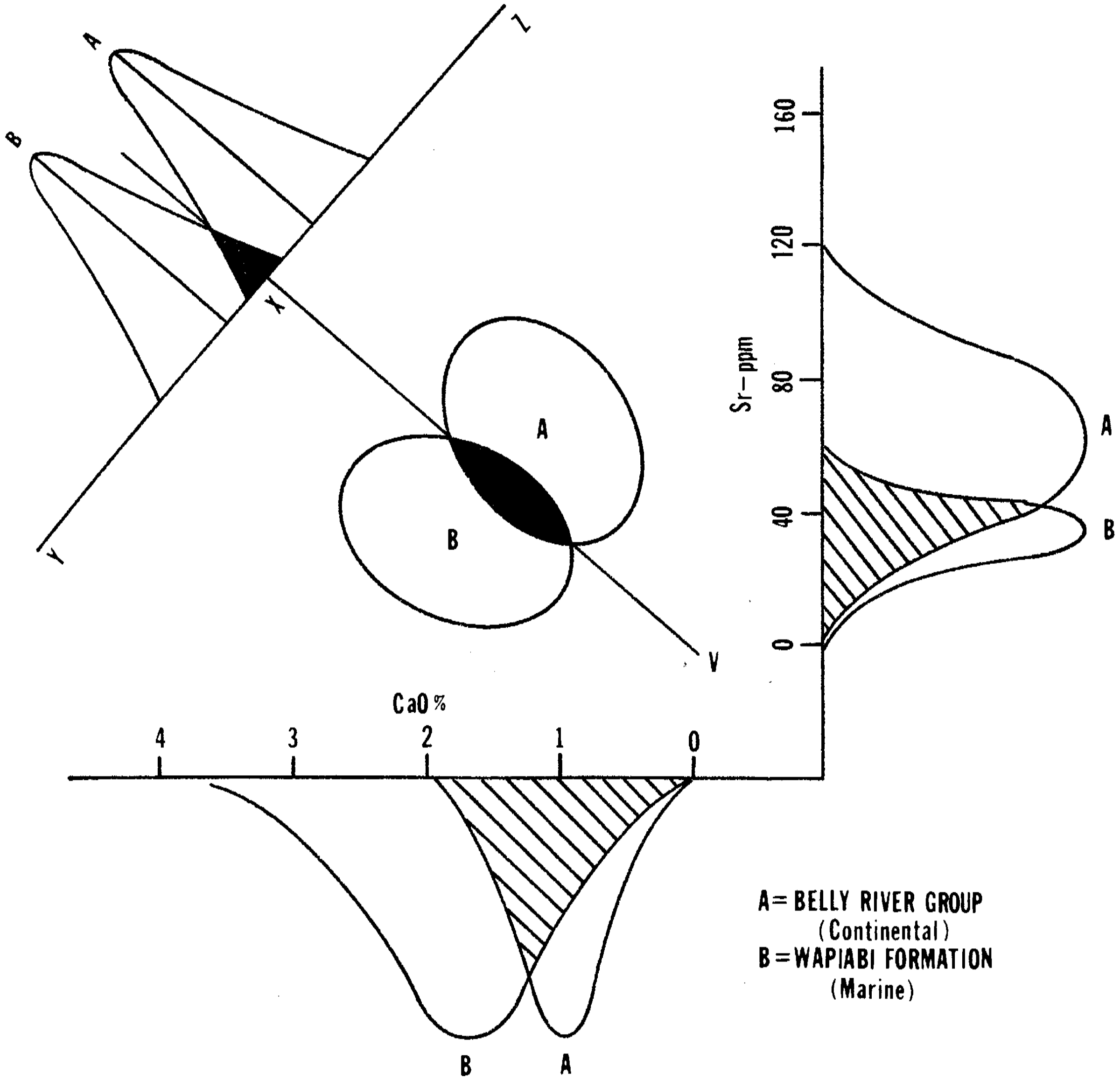

Figure 7. Bivariate plate with frequency contours and location of discriminant-functions.

examination of the frequency distributions (Fig. 6a and b), note that CaO appears to be more abundant, and Sr less abundant, in marine shales compared to continental shales. But considerable overlap exists between the frequency distribution of the concentrations in both cases. A classification scheme based on the abundance of a single oxide or element into one environment or another is tenuous at best.

If the oxide and element concentrations are assumed to be normally distributed, a series of ellipses within each group (Fig. 7) can be drawn. The ellipses represent contour values for the density of the items enclosed within them. A line can now be drawn through the intersection of the ellipses which have equal contour values (Line VX, Fig. 7). The two groups have now in fact, been separated in the "best" possible way. A second line (Line YXZ, Fig. 7) can be drawn perpendicular to VX. If all the points on the graph are projected on this line, they will show less overlap than along any other line on the graph. The line YXZ, does in fact represent two discriminant-functions of the form:

$$Y_1 = C_1 + a_{11} x_1 + a_{12} x_2$$

$$Y_2 = C_2 + a_{21} x_1 + a_{22} x_2$$

C = constant

a_{ij} = discriminant coefficient for variable j, in function i

x_1 = Sr concentration

x_2 = CaO concentrations.

That portion of the line YXZ (Fig. 7) between Z and X is represented by Y_1, and Y_2 represents that segment of the line between Y and X.

The two functions Y_1 and Y_2 could now be used to classify an individual sample into the marine and continental groups, based on the two variables Sr and CaO. By substituting in sample values for Sr (x_1) and CaO (x_2), and evaluating the equations, the resulting values could be compared. If $Y_1 \geqslant Y_2$, the sample would be classified as marine. However, if $Y_2 > Y_1$, the sample would be classified as continental.

In this example, only two variables from two different populations were considered in order to facilitate visualization of the method. The example could be expanded to include more variables from the population, because the solution for the discriminant-function is similar in n-dimensional space as in two-dimensional space.

The Assumption of Normality

In trace and major element studies, the discriminant-function has the disadvantage of being a parametric technique. Thus, for the purpose of testing, it is assumed that the elements have a normal distribution. Much has been written in recent years, concerning this question. The main issue is whether elements are normally distributed, or if they have a special distribution function, and what its exact form is. Ahrens (1954), Miller and Goldberg (1955), Tennat and White (1959), and Vistelius (1960) use empirical data to test the form of the distribution. Their data suggests some elements, such as Na, might be normally distributed, but other elements, such as Cu, may be lognormally distributed. Shaw (1961) developed theoretical distributions, and concluded that no single distribution suited all elements.

Most workers agree that a normal distribution is appropriate for the major elements, but there is less agreement for trace elements.

Potter et al. (1963) found that in applying their original trace element data, and logarithmically transformed data to discriminant analysis, there was no major difference in the results.

When considering the problem of element distribution, one should make a distinction between the two concepts of normality that enter here. First, there is the question of how elements are distributed areally. However this question is distinct from the one which asks about the normality of observed measurements in a particular locality or, put another way, the normality of the data being used in the discriminant analysis. In the case in question, element concentrations are calculated using the mean value from a number of independent observations (for example using X-ray analysis, the concentration of an element is calculated from seven separate nonsequential observations on a sample).

The assumption that the variables are normally distributed can be justified by use of the central limit theorem. The theorem can be stated as follows: (Larson, 1968, p. 187). X_1, X_2, X_3, ... is a sequence of independent identically distributed, random variables, each with mean μ and variance σ^2. Define the sequence of random variables Z_1, Z_2, Z, . . . by

$$Zn = \frac{\overline{X}_n - \mu}{\sigma/\sqrt{n}} \qquad n = 1, 2, 3, \ldots$$

Where

$$\overline{X}_n = \frac{1}{n} \sum_{i=1}^{n} X_i .$$

Then, for all real t,

$$\lim_{n \to \infty} F_{Z_n} (t) = N_Z (t)$$

where N_Z is the standard normal distribution function.

Referring to the theorem, then $X_1, X_2, X_3, \ldots X_n$ (concentration of an element) are independent because:

$$P(X_1 = a_1, X_2 = a_2, \ldots, X_n = a_n) = P(X_1 = a_1)\, P(X_2 = a_2) \ldots P(X_n = a_n)$$

for all values of $(a_1, a_2, \ldots a_n)$. The concentration is then calculated

$$\bar{X}_n = \frac{1}{n} \sum_{i=1}^{n} x_i$$

where n equals the number of observations on a sample for the element in question. Even if the observations are taken sequentially, and are therefore correlated, the central limit theorem can be used to justify a normal approximation. Therefore, for a large sample size, use of the normal distribution is justified. A similar result can be used to justify a multivariate normal distribution.

Test of Significance

Under the assumptions that the original measurements have a multivariate normal distribution within the populations from which the samples were drawn, and that the variance-covariance matrices are equal for the populations, there are a number of tests which can be performed. The Mahalanobis D^2 statistics can be used to test if there is a significant difference between the mean discriminant-function scores. The D^2 statistics is defined as:

$D^2 = d'C^{-1}d$

$d' = d$ = vector of mean differences

C^{-1} = inverse of the within-groups variance-covariance matrix.

Under the above assumptions, the D^2 statistic is related to the F distribution by:

$$F = \frac{n_1 n_2 \ (n_1 + n_2 \ - p - 1)}{p(n_1 + n_2)(n_1 + n_2 - 2)} \ D^2$$

Where

n_1 and n_2 = sample sizes

p = number of variables

The F statistic can be read from probability tables for $F\ (p,\ n_1 + n_2 - p - 1)$ degrees of freedom, to test whether there is a significant difference between the two groups. If the calculated value is greater than the tabulated F value, a significant difference exists.

Elimination of Inefficient Variables

In practice, the elimination of unneeded variables is very desirable. The goal of the study is to be able to classify individuals based on the smallest number of effective variables. The presence of ineffective variables not only increases the amount of analytical work, but also weakens the power of discriminant-functions.

The D^2 statistic can also be used to test whether certain variables can be eliminated from the discriminant-functions, without any significant loss in the power of the functions. The test statistic used, Rao (1952) is:

$$F = \frac{n_1 + n_2 - 1}{p - q} \cdot \frac{n_1 n_2 (D_p^2 - D_q^2)}{(n_1 + n_2)(n_1 + n_2 - 2) + n_1 \ n_2 \ D^2{}_q}$$

where

n_1 and n_2 = sample size

p = original number of variables

q = number of variables after elimination

$D_p^2 = d' \; C^{-1} d$ for original groups

$D_q^2 = d' \; C^{-1} d$ for groups after elimination.

The F statistic can then be read from probability tables for $F\,(p - q,\, n_1 + n_2 - p - 1)$ degrees of freedom. If the calculated value is less than the tabulated F value, no loss in the power of the discriminant-functions results from the elimination of variables.

Another method of selecting which variables to eliminate is based on the size of the coefficient of variation which gives some idea of the ease and precision with which elements can be analyzed. The coefficients of the discriminant-functions do not show the relative importance of the variables, and hence are not directly useful in making this choice.

<u>Use of Discriminant-Functions</u>

The form of the discriminant-functions used in this study is:

$$Y = C + a_1 X_2 + a_1 \; X_2 + \; . \; . \; . \; + a \cdot X_n \quad .$$

A function of this form is calculated for each group. When using this method of analysis to separate two groups, the cutting point X (Fig. 7), can be found by:

Cutting Point $= C_1 - C_2$

C_1 and C_2 = constants.

To classify an unknown sample, into one of the two groups, compute:

$$\overline{Y}_{1n} = C_1 + a_{11} X_1 + a_{12} X_2 + \ldots + a_{1n} X_n$$

and

$$\overline{Y}_{2n} = C_2 + a_{21} X_1 + a_{22} X_2 + \ldots + a_{2n} X_n$$

for the sample. The $X_1, X_2, X_3, \ldots, X_n$ are the observed values of the element concentrations on the unknown sample and C_1 and C_2 are constants. The sample is classified as belonging to population one if $\overline{Y}_n$ is closer to $\overline{Y}_{1n}$, and from population two if the reverse is true. That is:

$$V = \overline{Y}_n - \frac{(\overline{Y}_{1n} - \overline{Y}_{2n})}{2}$$

is computed and the sample is classified as belonging to group one if $V > 0$, and to group two if $V \leq 0$. Anderson (1958) shows than as $n_1 \to \infty$, and $n_2 \to \infty$, the distribution of V tends to be normal $(\alpha/2,\alpha)$ or $(-\alpha/2,\alpha)$ depending on whether the sample belongs to group one or two, and the difference, V, may be estimated by:

$$D^2 = d' C^{-1} d = \overline{Y}_{1n} - \overline{Y}_{2n} .$$

Therefore, for large n_1 and n_2, the approximate probability of misclassifying a sample can be calculated by:

$1 - F_Z(D/2)$ (Where $F_Z(D/2)$ indicates the normal distribution function at D/2)

In order to classify a formation as belonging to group one or two, the following procedure can be used (Anderson, 1958):

$$\overline{Y}_{sn} = \sum_{i=1}^{n} a_i \overline{Y}_{si}$$

and

$$\overline{V} = \overline{Y}_{sn} - \frac{(\overline{Y}_{1n} + Y_{2n})}{2}$$

where $\overline{Y}_{si}$ is the average of the Y_i's of the samples. The formation is classified as belonging to group one, if $\overline{V} > 0$, and group two if $\overline{V} \leq 0$.

APPLICATION TO THE PROBLEM

Basis for Discriminant-Model

Wall et al. (1971) studied the paleoecology of the 57 samples from the Strathmore core, between 1350 ft. to 1760 ft. On the basis of foraminiferal and megaspore evidence, they classify portions of this section of the core as being either continental, brackish or marine. In formulating the discriminant model, those samples of the core for which the depositional environment is known, based on the following paleoecological evidence, were used as standards.

Continental:	20 samples (Table 20)	
Evidence:	Abundant megaspores and lack of formaminifera.	
Megaspores:	*Azolla spp.*	*Azolla conspicua*
	Molaspora	*Azollopsis*
	Balmeisporites	*Erlansonisporites*
	Minerisporites	*Bacutriletes*
	Spermatites-Costatheca types	
Brackish:	63 samples (Table 21)	
Evidence:	Exclusively agglutinated foraminiferal fauna and a reduced megaspore population.	

Foraminifera: <u>Miliammina</u>

<u>Trochammina</u>

<u>Verneuilinoides</u>

Marine: 25 samples (Table 22)

Evidence: Varied foraminiferal fauna, with the agglutinated element superior in both species diversity and total population. Reduction in the total megaspore numbers with complete disappearance at maximum transgression.

A total of 108 samples fulfilled these criteria and were used to set the model. A two-step approach was used to facilitate statistical testing. In the first step, the groups marine vs. continental-brackish were separated. Then in the second step, the composite group (continental-brackish) was separated into a continental group and a brackish group. Therefore, the final model consists of the groups: continental, brackish and marine. A three-way discriminant analysis was also tried, but the pairwise approach proved to be more effective. The discriminant analysis was carried out on an IBM 360/40 computer, using the program described in System/360 Scientific Subroutine Package (1968).

Discrimination Between Samples of Known Depositional Environment

Marine vs. Continental-Brackish Using All Variables

In applying discriminant-function analysis, it is assumed that there is a common covariance matrix for the groups of data, and that the means of the elements within the groups vary. To obtain the common covariance matrix, the covariance matrices of the groups were pooled.

All 24 variables were used, initially, to classify (the classifications are given in appendix 2) the samples into established groups (Marine vs.

Continental-Brackish). The discriminant-functions obtained (using all 24 variables) are given in Table 24. The constant is given first, followed by the discriminant coefficients. To use the functions for classification, the values of X_1, X_2, . . . X_n (element concentrations) are substituted into the equations and solved. Based on the calculated value, the known sample is then classified as being either marine or continental-brackish origin.

A test of the significance of the functions was then performed using the D^2 value given in Table 15. The results of the test, given in Table 16, indicate that at the .999 significance level, the two populations can be separated using all 24 variables.

Tables 17, 18 and 19 give the depth and classification of the samples used as standards, based on paleontological evidence. The tables also give the sample classifications based on the discriminant-functions. Using the classification model, only 9.25% of the samples were misclassified.

Continental vs. Brackish Using All Variables

Once it was established that it was possible to separate the Marine vs. Continental-Brackish groups, a second step was taken. The group Continental-Brackish was divided into a continental group and a brackish group. The discriminant-functions obtained (using all 24 variables) are given in Table 20 and the classifications are given in Appendix 3.

The D^2 value (Table 20) was then used to test the significance of the functions. Results of the test are given in Table 16. The test indicates that at the .999 significance level, the two groups can be separated using all 24 variables.

The depth and classification of the samples used as standards is given in Table 17 and 18. Only 2.4% of the samples were misclassified using this model.

Table 15

DISCRIMINANT-FUNCTION 24 VARIABLES

	GROUP		GROUP	
	CONTINENTAL-BRACKISH		MARINE	
	Y_1		Y_2	
	C_1 = 672.12109375		C_2 = 655.823486328	
ELEMENT CONCENTRATION	COEFFICIENTS		COEFFICIENTS	
X_1 = Si	a_{11}	.002302214	a_{21}	.002271105
X_2 = Al	a_{12}	.003894767	a_{22}	.003866632
X_3 = Fe	a_{13}	.001746652	a_{23}	.001748435
X_4 = Mg	a_{14}	-.00099485	a_{23}	.000912193
X_5 = Ca	a_{15}	.003474343	a_{25}	.00343548
X_6 = Na	a_{16}	-.000355249	a_{26}	-.000346826
X_7 = K	a_{17}	.001326057	a_{27}	.00116819
X_8 = Ti	a_{18}	.009732164	a_{28}	.009451542
X_9 = Mn	a_{19}	.031533159	a_{29}	.034335159
X_{10} = Ba	a_{110}	-.001753531	a_{210}	-.006129816
X_{11} = Co	a_{111}	.228197813	a_{211}	-.117014527
X_{12} = Cu	a_{112}	.696543355	a_{212}	-.83538568

Table 15 (CONT.)

DISCRIMINANT-FUNCTION 24 VARIABLES

ELEMENT CONCENTRATION	GROUP CONTINENTAL-BRACKISH Y COEFFICIENTS		GROUP MARINE Y COEFFICIENTS	
X_{13} = Ga	a_{113}	-2.655446053	a_{213}	-2.722186089
X_{14} = Li	a_{114}	-2.243256569	a_{214}	2.798372269
X_{15} = Mo	a_{115}	-.197466195	a_{215}	.4448874
X_{16} = Pb	a_{116}	.588289559	a_{216}	.584162354
X_{17} = Rb	a_{117}	-.154583931	a_{217}	-.155018508
X_{18} = S	a_{118}	-.002759227	a_{218}	-.00339602
X_{19} = Sr	a_{119}	.705316424	a_{219}	.667390287
X_{20} = C and H_2O	a_{120}	.000884702	a_{220}	.000819143
X_{21} = Zn	a_{121}	-.01688176	a_{221}	-.004104771
X_{22} = Zr	a_{122}	.041593067	a_{222}	.058920398
X_{23} = V	a_{123}	.20898813	a_{223}	.213495553
X_{24} = Ni	a_{124}	0.052475989	a_{224}	-.056538284

$D^2 = 148.7272$

Table 16

TEST OF SIGNIFICANCE OF DISCRIMINANT-FUNCTIONS

GROUP	NO. OF VARIABLES	D^2	COMPUTED F	TABULATED F
Continental-Brackish vs. Marine	24	148.7272	93.22	$F_{(24,83)} = 2.58$
Continental vs. Brackish	24	233.2939	104.37	$F_{(24,58)} = 2.72$
Continental-Brackish vs. Marine	12	122.7419	176.12	$F_{(12,83)} = 3.20$
Continental vs. Brackish	16	161.3536	124.74	$F_{(16,58)} = 3.06$

Table 17

Samples used as Standards
Number of Samples: 20

Environment: Continental (Wall, et al. 1971)

Sample No.	Depth	Classification from Model
374	1351' - 1352.5'	Continental
375	1352.5'- 1355'	Continental
376	1355' - 1360'	Continental
378	1360.2'- 1364'	Continental
379	1364' - 1368'	Continental
381	1370' - 1371.7'	Continental
382	1371.7'- 1372.7'	Continental
383	1372.7'- 1376'	Continental
387	1386' - 1386.5'	Continental
388	1386.5'- 1392.5'	Continental
389	1392.5'- 1393.5'	Continental
390	1393.5'- 1398.5'	Continental
391	1398.5'- 1402'	Continental
393	1410' - 1412'	Continental
394	1412' - 1418'	Continental
395	1418' - 1425'	Continental
396	1425' - 1430.5'	Continental
397	1430.5'- 1437'	Continental
412	1492' - 1496.5'	Continental
413	1496.5'- 1499'	Continental

Table 18

Samples used as Standards
Number of samples: 63

Environment: Brackish (Wall, et al. 1971)

Sample No.	Depth	Classification from Model
402	1456.5' - 1461.5'	Brackish
403	1461.5' - 1466.5'	Continental
404	1466.5' - 1471.5'	Brackish
405	1471.5' - 1477.5'	Brackish
406	1477.5' - 1483'	Brackish
407	1483' - 1483.5'	Brackish
408	1483.5' - 1489'	Brackish
409	1489' - 1491.5'	Brackish
410	1491.5' - 1492'	Brackish
411	1492' - 1496.5'	Brackish
414	1505.5' - 1506'	Brackish
415	1506' - 1511'	Brackish
416	1511' - 1514'	Brackish
417	1514' - 1515'	Brackish
418	1515' - 1519'	Brackish
420	1520' - 1529'	Brackish
421	1529' - 1536'	Brackish
422	1536' - 1537.5'	Brackish
423	1537.5' - 1539.5'	Brackish
424	1539.5' - 1540'	Brackish
425	1540' - 1545.5'	Brackish
426	1545.5' - 1551'	Brackish
427	1551' - 1553'	Brackish
428	1553' - 1555'	Brackish
429	1555' - 1560'	Brackish
430	1560' - 1562.5'	Brackish
431	1562.5' - 1563'	Brackish
433	1564' - 1566'	Brackish
434	1566' - 1569'	Brackish
435	1569' - 1570.5'	Brackish
436	1570.5' - 1571'	Brackish
437	1571' - 1572.5'	Brackish
439	1572.5' - 1573.5'	Brackish

Table 18 (CONT.)

Environment: Brackish (Wall, et al. 1971)

Sample No.	Depth	Classification from Model
444	1595' - 1597.5'	Brackish
445	1597.5' - 1600.5'	Brackish
447	1601' - 1601.2'	Brackish
448	1601.2' - 1605'	Brackish
449	1605' - 1608.5'	Brackish
451	1611.5' - 1613'	Brackish
452	1613' - 1614'	Brackish
454	1614.2' - 1614.5'	Brackish
456	1617.5' - 1617.6'	Brackish
458	1622.5' - 1623'	Continental
459	1623' - 1624'	Brackish
462	1625.7' - 1628'	Brackish
464	1631' - 1633.5'	Brackish
465	1633.5' - 1638.5'	Brackish
466	1638.5' - 1640'	Brackish
485	1702' - 1705'	Brackish
486	1705' - 1707'	Brackish
487	1707' - 1711'	Brackish
488	1711' - 1715.5'	Brackish
490	1716' - 1721'	Brackish
491	1721' - 1725.5'	Brackish
492	1725.5' - 1728'	Brackish
493	1728' - 1730'	Brackish
494	1730' - 1735'	Brackish
495	1735' - 1736'	Brackish
496	1736' - 1736.2'	Brackish
497	1736.2' - 1739.5'	Brackish
498	1739.5' - 1743'	Brackish
499	1743' - 1750.5'	Brackish
500	1750.5' - 1751.5'	Brackish

Table 19

Samples used as Standards
Number of Samples: 25

Environment: Marine (Wall, et al. 1971)

Sample No.	Depth	Classification from Model
398	1437' - 1441.5'	Continental
399	1441.5' - 1442'	Marine
400	1442' - 1450'	Marine
401	1450' - 1456'	Marine
440	1577.5' - 1582'	Marine
441	1582' - 1585.5'	Brackish
442	1585.5' - 1590.5'	Marine
443	1590.5' - 1595'	Marine
468	1641' - 1647'	Marine
469	1647' - 1652'	Marine
470	1652' - 1657'	Marine
471	1657' - 1662'	Marine
472	1662' - 1666'	Marine
473	1666' - 1668'	Continental
474	1668' - 1672'	Marine
475	1672' - 1677'	Marine
476	1677' - 1683'	Marine
477	1683' - 1684'	Marine
478	1684' - 1688'	Marine
479	1688' - 1689'	Marine
480	1689' - 1693'	Marine
481	1693' - 1694'	Marine
482	1694' - 1697'	Marine
483	1697' - 1698'	Marine
484	1698' - 1702'	Marine

Table 20

DISCRIMINANT-FUNCTION 24 VARIABLES

		GROUP CONTINENTAL Y_1 $C_1 = -663.8369140625$		GROUP BRACKISH Y_2 $C_2 = -642.0764160156$
ELEMENT CONCENTRATION		COEFFICIENTS		COEFFICIENTS
X_1 = Si	a_{11}	.001965966	a_{21}	.00190019
X_2 = Al	a_{12}	.005069651	a_{22}	.00497276
X_3 = Fe	a_{13}	.00623142	a_{23}	.000759674
X_4 = Mg	a_{14}	-.000061675	a_{24}	-.000585826
X_5 = Ca	a_{15}	.003445059	a_{25}	.003435484
X_6 = Na	a_{16}	-.000779842	a_{26}	-.000576482
X_7 = K	a_{17}	-.000536586	a_{27}	.000025592
X_8 = Ti	a_{18}	.011025891	a_{28}	.010647856
X_9 = Mn	a_{19}	.065531731	a_{29}	.065516114
X_{10} = Ba	a_{110}	.023381993	a_{210}	.024494164
X_{11} = Co	a_{111}	-1.435041428	a_{211}	-1.177947998
X_{12} = Cu	a_{112}	-.745163262	a_{212}	-.711669028

Table 20 (CONT.)

DISCRIMINANT-FUNCTION 24 VARIABLES

ELEMENT CONCENTRATION	GROUP CONTINENTAL Y_1 COEFFICIENTS		GROUP BRACKISH Y_2 COEFFICIENTS	
X_{213} = Ga	a_{113}	-2.457188606	a_{213}	-2.512981878
X_{214} = Li	a_{114}	4.810051918	a_{214}	4.54336319
X_{215} = Mo	a_{115}	-.248349905	a_{215}	.307203293
X_{216} = Pb	a_{116}	.515569746	a_{216}	.489494443
X_{217} = Rb	a_{117}	-.103220463	a_{217}	-.10794884
X_{218} = X	a_{118}	-.004675575	a_{218}	-.003040926
X_{219} = Sr	a_{119}	.558767855	a_{219}	.578331649
X_{220} = C and H_2O	a_{120}	.000838356	a_{220}	.000766255
X_{221} = Zn	a_{121}	.031175487	a_{221}	.00687395
X_{222} = Zr	a_{122}	.107873261	a_{222}	.111444116
X_{223} = V	a_{123}	.228050411	a_{223}	.181617081
X_{224} = Ni	a_{124}	-.00958246	a_{224}	.012258112

$D^2 = 233.2939$

Marine vs. Continental - Brackish Using 12 Variables

The environments marine, brackish and continental can be effectively separated using discriminant-functions based on all the variables. The function used, however, may not be the most efficient. This is because some of the variables do not add to the discriminatory power of the functions. The most efficient functions would contain the smallest number of meaningful variables.

One basis (Potter, et al. 1963) for selecting a smaller number of variables is the ease and precision (size of coefficient of variation) with which the elements can be analyzed. Variables with high coefficients of variation tend to obscure the information contributed by those of low variability. Table 21 gives the coefficients of variation for the elements analyzed. The first elements eliminated were those with a coefficient of variation greater than 60%. In the second elimination variables with coefficients of variation greater than 50% were eliminated. In addition, Si and Al were also eliminated because of the abundance and variety of alumino-silicates in all three environments. Thus sixteen variables were left after the first elimination, and twelve were left after the second elimination.

Table 22 shows that 12.96% of the samples were misclassified using twelve variables. The variables used are given in Table 21.

An F test was used to test the significance of the functions. The results of the test are given in Table 16. The results indicate that the marine vs. continental-brackish groups can be effectively discriminated by using twelve variables at the .999 significance level.

Another F test was performed to determine whether the twelve variable functions are as effective as the functions based on all the variables.

Table 21

Coefficients of Variation for Analyzed Elements

ORIGINAL VARIABLES	C.V. %	SIXTEEN VARIABLES USED	TWELVE VARIABLES USED
Si	9.76		
Al	12.63		
Fe	60.33		
Mg	50.07	Mg	
Ca	91.42		
Na	57.03	Na	
K	52.19	K	
Ti	20.76	Ti	Ti
Mn	47.97	Mn	Mn
Ba	33.46	Ba	Ba
Co	30.00	Co	Co
Cu	35.48	Cu	Cu
Ga	26.08	Ga	Ga
Li	35.71	Li	Li
Mo	123.52		
Pb	100.00		
Rb	58.65	Rb	
S	160.36		
Sr	28.27	Sr	Sr
C and H_2O	48.70	C and H_2O	C and H_2O
Zn	35.16	Zn	Zn
Zr	18.43	Zr	Zr
V	40.35	V	V
Ni	69.53		

Table 22

Percent of Samples Using Discriminant-Functions

ENVIRONMENT	NO. OF VARIABLES	PERCENT MISCLASSIFIED
CONTINENTAL BRACKISH VS. MARINE	24	9.25
CONTINENTAL VS. BRACKISH	24	2.40
CONTINENTAL VS. BRACKISH	16	7.22
CONTINENTAL BRACKISH VS. MARINE	12	12.96
CONTINENTAL VS. BRACKISH	12	10.84

Results of the test are given in Table 23. Since the F test is not significant, the new discriminant-functions for the marine vs. continental-brackish group are as good as the original functions based on twenty four variables. The functions using twelve variables are given in Table 24 and the classifications are given in Appendix 4.

Continental vs. Brackish Using 16 Variables

The same procedures for the elimination of variables was used in this case, as in the previous section. Table 22 shows that 7.22% of the samples used as standards were misclassified using sixteen variables. Table 21 lists the variables used.

A test of significance was first used to test whether the environments continental vs. brackish could be separated using sixteen variables. Table 16 lists the results of the test. Since the results are not significant at the .999 level, it can be concluded that the new functions are as good as the original functions based on twenty four variables.

A second F test was also used to determine whether the sixteen variable functions were as effective as the twenty four variable functions. Table 23 lists the results of the test. From the table, note that the calculated F value is less than the tabulated F value. Therefore, the functions containing sixteen variables are as effective for separating the groups continental vs. brackish as the functions containing twenty four variables. The functions used for discriminating between the continental and brackish groups based on sixteen variables are given in Table 25 and the classifications are given in Appendix 5.

A further attempt at the elimination of variables was tried. The results of the F test at the .999 significance level, however, failed.

Test 23

Tests of significance for best discriminant-functions

Group	No. of Variables	Computed F	D^2	Tabulated F
Continental-Brackish vs. Marine	24		148.7272	
Continental vs. Brackish	24		233.2939	
Continental-Brackish vs. Marine	12	1.40	122.7419	$F(12,83) = 3.20$
Continental vs. Brackish	16	3.13	161.3536	$F(8,58) = 3.90$

Table 24

DISCRIMINANT-FUNCTION 12 VARIABLES

		GROUP		GROUP
		CONTINENTAL-BRACKISH		MARINE
		Y_1		Y_2
		$C_1 = -66.758499146$		$C_2 = -64.052871704$
ELEMENT CONCENTRATION		COEFFICIENTS		COEFFICIENTS
X_8 = Ti	a_{18}	.005764309	a_{28}	.005346049
X_9 = Mn	a_{19}	.014571335	a_{29}	.018260937
X_{10} = Ba	a_{110}	.02095557	a_{210}	.017059784
X_{11} = Co	a_{111}	.082721114	a_{211}	.164994419
X_{12} = Cu	a_{112}	-.028128639	a_{212}	-.164303243
X_{13} = Ga	a_{113}	-.03834337	a_{213}	-.140111923
X_{14} = Li	a_{114}	1.050294876	a_{214}	1.512454033
X_{19} = Sr	a_{119}	.216511965	a_{219}	.199439049
X_{20} = C and H_2O	a_{120}	.000167535	a_{220}	.000122587
X_{21} = Zn	a_{121}	-.130207002	a_{221}	-.119072437
X_{22} = Zr	a_{122}	.104708612	a_{222}	.101185918
X_{23} = V	a_{123}	.023740549	a_{223}	.027622953

$D^2 = 122.7419$

Table 25

DISCRIMINANT-FUNCTION 16 VARIABLES

ELEMENT CONCENTRATIONS	GROUP CONTINENTAL Y_1	$C_1 = -73.719589233$ COEFFICIENTS	GROUP BRACKISH Y_2	$C_2 = -79.568618774$ COEFFICIENTS
X_4 = Mg	a_{14}	.000157554	a_{24}	-.000245353
X_6 = Na	a_{16}	-.00003794	a_{26}	.000070451
X_6 = K	a_{17}	.000390766	a_{27}	.000716941
X_8 = Ti	a_{18}	.0070289	a_{28}	.006231286
X_9 = Mn	a_{19}	.003115894	a_{29}	.011671495
X_{10} = Ba	a_{110}	.026661061	a_{210}	.027534287
X_{11} = Co	a_{111}	-.282367647	a_{211}	-.028423373
X_{12} = Cu	a_{112}	.03970325	a_{212}	.043120325
X_{13} = Ga	a_{113}	-.197733819	a_{213}	.400927782
X_{14} = Li	a_{114}	1.965940475	a_{214}	1.719291687
X_{17} = Rb	a_{117}	.041430663	a_{217}	.043033693
X_{19} = Sr	a_{119}	.329023361	a_{219}	.351169348
X_{20} = C and H_2O	a_{120}	.000189272	a_{220}	.000167543
X_{21} = Zn	a_{121}	-.213716447	a_{221}	-.190811217
X_{22} = Zr	a_{122}	.029654499	a_{222}	.041280117
X_{23} = V	a_{123}	.022531826	a_{223}	-.014962699

$D^2 = 161.3536$

This indicates that the sixteen variable functions for the group continental vs. brackish and the twelve variable functions for the group continental-brackish vs. marine are the most efficient functions to use for the purpose of classification.

Further Elimination of Variables Based on Percent of Misclassification

When classifying unknown samples, the "best" results are obtained using the functions containing sixteen variables for the groups continental vs. brackish, and the functions containing twelve variables for the groups marine vs. continental-brackish. However, in an attempt to further eliminate variables, a test was formulated which considered only the percentage of misclassified samples. Table 22 gives the result of the test. Using twelve variables based on 108 samples; 12.96% of the samples are misclassified for the groups marine vs. continental-brackish. For the groups continental vs. brackish, using twelve variables based on 83 samples; 10.84% of the samples are misclassified. Even though the functions based on twelve variables are valid, they are not statistically significant at the .999 level. They could be used as a quick check for classifying unknown samples. The variables used are: Ti, Mn, Ba, Cu, Ga, Li, Sr, C plus H_2O, Zn, Zr and V.

Comparison of Paleoecologic Classification with Discriminant-Function

Figure 8 is an adaptation of the work from Wall et al. (1971) and Havard (1971). This figure checks the model against the curve for environments based on Wall's work, and the stratigraphic column based on Havard's work. The column to the right on Figure 8 includes samples used to formulate the discriminant-function plus 22 samples for which the paleoecologic evidence is not clear. Comparison of their work with the classification scheme based on discriminant-functions, shows that there

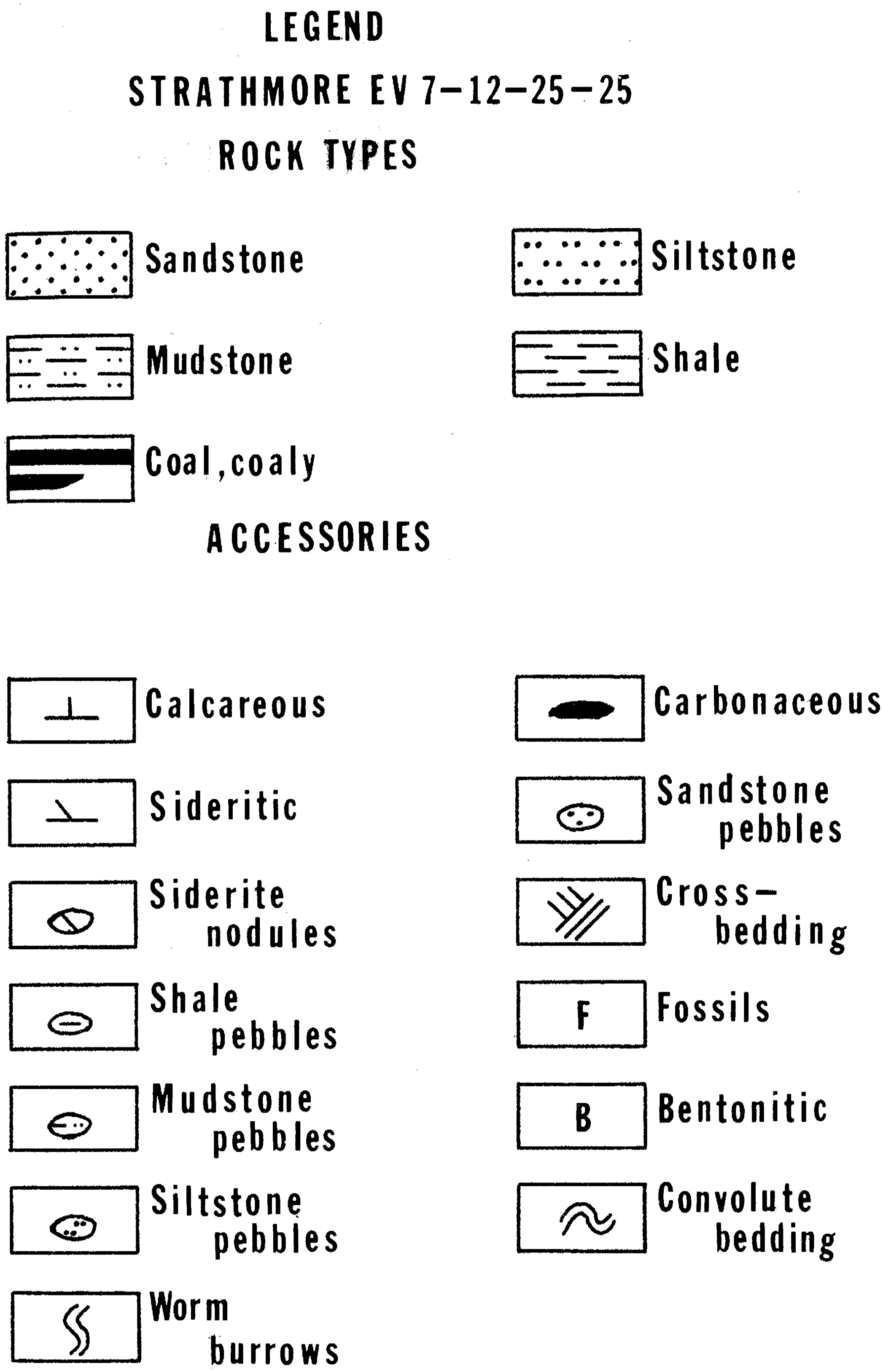

Fig. 8. Legend, CPOG Strathmore EV7-25-25W4 and comparison of paleoecologic classification with discriminant-function.

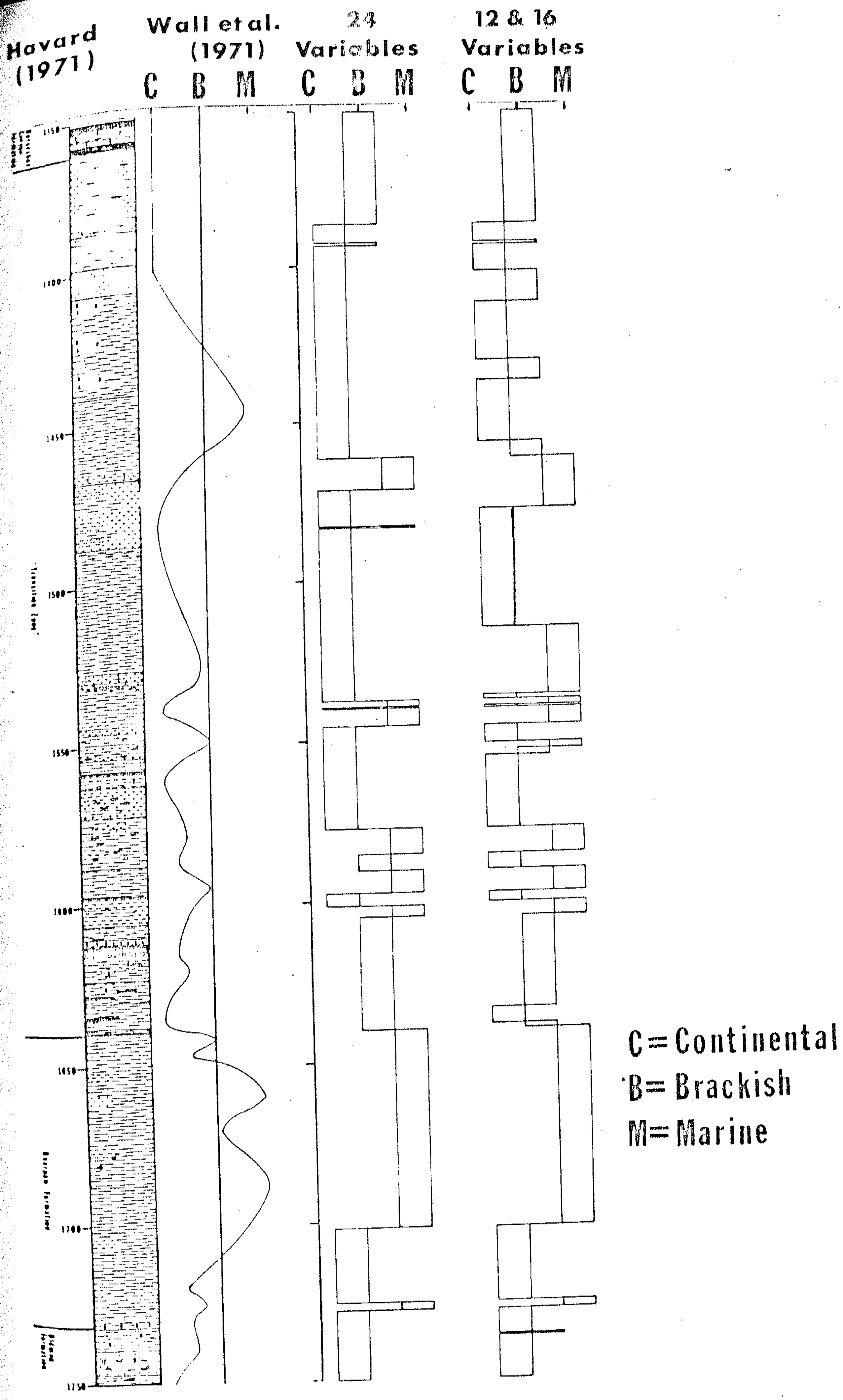
Havard (1971)
Wall et al. (1971)
24 Variables
12 & 16 Variables
C B M
C B M
C B M
1350
1400
1450
1500
1550
1600
1650
1700
1750
C=Continental
B=Brackish
M=Marine

Fig. 8 (CONT.)

is good correspondence. The only significant conflict noted is for the interval between 1425' to 1460' (Fig. 8). Wall et al. (1971) classify this interval as marine, but in this study the interval is mainly continental. With reference to Figure 8 based on the discriminant-functions, a definite marine interval is noted from 1462' to 1478'. This interval is probably correlative to the above interval. This conflict in interpretation between both studies is probably caused by either a misclassification of the samples by Wall et al. (1971) or this worker, or incorrect depths for the samples. Other problems of interpretation between this work and the work of Wall et al. (1971) could be caused by sample size. In Wall's paper 57 samples were studied, while in this work 130 samples were used for the same interval. From this figure, and statistical tests of the model, it is apparent that we can use the formulated discriminant-functions to classify the unknown portions of the core.

Discrimination Between Samples of Unknown Depositional Environment

As mentioned previously, 1940 ft. of the core were studied. The discriminant-functions were developed using selected samples from that portion of the core studied by Wall et al. (1971). Therefore, as far as environment of deposition is concerned, 1530 ft. of core can be considered as unknown.

In classifying the unknown portion of the core, a pairwise approach was still followed. First, the groups marine vs. continental-brackish were separated. Then in a second step, all samples classified as belonging to the continental-brackish group were separated into the groups continental or brackish.

The most efficient functions were used, that is, the twelve variable functions are used for the groups marine vs. continental-brackish, and the sixteen variable functions are used for the continental vs. brackish groups. The results are given in Appendix 6 and 7. Figure 9 is constructed using these classification functions and the core description given in Havard (1971). An interpretation of the depositional history for the Upper Cretaceous is given in the following chapter.

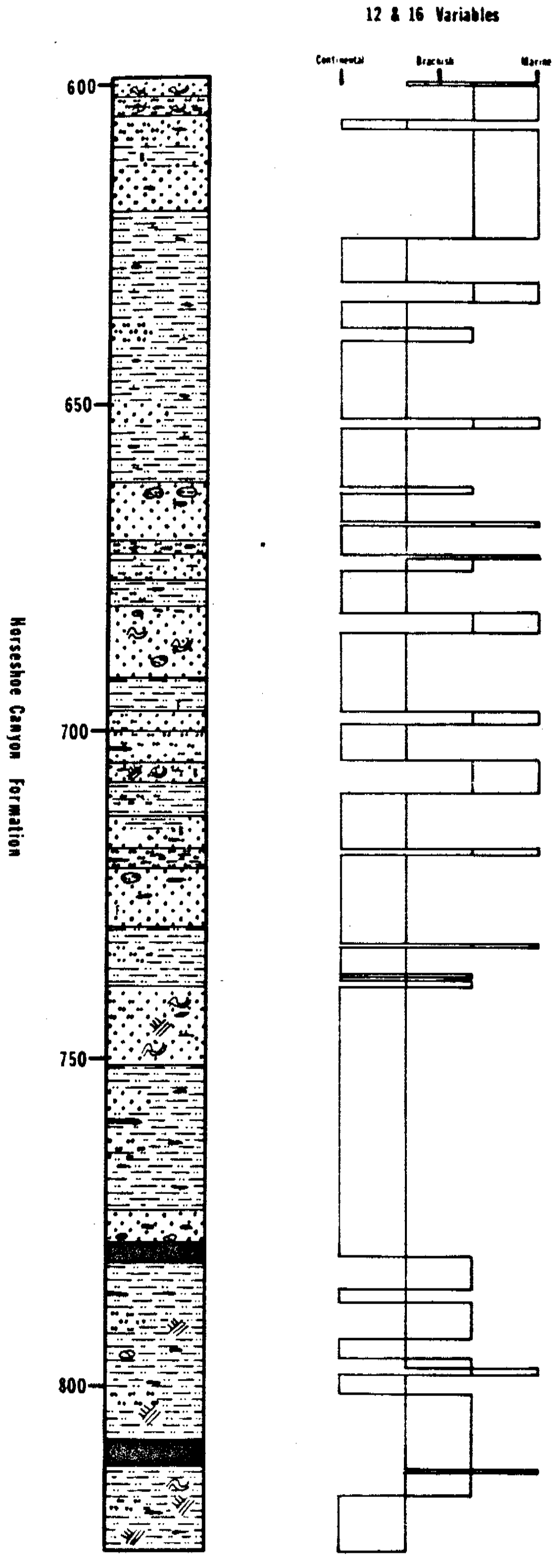

Fig. 9. Discrimination between samples of unknown depositional environment.

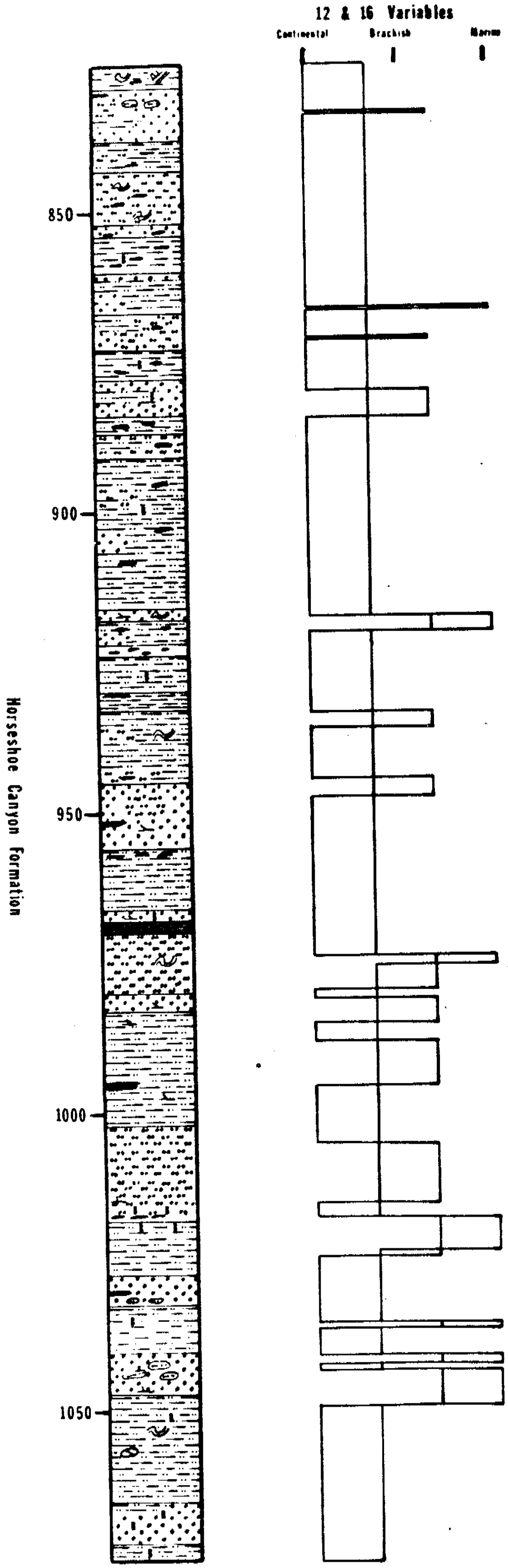

Figure 9 (CONT.)

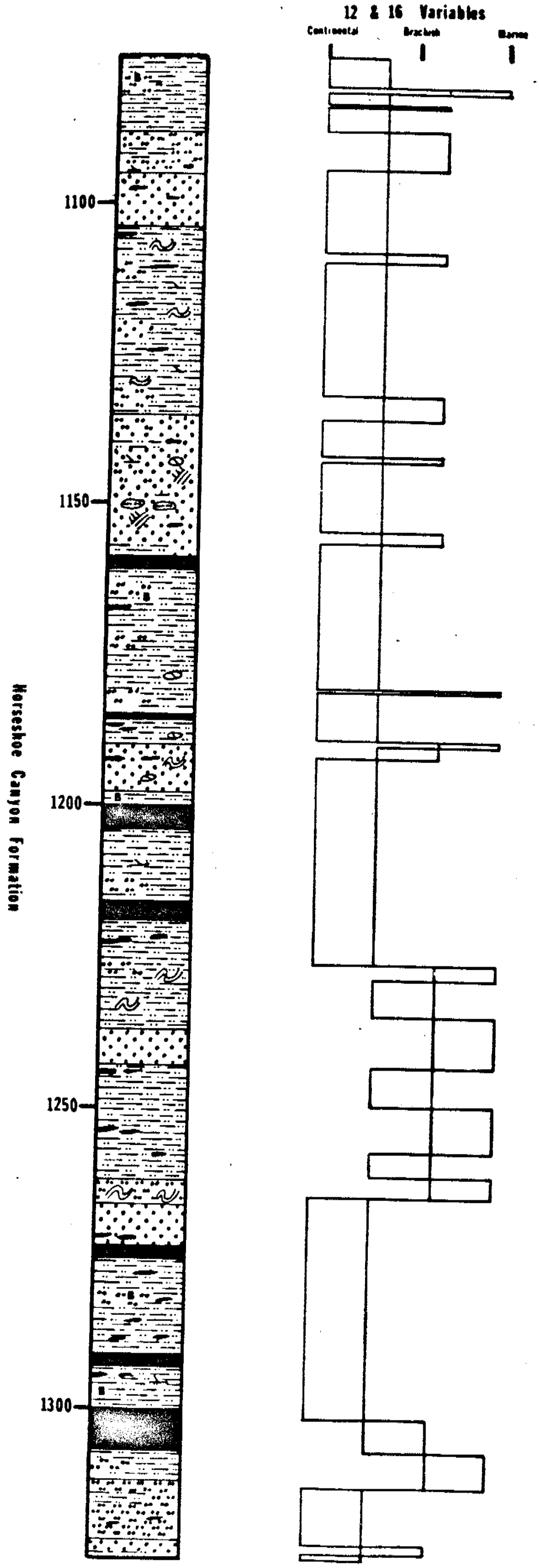

Figure 9 (CONT.)

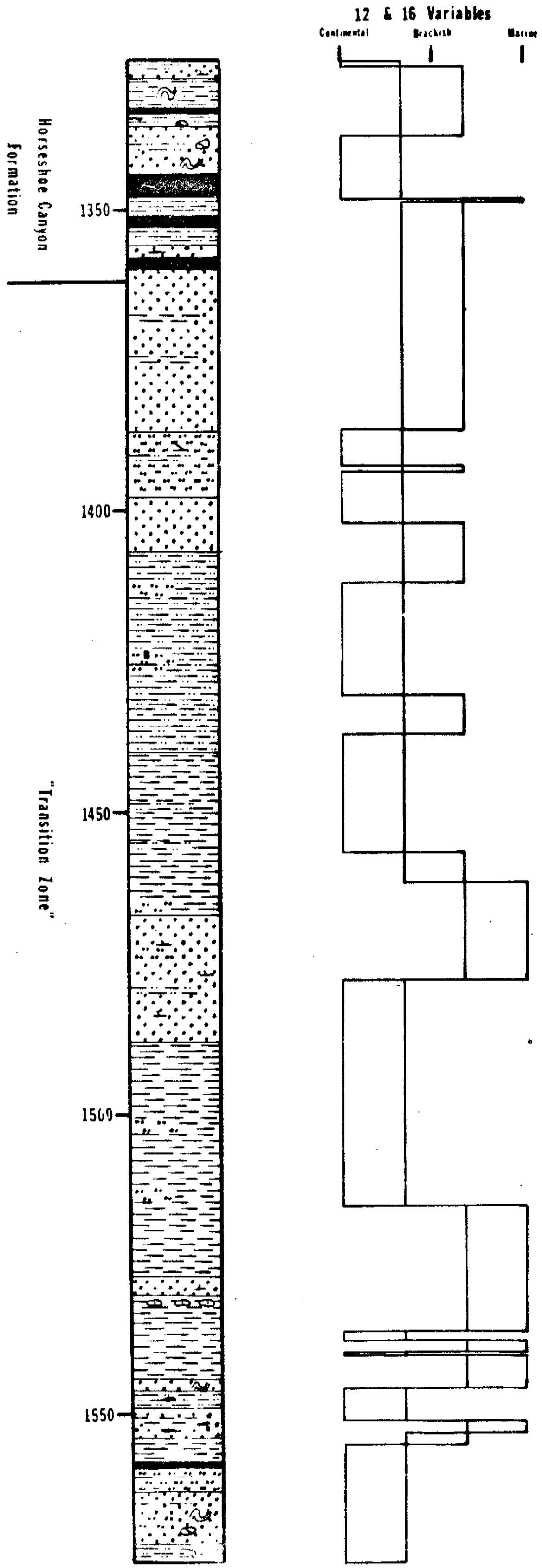

Figure 9 (CONT.)

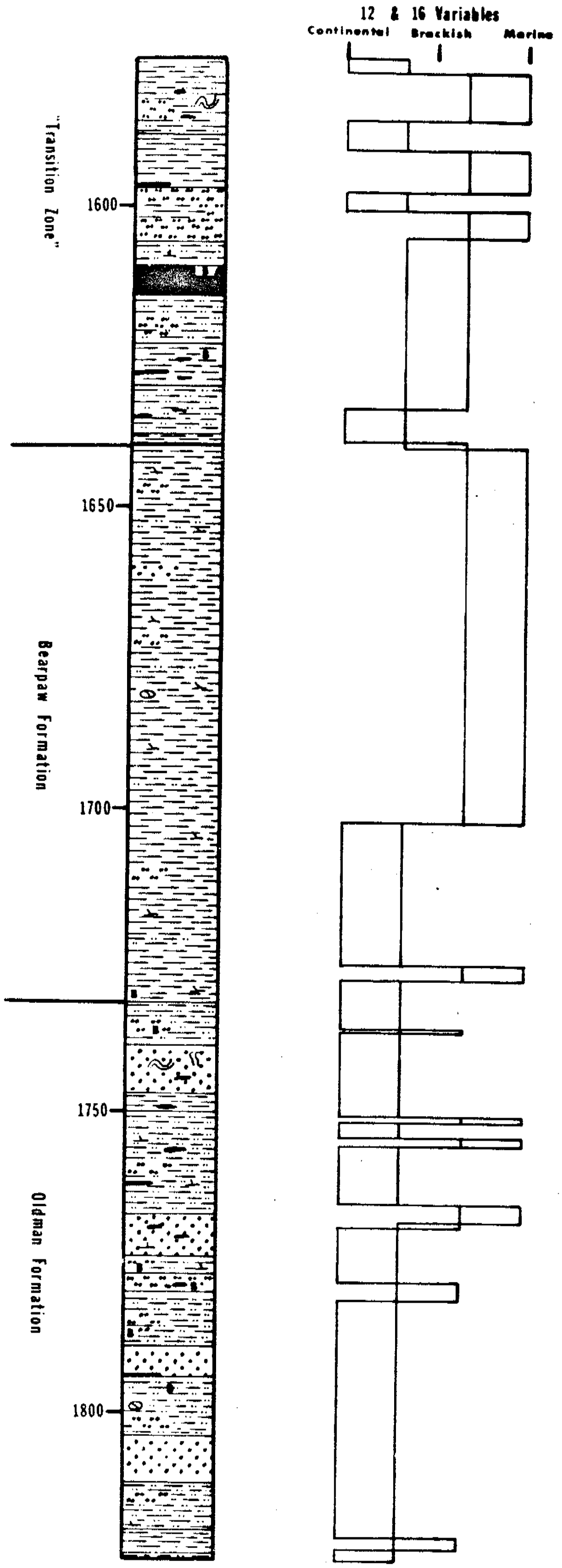

Figure 9 (CONT.)

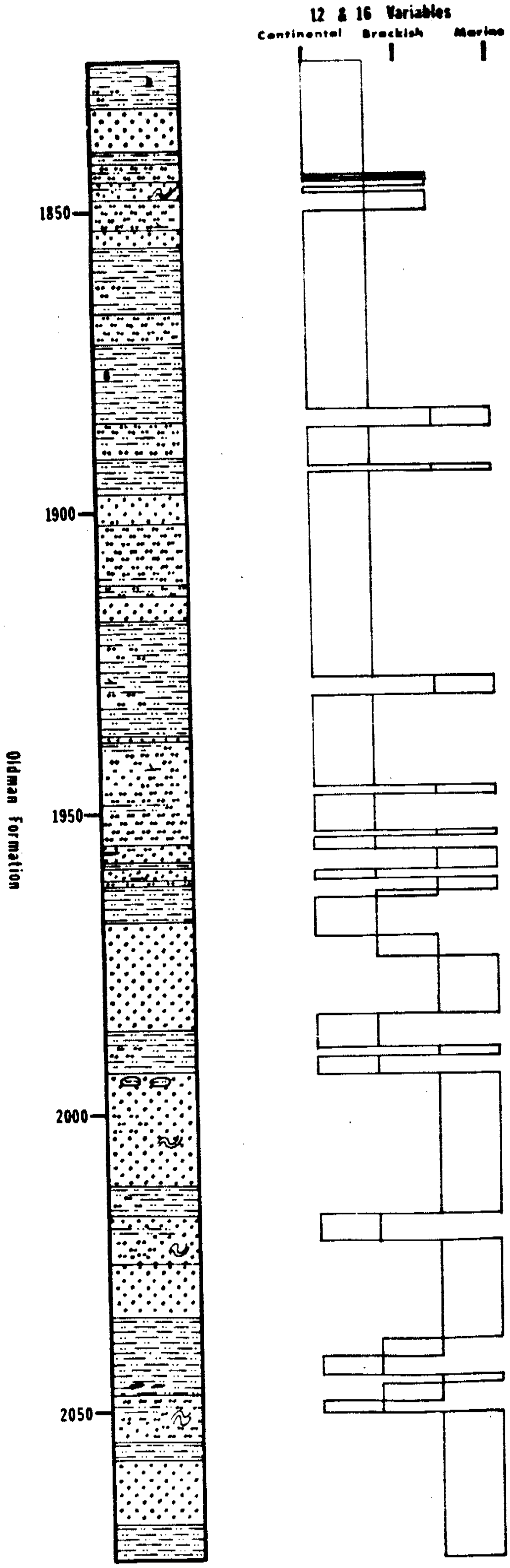

Figure 9 (CONT.)

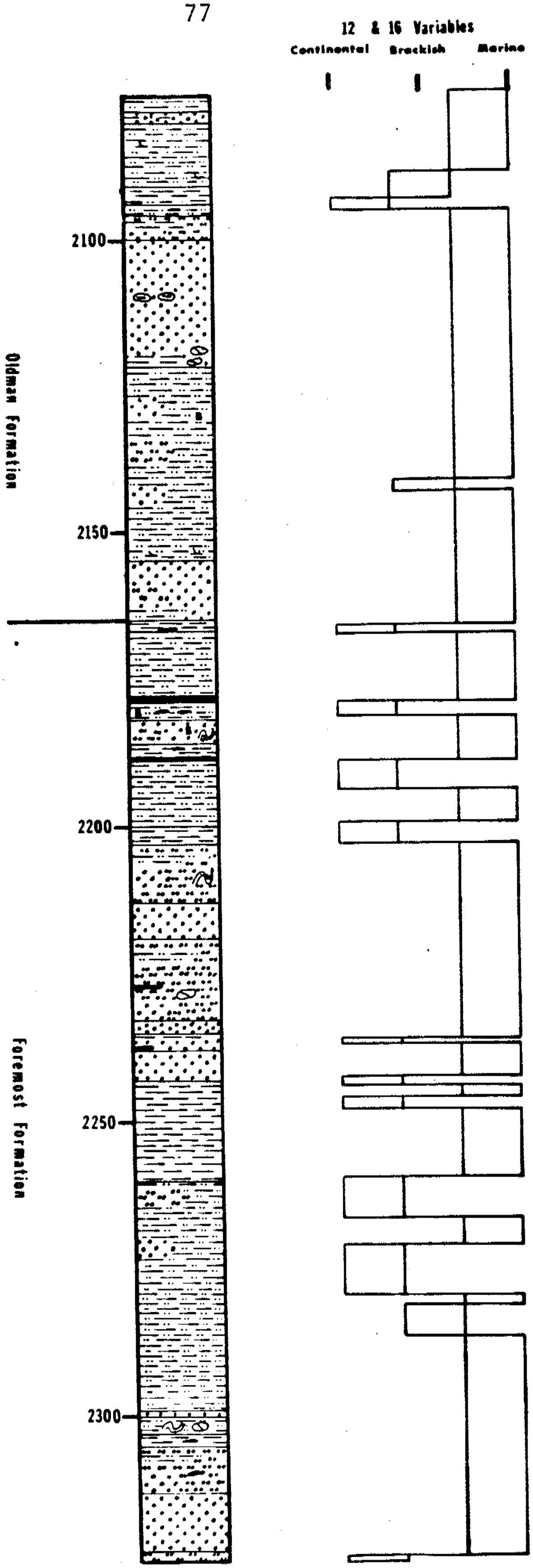

Figure 9 (CONT.)

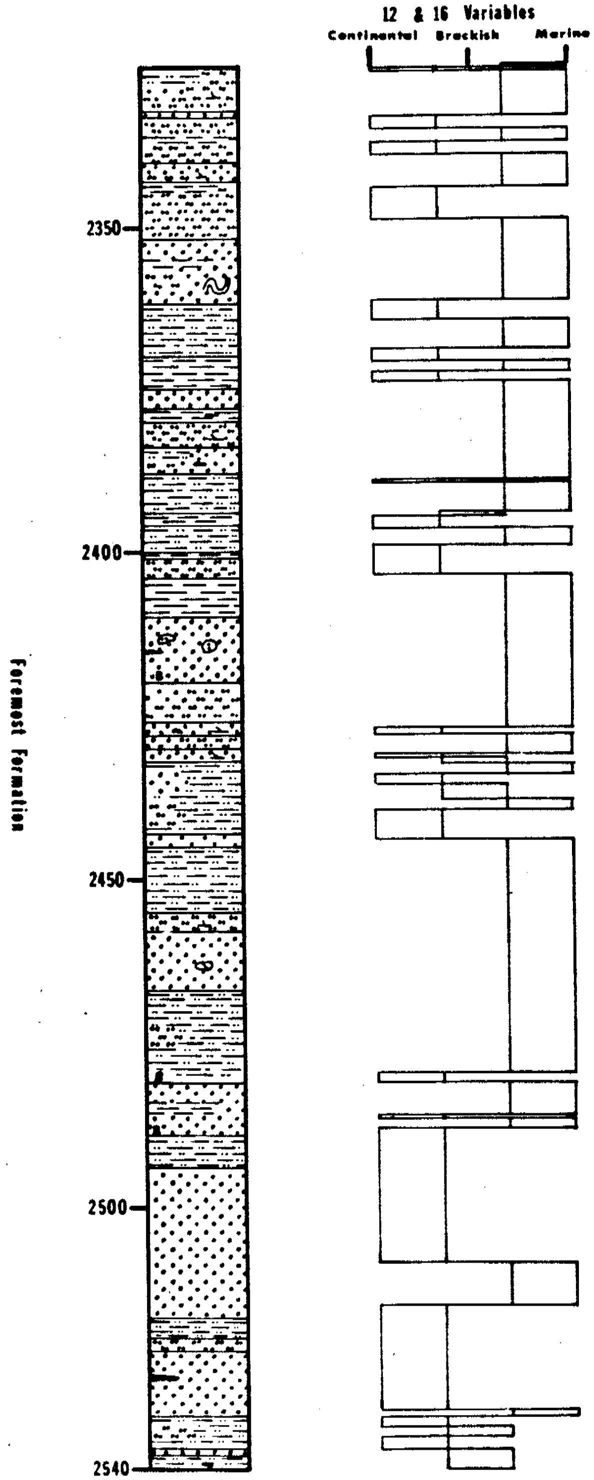

Figure 9 (CONT.)

CHAPTER IV: SUMMARY AND CONCLUSIONS

DEPOSITIONAL HISTORY OF THE LATE CRETACEOUS IN SOUTHERN ALBERTA

Introduction

The interpretation of the depositional history for the Late Cretaceous in southern Alberta is described in the following paragraphs. This interpretation is based on the published lithologic log (Havard, 1971) of the core, plus the classifications obtained through use of the formulated discriminant-functions and from the many papers which have been published on the area (Wall, et al. 1971; Havard, 1971; Williams and Burk, 1964; Powers, 1931; Russell and Landes, 1940; Hake and Addison, 1931; Shepheard and Hills, 1970; and Irish, 1970). Figure 5 gives a correlation chart for the Late Cretaceous and Paleocene in the area.

Foremost Time

Foremost time in the study area reflects the beginning of the gradual regression of the Claggett sea. The oscillatory nature of the process is shown in Figure 9. The depositional history during Foremost time can be broadly subdivided into two intervals. Many minor transgressions and regressions are recorded in the lower interval (2325' to 2540'). Within this interval both continental and marine deposits are of equal importance, with brackish elements almost lacking. Bentonites are common, probably reflecting a volcanic source to the west. No important coals occur in this interval, but coaly stringers are fairly common.

The upper interval (2165' to 2325') is dominantly marine, indicating a transgression of the Claggett sea. This sequence is composed mainly of siltstones, mudstones and shales with minor sandstones, bentonites and coals. Environments of deposition were more stable than within the previous interval.

The terrain during Foremost time was probably very flat, poorly drained and covered by vegetation. The drainage systems covering the coastal plain were unable to carry any coarse sediments. The coastline at this time was probably very sinuous and consisted of shallow bays and estuaries, resulting in the simultaneous deposition of continental and marine deposits over adjacent areas. The average chemical composition of the Foremost Formation is given in Table 26.

Oldman Time

The depositional history during Oldman time can be broadly subdivided into three intervals. Marine deposition remained important during the lower interval (2165' to 2045'). The sequence is still mainly siltstones, mudstones and shales with minor sandstones. During deposition of this interval, the terrain was probably quite similar to that of late Foremost time. Deposition from a source to the west, over a broad coastal plain, into shallow embayments was prevalent. Very little coarse material was deposited.

A middle interval (1925' to 2045') marks regression of the Claggett sea. Marine deposition is still predominant, but both continental and brackish elements are more common. Within this section, sandstones become more prevalent. At this time the coastal plain was probably being uplifted above sea level causing the Claggett sea to retreat to the east. This situation created a more efficient drainage system which allowed coarser material to be deposited. Most of the organic matter being deposited at this time was being oxidized, and very little carbonaceous matter was preserved.

Table 26

Average Element Abundances (in ppm) for Foremost Formation 2165' - 2540'

No. of Samples = 159

Element	$\overline{X}$	S	C.V. %
Si	252170	40715	16.14
Al	87322	8739	10.00
Fe	52332	11019	21.05
Mg	10934	5303	48.5
Ca	12356	14496	117.31
Na	15635	3223	20.61
K	10934	2425	22.17
Ti	5816	764	13.13
Mn	1491	9154	613.95
Ba	569	144	25.3
Co	54	13	24.03
Cu	41	14	34.14
Ga	21	8	38.09
Li	19	5	26.31
Mo	1	1	100.00
Pb	17	12	70.58
Rb	56	31	55.35
S	134	85	63.43
Sr	258	100	38.75
C and H_2O	50236	18393	36.61
Zn	91	29	31.86
Zr	180	45	25.0
V	181	44	24.3
Ni	63	18	28.57

An upper interval (1734' to 1925') can be characterized as being continental with minor marine and brackish units. This interval marks complete withdrawal of the Claggett sea. Sediments deposited in this interval record a time when once again the drainage system became sluggish, and mainly deposited mud and silt. Very few sands were deposited. Coal swamp conditions, however, were not established at this time as shown by the lack of carbonaceous material in this portion of the column.

The average element concentrations for the Oldman Formation are given in Table 27.

Bearpaw Time

The depositional history during Bearpaw time can be subdivided into three intervals. Continental conditions, similar to late Oldman time, persisted through the lower interval (1704' to 1734'). Shales and mudstones are most prevalent. A marked change, however, is noted for the middle interval (1650' to 1704'). At this time a major transgression of the Bearpaw sea occurred. Stable marine conditions persisted for this time. A major regression then occurred, as shown by the presence of a coal bed at 1640'. During the upper interval (1640' to 1650') brackish conditions of deposition were most prevalent, with minor continental elements.

Deposition for all of Bearpaw time can be characterized as being mainly marine, with continental and brackish deposits of secondary importance. This major incursion of marine waters, could possibly have been caused by subsidence within the basin. Near the end of Bearpaw time, however, the area was near sea level. Coal swamp conditions were established, and brackish water lagoons were common.

Table 27

Average Element Abundances (values in ppm) for
Oldman Formation 1732'-2165'

No. of Samples = 181

Element	$\overline{X}$	S	C.V. %
Si	295924	23545	7.95
Al	82502	10338	12.53
Fe	39763	15836	39.82
Mg	11896	7506	63.09
Ca	14490	15665	108.10
Na	13643	3862	28.30
K	14599	7107	48.68
Ti	4761	1057	22.20
Mn	735	996	135.51
Ba	602	178	29.56
Co	42	14	33.33
Cu	32	14	43.75
Ga	20	7	35.00
Li	14	7	50.00
Mo	1	1	100.00
Pb	13	7	53.84
Rb	89	45	50.56
S	206	264	128.15
Sr	194	65	33.50
C and H_2O	50493	26770	53.01
Zn	70	29	41.42
Zr	194	54	27.83
V	101	49	48.51
Ni	107	61	57.00

Drainage over the area was sluggish, not unlike modern deltas such as the Mississippi Delta. The average element concentrations for the Bearpaw Formation are given in Table 28.

"Transition Zone" Time

The entire "zone" (1364' to 1615') can be characterized as being mainly continental but containing important marine and brackish units. A lower interval (1615' to 1404') within the "zone" is composed principally of siltstones, mudstones and shales, with two prominent coal beds. This section marks the initiation of the regression of the Bearpaw sea. A low energy flow regime was dominant. This is recorded by the prevalence of silts and muds being deposited. The climate was humid and the area was well vegetated allowing coal swamp conditions to be established. An upper interval (1404' to 1364') within the "zone" marks a change in depositional environment. More sands were deposited, indicating an increase in the transporting power of the streams draining the area. At this time, the sediments were probably being deposited on a broad coastal plain and in brackish water lagoons. The average chemical composition of the "transition zone" is given in Table 29.

Horseshoe Canyon Time

Deposition during Horseshoe Canyon time, Figure 9, was highly variable between continental, brackish and marine. The continental element, however, is most important. A period of deltaic sedimentation seems most appropriate to account for the great diversity of sediment types being deposited. The material varies from sandstones to shales over short intervals. Coals and organic matter are common. Many of the sands are crossbedded. Contorted and convolute bedding is also very common within the section.

Table 28

Average Element Abundances (values in ppm) for Bearpaw Formation 1640'-1732'

No. of Samples = 25

Element	$\bar{X}$	S	C.V. %
Si	271692	36987	13.61
Al	83318	12988	15.98
Fe	68197	52887	77.55
Mg	13385	5844	43.66
Ca	13408	11511	85.85
Na	9072	3693	40.7
K	21242	8280	38.97
Ti	5098	898	17.61
Mn	1038	604	58.18
Ba	695	213	30.64
Co	51	13	25.49
Cu	33	6	18.18
Ga	24	6	25.00
Li	17	4	23.52
Mo	1	1	100.00
Pb	23	5	21.73
Rb	145	52	35.86
S	794	416	52.39
Sr	152	51	33.55
C and H_2O	69188	23574	34.07
Zn	105	36	34.28
Zr	131	26	19.84
V	170	62	36.47
Ni	188	155	82.44

Table 29

Average Element Abundances (values in ppm)
"Transition Zone" 1362'-1640'

No. of Samples = 72

Element	$\overline{X}$	S	C.V. %
Si	273824	22841	8.34
Al	81390	9604	11.79
Fe	44954	16130	35.88
Mg	12905	6315	48.93
Ca	17000	15709	92.4
Na	14197	8243	58.06
K	15994	8657	54.12
Ti	4727	997	21.09
Mn	767	267	34.81
Ba	795	261	32.83
Co	37	10	27.02
Cu	31	12	38.7
Ga	22	6	27.27
Li	13	5	38.46
Mo	1	1	100.00
Pb	23	27	117.39
Rb	90	53	58.88
S	762	1530	200.78
Sr	202	49	24.25
C and H_2O	77338	37731	48.78
Zn	88	30	34.09
Zr	143	24	16.78
V	179	65	36.31
Ni	105	38	36.19

It is suggested that as Laramide mountain building reached a peak to the west, the influx of sediments and bentonitic material increased. Large deltas formed, and enroached on the Bearpaw sea. Many different depositional environments are recorded, from coal swamp, beach, brackish-water lagoon to fluvial, similar to the rapid facies changes in the Mississippi Delta today. A humid climate prevailed. Very temporary swamps formed locally, on the subaerial inter-distributary areas of the deltas. In these areas, vegetation accumulated to form coals. As the deltas prograded they forced the Bearpaw sea to retreat to the east. Minor incursions of the Bearpaw sea still occurred, however, up until the end of Horseshoe Canyon time. The average element concentration for the Horseshoe Canyon Formation is given in Table 30.

UTILITY OF GEOCHEMICAL FACIES ANALYSIS

This study has shown that a statistical approach to geochemical facies analysis is most appropriate. The method is an important tool which can be used by most geologists. Many problems in geology are applicable to this approach. In this case, it was used to classify sediments and to interpret the depositional history. It could, however, also be used for correlating fossil-free sediments, tracing oil to source rock, tracing ore forming fluids, and to determine parent material of metamorphic rocks, to name a few functions. The need for concise techniques, which give statistically significant answers, is apparent.

Table 30

Average Element Abundances (values in ppm) for
Horseshoe Canyon Formation 599'-1362'

No. of Samples = 399

Element	$\overline{X}$	S	C.V. %
Si	293262	25681	8.75
Al	82614	7203	8.71
Fe	37847	17979	47.5
Mg	8819	5734	65.01
Ca	12452	12469	100.13
Na	16166	4251	26.29
K	15073	8036	53.31
Ti	4513	2409	53.37
Mn	1503	14781	983.43
Ba	911	296	32.49
Co	35	13	37.14
Cu	28	16	57.14
Ga	23	8	34.78
Li	15	12	80.00
Mo	1	2	200.00
Pb	13	8	61.53
Rb	80	49	61.25
S	180	138	76.66
Sr	214	62	28.97
C and H_2O	66909	32505	48.58
Zn	74	23	31.08
Zr	143	24	16.78
V	139	52	37.41
Ni	127	62	48.81

CONCLUSIONS

Major and trace elements were studied in ancient argillaceous sediments to determine their importance for discriminating between continental, brackish and marine environments of deposition.

In order to provide as concise a test as possible, samples from known environments of deposition were used to formulate discriminant-functions. These samples are from one basin of deposition where source area, tectonic conditions, climate and sedimentation rates were similar.

The following was determined:

1. Ancient continental, brackish and marine sediments, can be distinguished on the basis of major and trace element concentrations.
2. The group marine vs. composite group continental-brackish, can be separated using a discriminant-function containing the variable Ti, Mn, Ba, Co, Cu, Ga, Li, Sr, C plus H_2O, Zn, Zr and V.
3. The composite group continental-brackish can be separated using a discriminant-function based on the variables Mg, Na, K, Ti, Mn, Ba, Co, Cu, Ga, Li, Rb, Sr, C plus H_2O, Zn, Zr and V.
4. The depositional history for the Upper Cretaceous in southern Alberta can be interpreted by applying discriminant analysis to the element concentration data for the classification of samples of unknown environment.

5. It is shown that the model as implied by Wall et al. (1971) of gradual transitions between continental and marine deposits, passing through a brackish stage is probably inappropriate. Brackish water deposits are relatively rare during a regression or transgression of an epicontinental sea. This is due to the rapid rates to transgression or regression over a broad, flat, coastal plane at or near sea level.
6. While transgressions and regressions are harmonic in nature, over short intervals rapid rates are noted.

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Appendix 1

Elements Concentrations

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -1 599.5 0.0	ST- 2 600.0 0.0	ST -3 600.0 -602.0	ST -4 602.0 -603.2
SI	298630.	295630.	295260.	290090.
AL	83900.	83850.	81960.	81420.
FE	32750.	37180.	33780.	41840.
MG	5980.	6240.	5580.	6520.
CA	10370.	9860.	10480.	10100.
NA	17300.	18600.	20100.	17800.
K	14510.	17640.	18920.	22260.
TI	3660.	4200.	3770.	4090.
MN	120.	160.	150.	250.
BA	980.	660.	700.	540.
CO	24.	26.	36.	38.
CU	24.	25.	23.	23.
GA	24.	23.	22.	22.
LI	22.	24.	24.	24.
MO	1.	1.	1.	1.
PB	7.	8.	21.	9.
RB	47.	59.	58.	81.
S	105.	134.	173.	205.
SR	284.	276.	297.	294.
C&H2O	32600.	39800.	29500.	28900.
ZN	82.	98.	75.	80.
ZR	162.	166.	144.	157.
V	140.	160.	140.	180.
NI	90.	94.	126.	148.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -5 603.2 -603.4	ST -6 603.4 -605.7	ST -7 605.7 -607.2	ST -9 607.4 -611.5
SI	290320.	293500.	299490.	294700.
AL	82550.	82810.	84850.	71880.
FE	46110.	45450.	26390.	31750.
MG	8020.	7240.	4280.	6060.
CA	9180.	9270.	11440.	28010.
NA	15400.	17900.	16700.	18400.
K	20890.	20180.	16220.	17650.
TI	4120.	4100.	3220.	3660.
MN	340.	270.	200.	1040.
BA	540.	660.	680.	840.
CO	42.	40.	30.	36.
CU	31.	32.	23.	22.
GA	27.	24.	35.	23.
LI	24.	28.	22.	24.
MO	1.	0.	1.	0.
PB	8.	6.	23.	14.
RB	81.	78.	58.	53.
S	201.	159.	190.	193.
SR	249.	261.	431.	307.
C&H2O	38300.	36700.	28300.	32400.
ZN	99.	87.	73.	61.
ZR	149.	160.	218.	174.
V	220.	180.	120.	180.
NI	180.	170.	134.	202.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -10 611.5 -612.0	ST -11 612.0 -616.3	ST -12 616.3 -618.0	ST -13 618.0 -622.0
SI	236480.	293390.	297630.	298780.
AL	84450.	82870.	82230.	76560.
FE	49490.	33650.	42970.	27030.
MG	9640.	6440.	7220.	5280.
CA	14120.	22960.	9880.	12260.
NA	16700.	19800.	16400.	16500.
K	18670.	17500.	22210.	17810.
TI	3980.	3610.	4000.	3290.
MN	1050.	1140.	420.	300.
BA	720.	840.	640.	480.
CO	58.	40.	36.	32.
CU	29.	25.	36.	21.
GA	21.	26.	25.	20.
LI	24.	24.	36.	28.
MO	1.	1.	0.	1.
PB	9.	9.	12.	9.
RB	48.	49.	83.	43.
S	232.	112.	308.	145.
SR	217.	296.	272.	290.
C&H2O	56900.	28900.	40800.	27800.
ZN	63.	64.	80.	50.
ZR	116.	157.	161.	180.
V	160.	180.	180.	100.
NI	264.	198.	208.	162.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -14 622.0 -623.0	ST -15 623.0 -624.0	ST -16 624.0 -631.0	ST -17 631.0 -632.3
SI	294720.	307780.	298480.	250330.
AL	82810.	78360.	78890.	63520.
FE	43340.	36800.	43080.	101860.
MG	6160.	4720.	7180.	9120.
CA	9160.	9950.	10460.	41950.
NA	17600.	15200.	5400.	12400.
K	20870.	19490.	20160.	10670.
TI	4150.	3720.	3870.	3030.
MN	210.	520.	440.	6020.
BA	400.	440.	600.	400.
CO	34.	30.	12.	22.
CU	37.	29.	31.	32.
GA	30.	22.	21.	24.
LI	30.	28.	22.	28.
MO	2.	1.	0.	1.
PB	13.	11.	9.	9.
RB	98.	68.	87.	54.
S	416.	360.	72.	228.
SR	301.	290.	278.	208.
C&H2O	48300.	39400.	25600.	93600.
ZN	67.	60.	80.	64.
ZR	167.	158.	158.	115.
V	200.	120.	100.	180.
NI	198.	182.	222.	368.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -18 632.3 -633.8	ST -19 633.8 -635.0	ST -20 635.0 -638.0	ST -21 638.0 -640.0
SI	281090.	281970.	281460.	306450.
AL	74560.	69700.	86110.	81800.
FE	26500.	52760.	36280.	39090.
MG	6020.	9420.	7260.	7208.
CA	36470.	12720.	13560.	9680.
NA	20000.	16900.	20600.	18600.
K	9430.	9890.	7930.	12240.
TI	2760.	3320.	3070.	3620.
MN	2240.	1080.	1000.	80.
BA	980.	640.	720.	440.
CO	30.	32.	30.	22.
CU	19.	28.	22.	23.
GA	19.	30.	28.	27.
LI	30.	12.	11.	11.
MO	1.	1.	1.	1.
PB	11.	9.	9.	9.
RB	25.	58.	36.	80.
S	158.	87.	177.	181.
SR	360.	288.	337.	285.
C&H2O	32000.	45800.	41500.	36100.
ZN	42.	86.	69.	62.
ZR	157.	156.	155.	171.
V	120.	180.	180.	180.
NI	168.	174.	174.	182.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -22 640.0 -644.5	ST -23 644.5 -645.0	ST -24 645.0 -648.0	ST -25 645.0 -650.5
SI	304940.	301410.	289430.	288730.
AL	80540.	82970.	82970.	83850.
FE	35670.	35420.	46270.	44660.
MG	4900.	5580.	7260.	7900.
CA	9770.	10600.	9800.	10300.
NA	16700.	15800.	19000.	16900.
K	15870.	17130.	18850.	24300.
TI	3650.	3540.	3950.	4140.
MN	170.	130.	220.	270.
BA	720.	720.	800.	780.
CO	32.	26.	28.	32.
CU	30.	25.	34.	48.
GA	26.	26.	32.	22.
LI	12.	11.	11.	13.
MO	1.	5.	1.	1.
PB	10.	23.	15.	10.
RB	74.	65.	100.	97.
S	490.	281.	175.	233.
SR	284.	310.	297.	275.
C&H2O	42000.	36700.	37100.	38800.
ZN	72.	69.	85.	90.
ZR	168.	166.	172.	158.
V	180.	180.	220.	220.
NI	180.	188.	216.	200.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -26 650.5 -652.0	ST -27 652.0 -653.5	ST -28 653.5 -657.0	ST -29 657.0 -658.0
SI	284090.	241300.	191750.	281670.
AL	84250.	65620.	82070.	83900.
FE	53900.	56830.	41980.	34960.
MG	9000.	8280.	5420.	5360.
CA	11730.	86160.	8950.	12100.
NA	17800.	13200.	18100.	21600.
K	23380.	14770.	18190.	13310.
TI	3940.	2750.	3960.	2960.
MN	1190.	3470.	220.	1030.
BA	760.	720.	760.	800.
CO	48.	24.	16.	32.
CU	48.	37.	39.	30.
GA	22.	18.	20.	19.
LI	13.	9.	11.	11.
MO	2.	1.	2.	1.
PB	13.	7.	9.	29.
RB	83.	63.	91.	40.
S	241.	266.	187.	189.
SR	275.	234.	389.	324.
C&H2O	49300.	54400.	49500.	46300.
ZN	96.	66.	88.	57.
ZR	155.	127.	156.	133.
V	200.	140.	160.	120.
NI	280.	250.	206.	190.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -30 658.0 -660.5	ST -31 660.5 -661.0	ST -32 661.0 -662.0	ST -33 662.0 -662.5
SI	283710.	235090.	299200.	296590.
AL	79410.	77590.	86110.	80370.
FE	32690.	27030.	37390.	28360.
MG	4300.	3760.	5400.	3800.
CA	10210.	18450.	10920.	17940.
NA	20600.	21500.	17100.	21500.
K	14300.	8820.	10820.	7040.
TI	3580.	2890.	3440.	3470.
MN	30.	600.	450.	630.
BA	720.	1260.	940.	1300.
CO	26.	18.	18.	24.
CU	24.	19.	29.	18.
GA	17.	28.	32.	23.
LI	11.	9.	11.	11.
MO	2.	1.	0.	2.
PB	18.	15.	11.	14.
RB	65.	24.	49.	12.
S	277.	246.	102.	157.
SR	291.	397.	315.	389.
C&H2O	45100.	32200.	39700.	33500.
ZN	56.	64.	69.	59.
ZR	164.	200.	169.	268.
V	140.	100.	120.	160.
NI	172.	86.	50.	122.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -34 662.5 -663.5	ST -35 663.5 -667.5	ST -36 667.5 -667.7	ST -37 667.7 -667.9
SI	281990.	275920.	288080.	228600.
AL	89270.	79230.	80820.	65320.
FE	47110.	29250.	41250.	116960.
MG	7340.	4440.	5220.	6860.
CA	11190.	17550.	17620.	17330.
NA	17100.	20400.	16700.	9900.
K	6120.	6220.	8370.	4350.
TI	3390.	2810.	3620.	2010.
MN	540.	670.	690.	3130.
BA	620.	1440.	800.	880.
CO	26.	22.	28.	20.
CU	26.	15.	26.	22.
GA	31.	27.	32.	25.
LI	21.	13.	12.	16.
MO	2.	1.	1.	0.
PB	14.	13.	12.	18.
RB	28.	4.	42.	10.
S	149.	145.	137.	44.
SR	318.	425.	322.	232.
C&H2O	60700.	36400.	49100.	133200.
ZN	60.	51.	83.	71.
ZR	223.	221.	196.	142.
V	180.	80.	180.	120.
NI	162.	128.	158.	320.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -38 667.9 -668.1	ST -39 668.1 -673.0	ST -40 673.0 -673.5	ST -41 673.5 -674.5
SI	294810.	278660.	284700.	289780.
AL	81960.	75450.	82440.	82970.
FE	38540.	41500.	43540.	33720.
MG	5120.	6140.	6000.	5620.
CA	9360.	33330.	11540.	10180.
NA	33900.	19500.	18100.	20700.
K	13830.	12260.	16830.	18210.
TI	3790.	3430.	3960.	3910.
MN	460.	1530.	690.	490.
BA	940.	1240.	920.	660.
CO	18.	22.	34.	16.
CU	26.	26.	24.	23.
GA	25.	24.	26.	26.
LI	15.	17.	22.	19.
MO	0.	1.	0.	1.
PB	15.	18.	40.	22.
RB	66.	43.	64.	54.
S	127.	166.	504.	166.
SR	297.	319.	288.	293.
C&H2O	35700.	40200.	53500.	39300.
ZN	82.	67.	88.	80.
ZR	150.	167.	179.	153.
V	160.	120.	140.	200.
NI	136.	136.	132.	86.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -42 674.5 -675.5	ST -43 675.5 -677.0	ST -44 677.0 -679.0	ST -45 679.0 -679.5
SI	290910.	291850.	279540.	288260.
AL	85630.	84850.	83700.	81910.
FE	38820.	36380.	47940.	36440.
MG	7540.	3840.	7360.	6420.
CA	3830.	9180.	8150.	11270.
NA	16900.	18800.	18300.	18300.
K	22010.	18310.	22300.	17030.
TI	4330.	4120.	4370.	4120.
MN	480.	530.	550.	530.
BA	780.	1020.	768.	840.
CO	18.	22.	24.	18.
CU	35.	25.	35.	28.
GA	29.	23.	25.	20.
LI	20.	19.	21.	21.
MO	0.	1.	2.	1.
PB	18.	7.	10.	5.
RB	71.	55.	93.	56.
S	177.	123.	149.	95.
SR	260.	264.	233.	262.
C&H2O	41000.	36000.	51600.	41000.
ZN	100.	72.	107.	83.
ZR	156.	154.	160.	152.
V	180.	140.	200.	140.
NI	119.	136.	184.	120.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -46 679.5 -682.0	ST -47 682.0 -685.0	ST -48 685.0 -685.2	ST -49 685.2 -693.0
SI	284430.	274760.	191630.	289850.
AL	82970.	79290.	45530.	79750.
FE	44010.	48620.	161890.	32070.
MG	9280.	9740.	7820.	5180.
CA	10670.	14880.	31360.	18510.
NA	17000.	17600.	9800.	19800.
K	18360.	17130.	6980.	19670.
TI	4220.	3790.	2430.	3240.
MN	660.	1000.	6240.	890.
BA	1000.	780.	1000.	860.
CO	18.	24.	14.	16.
CU	29.	23.	25.	19.
GA	23.	27.	15.	21.
LI	17.	26.	24.	13.
MO	1.	1.	1.	1.
PB	9.	10.	12.	18.
RB	74.	52.	20.	49.
S	253.	160.	156.	101.
SR	247.	257.	122.	237.
C&H2O	43200.	53000.	171500.	28700.
ZN	88.	82.	36.	47.
ZR	164.	171.	105.	140.
V	160.	140.	360.	100.
NI	126.	86.	200.	86.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -50 693.0 -697.0	ST -51 697.0 -699.0	ST -52 699.0 -700.5	ST -53 700.5 -702.0
SI	286820.	296550.	291140.	287230.
AL	84750.	60090.	83640.	82120.
FE	42820.	31010.	39510.	41750.
MG	5840.	6360.	7160.	7580.
CA	25160.	18570.	9100.	9810.
NA	15800.	16200.	14700.	15300.
K	25910.	24460.	27750.	16920.
TI	3890.	3730.	4080.	4110.
MN	590.	750.	520.	500.
BA	760.	540.	520.	520.
CO	16.	34.	68.	36.
CU	34.	20.	30.	35.
GA	25.	24.	25.	25.
LI	14.	106.	12.	12.
MO	0.	0.	1.	0.
PB	5.	9.	9.	3.
RB	102.	68.	88.	71.
S	213.	121.	332.	92.
SR	360.	281.	254.	256.
C&H2O	42100.	35400.	46000.	47000.
ZN	87.	68.	87.	77.
ZR	180.	149.	158.	157.
V	160.	100.	140.	140.
NI	94.	98.	116.	232.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -54 702.0 -703.0	ST -55 703.0 -704.5	ST -56 704.5 -705.5	ST -57 705.5 -709.0
SI	277080.	302170.	265850.	271830.
AL	81040.	81370.	72420.	75120.
FE	36340.	34190.	92320.	29840.
MG	8040.	4120.	7340.	4260.
CA	13210.	9580.	21620.	49380.
NA	19800.	13000.	15500.	20000.
K	10980.	15160.	10950.	11720.
TI	3720.	3710.	2940.	3130.
MN	700.	440.	2170.	1130.
BA	400.	440.	380.	400.
CO	46.	32.	36.	36.
CU	28.	30.	28.	19.
GA	26.	18.	11.	17.
LI	12.	10.	9.	10.
MO	0.	3.	1.	3.
PB	6.	17.	20.	26.
RB	42.	64.	51.	33.
S	175.	105.	288.	82.
SR	286.	290.	283.	342.
C&H2O	47700.	46500.	57000.	25800.
ZN	94.	66.	45.	61.
ZR	148.	178.	170.	152.
V	140.	180.	180.	180.
NI	136.	112.	242.	152.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -58 709.0 -709.5	ST -59 709.5 -710.5	ST -60 710.5 -711.0	ST -61 711.0 -712.0
SI	294900.	304410.	296640.	293120.
AL	79750.	83750.	79690.	79120.
FE	69750.	38850.	37060.	39550.
MG	6220.	4360.	4720.	4840.
CA	10430.	8810.	9160.	9270.
NA	13900.	18500.	19900.	17900.
K	15970.	16450.	13860.	14040.
TI	3800.	3950.	3780.	4750.
MN	1380.	440.	450.	450.
BA	480.	480.	500.	440.
CO	46.	50.	34.	38.
CU	32.	33.	25.	24.
GA	21.	17.	17.	16.
LI	10.	9.	9.	8.
MO	2.	2.	2.	2.
PB	30.	14.	20.	9.
RB	88.	81.	69.	80.
S	181.	250.	155.	143.
SR	269.	274.	289.	292.
C&H2O	48600.	46500.	48700.	46600.
ZN	70.	85.	75.	76.
ZR	174.	171.	165.	167.
V	220.	140.	140.	140.
NI	214.	148.	96.	110.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -62 712.0 -713.0	ST -63 713.0 -713.5	ST -64 713.5 -718.0	ST -65 718.0 -719.2
SI	293650.	296160.	299500.	298210.
AL	85970.	82810.	82280.	78710.
FE	39800.	43320.	31580.	45340.
MG	3760.	5480.	4960.	5460.
CA	9830.	9370.	15690.	10740.
NA	19600.	18600.	11000.	15100.
K	12620.	15380.	10560.	6220.
TI	4330.	4510.	4290.	3810.
MN	460.	470.	610.	490.
BA	460.	420.	560.	420.
CO	30.	34.	36.	42.
CU	24.	27.	18.	14.
GA	18.	19.	19.	21.
LI	11.	10.	12.	19.
MO	0.	1.	1.	2.
PB	8.	9.	5.	6.
RB	60.	77.	38.	29.
S	50.	211.	155.	231.
SR	304.	295.	340.	258.
C&H2O	50100.	48100.	40000.	111000.
ZN	79.	75.	65.	53.
ZR	154.	147.	157.	151.
V	200.	220.	160.	120.
NI	124.	156.	146.	170.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -68 719.2 -719.4	ST -69 721.0 -730.0	ST -70 730.0 -732.0	ST -71 732.0 -732.6
SI	251090.	292940.	303820.	295140.
AL	84900.	80480.	82920.	80710.
FE	66450.	26840.	43050.	55990.
MG	7080.	2960.	6040.	8520.
CA	14250.	16630.	8570.	11660.
NA	13100.	20600.	18400.	17200.
K	3040.	14020.	24010.	19060.
TI	3340.	4590.	5070.	4750.
MN	490.	720.	650.	1100.
BA	380.	540.	520.	880.
CO	34.	38.	36.	24.
CU	6.	12.	23.	19.
GA	23.	20.	22.	25.
LI	16.	9.	9.	9.
MO	2.	2.	1.	1.
PB	10.	5.	13.	13.
RB	0.	38.	112.	81.
S	56.	102.	116.	170.
SP	369.	285.	258.	270.
C&H2O	101300.	81000.	48600.	60600.
ZN	60.	61.	68.	84.
ZR	202.	152.	152.	158.
V	40.	140.	200.	140.
NI	196.	168.	183.	138.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -72 732.6 -733.2	ST -73 733.2 -734.5	ST -74 734.5 -735.0	ST -75 735.0 -737.2
SI	174370.	303730.	302119.	302510.
AL	36050.	83280.	85090.	85120.
FE	41120.	23990.	36120.	40990.
MG	7160.	5040.	6020.	8640.
CA	84690.	10010.	8960.	6210.
NA	19200.	21300.	13060.	17400.
K	8080.	18000.	22870.	19040.
TI	1720.	4330.	4870.	5200.
MN	1210.	570.	450.	530.
BA	680.	740.	720.	1540.
CO	34.	27.	24.	28.
CU	0.	11.	18.	44.
GA	16.	17.	21.	24.
LI	13.	11.	10.	20.
MO	0.	1.	0.	0.
PB	23.	17.	13.	13.
RB	36.	47.	93.	87.
S	185.	195.	132.	192.
SR	217.	291.	276.	257.
C&H2O	51200.	39200.	48500.	57900.
ZN	37.	56.	74.	77.
ZR	113.	148.	167.	156.
V	140.	120.	140.	120.
NI	150.	134.	142.	170.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -76 737.2 -737.5	ST -77 737.5 -738.0	ST -78 738.0 -739.2	ST -79 739.2 -743.0
SI	300190.	297870.	260610.	302880.
AL	79410.	81780.	91380.	79070.
FE	35340.	45650.	41920.	21760.
MG	6360.	7480.	11440.	5560.
CA	9250.	8140.	9830.	25750.
NA	13100.	14300.	17100.	20900.
K	11710.	13760.	4080.	11330.
TI	45500.	6150.	3640.	4110.
MN	430.	450.	420.	710.
BA	900.	860.	580.	1040.
CO	20.	38.	30.	30.
CU	22.	29.	11.	16.
GA	19.	22.	24.	21.
LI	10.	12.	15.	12.
MO	0.	1.	1.	1.
PB	12.	7.	13.	8.
RB	54.	66.	8.	24.
S	166.	60.	27.	149.
SR	284.	247.	259.	297.
C&H2O	51000.	62100.	104600.	32000.
ZN	95.	42.	39.	51.
ZR	152.	169.	174.	150.
V	120.	180.	60.	100.
NI	166.	188.	164.	142.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -80 743.0 -744.3	ST -81 744.3 -746.5	ST -82 746.5 -747.4	ST -83 747.4 -750.8
SI	301360.	302580.	300290.	298850.
AL	82260.	81230.	81670.	85850.
FE	35010.	26150.	34830.	32890.
MG	6420.	5460.	6280.	4760.
CA	8780.	10970.	9600.	11670.
NA	20100.	22500.	16800.	19100.
K	14950.	9370.	13200.	10520.
TI	5020.	3770.	4640.	3770.
MN	500.	530.	540.	610.
BA	940.	840.	620.	480.
CO	28.	18.	22.	28.
CU	27.	12.	14.	17.
GA	19.	15.	20.	17.
LI	12.	10.	9.	10.
MO	1.	1.	1.	1.
PB	10.	10.	9.	12.
RB	67.	36.	569.	40.
S	76.	90.	104.	171.
SR	275.	301.	289.	310.
C&H2O	57900.	45200.	49500.	48800.
ZN	50.	46.	61.	59.
ZR	165.	164.	169.	158.
V	140.	80.	100.	160.
NI	148.	124.	170.	128.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -84 750.8 -752.5	ST -85 752.5 -754.0	ST -86 754.0 -755.2	ST -87 755.2 -757.5
SI	292330.	283180.	292670.	296550.
AL	82220.	82930.	84910.	80440.
FE	45340.	43630.	35360.	31390.
MG	6340.	7160.	7020.	5940.
CA	8170.	7860.	8280.	9270.
NA	18360.	13200.	17000.	17200.
K	14770.	14690.	12300.	14590.
TI	4850.	4810.	4670.	4440.
MN	460.	460.	430.	430.
BA	320.	660.	800.	920.
CO	24.	26.	22.	18.
CU	33.	37.	30.	32.
GA	19.	24.	23.	20.
LI	10.	12.	10.	10.
MO	0.	1.	0.	0.
PB	10.	10.	8.	15.
RB	99.	94.	54.	66.
S	112.	374.	125.	113.
SR	247.	232.	262.	292.
C&H2O	61500.	70800.	57000.	45200.
ZN	91.	113.	64.	64.
ZR	152.	143.	160.	156.
V	160.	140.	120.	140.
NI	156.	168.	164.	138.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -88 757.5 -758.5	ST -90 759.2 -763.8	ST -91 763.8 -765.8	ST -92 765.8 -770.1
SI	303870.	306940.	302490.	295810.
AL	89490.	85330.	84010.	82390.
FE	36840.	35420.	39510.	42770.
MG	8880.	5260.	6160.	5640.
CA	8360.	8220.	7840.	8040.
NA	17200.	16400.	15900.	14100.
K	23770.	20630.	19860.	19890.
TI	4950.	4860.	5020.	5330.
MN	460.	440.	440.	490.
BA	920.	760.	960.	820.
CO	22.	24.	28.	50.
CU	22.	38.	21.	263.
GA	26.	25.	22.	27.
LI	13.	10.	12.	11.
MO	1.	1.	0.	0.
PB	17.	13.	12.	11.
RB	128.	100.	115.	111.
S	298.	138.	196.	243.
SR	280.	268.	247.	235.
C&H2O	49600.	44400.	52900.	45300.
ZN	84.	110.	82.	91.
ZR	152.	143.	148.	153.
V	160.	140.	200.	180.
NI	190.	138.	166.	270.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -93 770.1 -770.8	ST -94 770.8 -775.5	ST -95 775.5 -780.0	ST -97 782.3 -782.9
SI	288420.	293000.	267640.	287590.
AL	80830.	86870.	79470.	85800.
FE	43990.	37470.	57500.	36970.
MG	9680.	9460.	5700.	5720.
CA	14050.	8250.	24210.	6810.
NA	15500.	15400.	20700.	6800.
K	18460.	25950.	17880.	5980.
TI	5110.	5360.	4580.	6370.
MN	850.	600.	1300.	410.
BA	320.	900.	960.	620.
CO	28.	34.	38.	16.
CU	41.	46.	33.	29.
GA	24.	20.	19.	26.
LI	11.	13.	12.	16.
MO	0.	0.	0.	0.
PB	19.	7.	17.	2.
RB	70.	97.	61.	70.
S	166.	162.	169.	130.
SR	270.	226.	247.	134.
C&H2O	47700.	51100.	51700.	107000.
ZN	94.	103.	80.	44.
ZR	157.	147.	134.	121.
V	160.	200.	180.	180.
NI	140.	174.	186.	164.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST -98 782.9 -784.8	ST -99 784.8 -785.3	ST-100 785.3 -786.5	ST-101 786.5 -787.2
SI	285570.	280160.	290650.	292010.
AL	84540.	85950.	84060.	83640.
FE	38620.	31260.	41320.	38060.
MG	5540.	5120.	7080.	7800.
CA	6320.	6890.	6450.	6620.
NA	10800.	12400.	12800.	15200.
K	12260.	18300.	21050.	21430.
TI	5410.	5340.	5410.	5650.
MN	400.	410.	430.	430.
BA	700.	680.	860.	740.
CO	32.	26.	40.	32.
CU	35.	43.	42.	39.
GA	22.	19.	4.	28.
LI	14.	15.	16.	17.
MO	0.	0.	0.	1.
PB	4.	7.	8.	13.
RB	102.	86.	116.	113.
S	87.	494.	211.	181.
SR	157.	151.	179.	166.
C&H2O	74000.	131200.	60100.	75500.
ZN	78.	82.	96.	172.
ZR	123.	144.	140.	144.
V	180.	260.	200.	180.
NI	178.	158.	184.	168.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-102 787.2 -791.2	ST-103 791.2 -791.5	ST-104 791.5 -792.0	ST-105 792.0 -792.5
SI	301760.	267350.	323490.	303100.
AL	90640.	86980.	85800.	85020.
FE	36040.	41250.	32110.	44970.
MG	13520.	11020.	20420.	16880.
CA	7200.	7230.	5960.	6490.
NA	12900.	12300.	11600.	11600.
K	13080.	10980.	20810.	19320.
TI	5570.	5100.	5140.	5140.
MN	420.	430.	420.	430.
BA	900.	1160.	1500.	1420.
CO	30.	50.	46.	38.
CU	33.	29.	33.	34.
GA	26.	27.	24.	25.
LI	13.	22.	20.	18.
MO	1.	1.	2.	1.
PB	11.	25.	17.	32.
RB	104.	67.	94.	187.
S	132.	755.	213.	201.
SR	207.	152.	145.	174.
C&H2O	72000.	153600.	56100.	63300.
ZN	80.	74.	71.	78.
ZR	150.	155.	141.	142.
V	200.	180.	200.	200.
NI	160.	190.	200.	198.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-107 794.0 -794.5	ST-108 794.5 -795.5	ST-109 795.5 -796.0	ST-110 796.0 -797.0
SI	300710.	306050.	300220.	292760.
AL	83900.	84170.	88670.	82550.
FE	34270.	26950.	34900.	35810.
MG	22740.	13180.	13980.	12500.
CA	7410.	10020.	7860.	8740.
NA	23500.	10200.	13000.	19300.
K	17530.	11920.	15470.	12660.
TI	5470.	4740.	5300.	4980.
MN	450.	450.	460.	480.
BA	1440.	1180.	1200.	1200.
CO	46.	44.	36.	26.
CU	42.	23.	34.	26.
GA	24.	20.	22.	24.
LI	15.	18.	20.	17.
MO	1.	0.	1.	1.
PB	14.	21.	15.	13.
RB	83.	51.	83.	74.
S	320.	165.	245.	191.
SR	206.	254.	213.	245.
C&H2O	52900.	79400.	72200.	69690.
ZN	120.	88.	106.	89.
ZR	145.	147.	150.	157.
V	180.	140.	140.	120.
NI	170.	168.	174.	162.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-111 797.0 -798.0	ST-112 798.0 -799.0	ST-113 799.0 -801.0	ST-114 801.0 -801.5
SI	297010.	291110.	291650.	297160.
AL	86060.	87780.	82930.	73620.
FE	39550.	32180.	46170.	37860.
MG	9420.	15060.	19040.	11360.
CA	8500.	135060.	6880.	7500.
NA	11900.	17500.	14400.	13500.
K	11110.	7000.	8270.	12340.
TI	4400.	3670.	3980.	4480.
MN	2790.	470.	810.	520.
BA	1120.	1620.	1400.	1080.
CO	34.	26.	32.	28.
CU	38.	22.	26.	40.
GA	28.	28.	25.	29.
LI	15.	12.	15.	18.
MO	0.	1.	0.	1.
PB	20.	18.	15.	11.
RB	89.	32.	49.	82.
S	199.	196.	240.	364.
SR	238.	291.	225.	168.
C&H2O	73100.	61200.	71200.	164700.
ZN	93.	79.	72.	94.
ZR	157.	165.	151.	115.
V	80.	60.	60.	120.
NI	294.	264.	280.	264.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-115 801.5 -805.5	ST-116 805.5 -806.0	ST-117 806.0 -807.5	ST-118 807.5 -809.0
SI	316100.	315390.	320820.	304840.
AL	86160.	74970.	84960.	79130.
FE	41110.	30370.	29530.	32280.
MG	10800.	23520.	14620.	16860.
CA	8250.	7520.	8370.	8330.
NA	18400.	18700.	23100.	16700.
K	4280.	5480.	4310.	4700.
TI	3090.	3700.	2830.	3540.
MN	780.	580.	520.	580.
BA	1920.	1660.	2320.	1620.
CO	12.	24.	16.	12.
CU	19.	22.	18.	23.
GA	27.	23.	22.	23.
LI	15.	17.	15.	19.
MO	2.	4.	1.	2.
PB	11.	12.	11.	6.
RB	22.	26.	13.	13.
S	40.	128.	83.	88.
SR	195.	147.	193.	184.
C&H2O	84800.	76600.	75500.	77900.
ZN	56.	63.	60.	53.
ZR	230.	162.	187.	168.
V	40.	60.	20.	40.
NI	254.	262.	232.	166.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-119 809.0 -810.2	ST-120 810.2 -810.5	ST-122 812.5 -813.0	ST-124 814.2 -816.7
SI	309240.	306800.	257830.	302000.
AL	75400.	79810.	89400.	84860.
FE	33440.	27610.	50070.	33340.
MG	10380.	9360.	13300.	5700.
CA	7140.	7950.	9260.	6730.
NA	15400.	19500.	16900.	14700.
K	5950.	4540.	3530.	14080.
TI	3810.	2940.	3250.	5080.
MN	470.	450.	800.	420.
BA	860.	1100.	740.	1060.
CO	18.	14.	24.	24.
CU	29.	12.	16.	32.
GA	25.	21.	27.	23.
LI	15.	13.	22.	10.
MO	1.	1.	2.	0.
PB	6.	5.	7.	6.
RB	56.	22.	0.	103.
S	75.	78.	60.	160.
SR	159.	217.	203.	183.
C&H2O	87000.	55400.	92100.	73200.
ZN	53.	65.	68.	70.
ZR	152.	155.	200.	137.
V	100.	80.	40.	180.
NI	78.	90.	122.	114.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-125 816.7 -817.7	ST-126 817.7 -820.0	ST-127 820.0 -821.5	ST-128 821.5 -823.0
SI	311070.	311010.	299690.	284650.
AL	94440.	84960.	79930.	81280.
FE	37800.	42500.	33640.	54710.
MG	6360.	8260.	5940.	8560.
CA	6370.	6620.	18560.	11100.
NA	17400.	17500.	15200.	13900.
K	22840.	24930.	24320.	25490.
TI	5170.	5310.	4200.	4910.
MN	420.	420.	730.	990.
BA	1100.	1200.	1400.	1300.
CO	58.	36.	34.	38.
CU	38.	35.	30.	46.
GA	23.	26.	20.	24.
LI	13.	18.	10.	15.
MO	0.	1.	0.	2.
PB	9.	21.	14.	13.
RB	149.	150.	77.	105.
S	238.	179.	232.	343.
SR	184.	202.	257.	219.
C&H2O	52400.	54700.	43200.	68200.
ZN	107.	74.	94.	116.
ZR	146.	148.	142.	145.
V	200.	180.	160.	160.
NI	204.	142.	132.	170.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-129 823.0 -825.0	ST-130 825.0 -826.0	ST-131 826.0 -827.0	ST-132 827.0 -829.5
SI	310620.	307210.	306010.	278100.
AL	83820.	85070.	82100.	79810.
FE	39470.	35860.	34530.	70700.
MG	9420.	6900.	6680.	8460.
CA	6900.	7370.	9400.	11010.
NA	17400.	17800.	20400.	17500.
K	19020.	21030.	14080.	16700.
TI	5060.	5340.	4700.	4940.
MN	420.	430.	790.	1400.
BA	1300.	1160.	1100.	900.
CO	26.	40.	40.	38.
CU	34.	36.	25.	43.
GA	24.	22.	21.	27.
LI	12.	14.	13.	14.
MO	2.	2.	3.	1.
PB	12.	8.	7.	14.
RB	137.	118.	54.	95.
S	186.	221.	229.	226.
SR	208.	229.	276.	238.
C&H2O	71900.	55300.	53100.	86700.
ZN	137.	127.	62.	131.
ZR	154.	155.	164.	172.
V	140.	140.	140.	100.
NI	172.	138.	134.	136.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-133 829.5 -832.0	ST-134 832.0 -832.5	ST-135 832.5 -833.0	ST-136 833.0 -833.2
SI	328150.	297160.	284900.	308110.
AL	77080.	80950.	97500.	77550.
FE	31560.	32420.	29470.	56130.
MG	6060.	7160.	9200.	10540.
CA	14670.	8410.	16250.	10450.
NA	19930.	25400.	23100.	15000.
K	12810.	11210.	5060.	10820.
TI	4670.	5470.	3940.	4950.
MN	850.	480.	590.	1210.
BA	940.	880.	700.	820.
CO	26.	40.	34.	32.
CU	21.	26.	23.	47.
GA	22.	27.	27.	26.
LI	10.	14.	11.	14.
MO	3.	0.	0.	0.
PB	14.	15.	10.	11.
RB	43.	85.	13.	65.
S	153.	205.	111.	134.
SR	258.	212.	304.	208.
C&H2O	40200.	89800.	76700.	71000.
ZN	67.	71.	91.	90.
ZR	124.	170.	153.	155.
V	60.	160.	60.	140.
NI	126.	120.	180.	170.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-137 833.2 -833.5	ST-138 833.5 -834.0	ST-139 834.0 -838.0	ST-140 838.0 -838.5
SI	269590.	309110.	297290.	287550.
AL	94800.	86520.	84600.	85230.
FE	34900.	27390.	35960.	52810.
MG	13920.	14440.	9500.	11540.
CA	13130.	10120.	14070.	9410.
NA	20200.	18100.	22900.	13500.
K	3420.	11080.	11400.	15300.
TI	3520.	4760.	4440.	5230.
MN	450.	500.	720.	950.
BA	460.	1190.	980.	1040.
CO	34.	42.	28.	40.
CU	22.	31.	22.	38.
GA	25.	22.	22.	21.
LI	11.	13.	10.	13.
MO	0.	5.	16.	1.
PB	7.	15.	12.	11.
RB	0.	56.	47.	97.
S	35.	139.	94.	143.
SR	236.	226.	259.	212.
C&H2O	94400.	55200.	47000.	78700.
ZN	8.	28.	63.	74.
ZR	159.	142.	138.	158.
V	40.	140.	80.	200.
NI	108.	142.	118.	108.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-141 838.5 -840.0	ST-142 840.0 -841.0	ST-143 841.0 -844.2	ST-144 844.2 -845.5
SI	302670.	299230.	296800.	294010.
AL	92070.	84330.	84650.	84170.
FE	22670.	41300.	34000.	45450.
MG	7900.	11520.	9160.	14620.
CA	15200.	12660.	20590.	17080.
NA	18700.	16700.	18400.	16900.
K	10510.	16610.	17960.	20070.
TI	4660.	5050.	4560.	5190.
MN	520.	820.	800.	870.
BA	1000.	960.	1180.	1180.
CO	30.	38.	36.	40.
CU	20.	32.	15.	44.
GA	17.	23.	19.	25.
LI	10.	13.	8.	12.
MO	0.	0.	0.	0.
PB	13.	12.	27.	13.
RB	38.	79.	55.	83.
S	105.	150.	154.	189.
SR	271.	214.	231.	220.
C&H2O	46800.	65700.	40500.	66700.
ZN	70.	99.	73.	103.
ZR	164.	151.	135.	155.
V	160.	220.	160.	240.
NI	74.	140.	170.	146.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-145 845.5 -846.8	ST-146 846.8 -848.0	ST-147 848.0 -849.0	ST-148 849.0 -850.5
SI	291100.	308870.	302260.	307660.
AL	90230.	88910.	84810.	85070.
FE	49570.	38370.	41400.	23750.
MG	11720.	7000.	7240.	14680.
CA	11110.	6760.	6990.	10760.
NA	14100.	13000.	17100.	19800.
K	14250.	19660.	22080.	18650.
TI	5330.	5310.	5060.	4330.
MN	680.	420.	430.	500.
BA	960.	960.	980.	1560.
CO	44.	40.	26.	24.
CU	36.	38.	46.	22.
GA	20.	20.	25.	17.
LI	13.	12.	13.	10.
MO	0.	0.	1.	1.
PB	8.	26.	26.	17.
RB	83.	137.	126.	60.
S	192.	251.	208.	356.
SR	217.	173.	197.	257.
C&H2O	65400.	63400.	47800.	34700.
ZN	101.	58.	67.	68.
ZR	141.	138.	142.	138.
V	200.	200.	200.	140.
NI	170.	130.	134.	114.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-149 850.5 -854.0	ST-150 854.0 -857.0	ST-151 857.0 -858.5	ST-152 858.5 -859.0
SI	312460.	295600.	299950.	300600.
AL	89110.	87480.	81840.	85590.
FE	29320.	38990.	46920.	15510.
MG	15280.	8640.	9680.	18920.
CA	12900.	13920.	9500.	8840.
NA	10300.	14600.	15000.	23100.
K	20100.	19490.	16580.	23790.
TI	5030.	4770.	4750.	3610.
MN	620.	780.	1100.	430.
BA	1400.	960.	1160.	1960.
CO	30.	26.	26.	32.
CU	32.	43.	36.	13.
GA	21.	24.	26.	16.
LI	11.	13.	11.	8.
MO	0.	0.	0.	0.
PB	12.	17.	21.	21.
RB	72.	44.	136.	75.
S	162.	169.	219.	202.
SR	241.	251.	192.	244.
C&H2O	50700.	55500.	66600.	46000.
ZN	75.	83.	92.	54.
ZR	150.	146.	154.	115.
V	180.	160.	120.	80.
NI	142.	140.	120.	84.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-152 859.0 -859.5	ST-154 859.5 -860.5	ST-156 860.7 -865.5	ST-158 866.0 866.2
SI	234350.	303920.	252490.	192610.
AL	35430.	87230.	72490.	45880.
FE	36620.	31240.	62590.	165380.
MG	11940.	7500.	15660.	52600.
CA	7060.	6780.	68490.	23090.
NA	10400.	27300.	15800.	4700.
K	20220.	25060.	12760.	8750.
TI	4630.	5020.	2940.	3230.
MN	650.	510.	1640.	6410.
BA	1150.	1120.	1520.	1720.
CO	32.	34.	26.	59.
CU	20.	32.	24.	42.
GA	23.	20.	21.	14.
LI	15.	15.	12.	16.
MO	2.	1.	1.	0.
PB	33.	17.	15.	12.
RB	111.	126.	54.	53.
S	348.	325.	274.	986.
SR	136.	157.	263.	75.
C&H2O	93600.	77800.	74500.	298700.
ZN	90.	85.	71.	39.
ZR	149.	116.	116.	95.
V	140.	140.	160.	160.
NI	142.	140.	100.	550.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-159 866.2 -870.0	ST-160 870.0 -871.0	ST-161 871.0 -871.3	ST-162 871.3 -872.5
SI	304580.	327160.	323760.	316610.
AL	85210.	81000.	52580.	87080.
FE	42170.	32440.	24670.	40480.
MG	11860.	8280.	17820.	15040.
CA	7170.	5980.	6250.	6570.
NA	15500.	11600.	14900.	11300.
K	17530.	17490.	13740.	18270.
TI	4980.	4930.	5420.	5070.
MN	850.	390.	380.	660.
BA	1060.	1040.	1540.	1440.
CO	24.	24.	30.	38.
CU	27.	23.	23.	21.
GA	19.	18.	18.	26.
LI	13.	11.	12.	13.
MO	1.	0.	1.	1.
PB	31.	30.	24.	17.
RB	149.	184.	106.	159.
S	219.	186.	363.	258.
SR	158.	140.	128.	156.
C&H2O	76900.	47700.	94000.	65400.
ZN	104.	115.	100.	81.
ZR	147.	151.	153.	151.
V	100.	160.	140.	180.
NI	98.	116.	96.	88.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-163 872.5 -876.5	ST-164 876.5 -879.2	ST-165 879.2 -880.0	ST-166 880.0 -882.8
SI	294100.	251930.	307660.	299630.
AL	78350.	71030.	83530.	87480.
FE	29630.	125780.	26730.	37130.
MG	13320.	18400.	13900.	9440.
CA	15390.	12940.	6460.	6440.
NA	16800.	11300.	19800.	15700.
K	19270.	11930.	19100.	11800.
TI	3720.	4310.	4960.	5250.
MN	790.	2850.	410.	440.
BA	1740.	1580.	1380.	1060.
CO	40.	38.	40.	40.
CU	22.	51.	26.	30.
GA	22.	24.	19.	25.
LI	9.	14.	11.	12.
MO	0.	0.	1.	1.
PB	20.	12.	11.	20.
RB	80.	77.	121.	144.
S	217.	163.	501.	115.
SR	212.	176.	115.	167.
C&H2O	43500.	129700.	59500.	57600.
ZN	53.	77.	72.	68.
ZR	141.	123.	119.	143.
V	120.	140.	120.	260.
NI	90.	318.	100.	126.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-167 882.3 -884.5	ST-168 884.5 -885.5	ST-169 885.5 -887.0	ST-170 887.0 891.4
SI	283670.	301840.	301930.	303760.
AL	88520.	85590.	88030.	85070.
FE	38170.	35660.	31690.	28000.
MG	3220.	13960.	10920.	9920.
CA	6970.	7430.	8680.	8270.
NA	14900.	18700.	18600.	22600.
K	9870.	11060.	9140.	10550.
TI	5420.	4560.	4110.	4090.
MN	420.	420.	610.	420.
BA	1620.	1540.	1280.	1240.
CO	44.	42.	46.	42.
CU	11.	32.	27.	22.
GA	22.	22.	21.	14.
LI	15.	13.	10.	10.
MO	1.	1.	1.	2.
PB	3.	10.	4.	9.
RB	122.	104.	67.	56.
S	247.	175.	158.	242.
SR	164.	207.	234.	277.
C&H2O	105600.	68900.	69000.	37400.
ZN	95.	76.	77.	86.
ZR	140.	155.	144.	145.
V	180.	140.	220.	140.
NI	112.	102.	100.	94.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-171 891.4 -892.5	ST-172 892.5 -899.0	ST-173 904.0 -905.2	ST-174 905.2 -907.7
SI	303960.	299180.	310630.	296570.
AL	83640.	83150.	90820.	77080.
FE	39620.	31710.	27950.	58660.
MG	8260.	6640.	9320.	8500.
CA	8450.	7810.	9120.	10120.
NA	16700.	26800.	18700.	15900.
K	3330.	24570.	18720.	17080.
TI	4770.	5290.	4790.	5030.
MN	830.	440.	440.	1190.
BA	1000.	960.	960.	880.
CO	40.	42.	36.	40.
CU	36.	31.	27.	35.
GA	22.	22.	20.	22.
LI	13.	14.	11.	14.
MO	0.	1.	0.	1.
PB	3.	2.	5.	1.
RB	93.	122.	81.	102.
S	268.	182.	147.	187.
SR	205.	172.	211.	193.
C&H2O	58300.	48700.	50000.	63600.
ZN	80.	80.	87.	76.
ZR	141.	135.	142.	151.
V	160.	180.	140.	200.
NI	118.	98.	108.	154.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-175 907.7 -909.5	ST-176 909.5 -912.5	ST-177 912.5 -917.5	ST-178 917.5 920.0
SI	303520.	309970.	290360.	317500.
AL	84060.	85900.	73870.	81280.
FE	31780.	27340.	47780.	33170.
MG	5960.	6940.	6040.	5060.
CA	9800.	10790.	9590.	8270.
NA	19100.	16600.	14100.	16700.
K	12620.	15060.	12550.	20780.
TI	4890.	4400.	4850.	4850.
MN	600.	610.	1010.	420.
BA	940.	1040.	960.	960.
CO	42.	40.	34.	124.
CU	22.	24.	28.	31.
GA	19.	21.	17.	23.
LI	15.	11.	12.	12.
MO	0.	1.	2.	1.
PB	5.	9.	3.	4.
RB	72.	66.	92.	125.
S	227.	154.	285.	306.
SR	197.	244.	189.	198.
C&H2O	75400.	54900.	78800.	46600.
ZN	60.	76.	65.	73.
ZR	162.	154.	158.	156.
V	140.	140.	160.	180.
NI	112.	90.	112.	264.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-179 920.0 921.5	ST-180 921.5 924.8	ST-181 924.8 -929.6	ST-182 929.6 -933.0
SI	300360.	299690.	310630.	298400.
AL	85050.	82280.	84440.	82280.
FE	49470.	41730.	37290.	37410.
MG	6620.	6440.	6340.	8140.
CA	9910.	8140.	9280.	14940.
NA	14900.	25600.	14800.	16100.
K	13130.	17210.	11880.	9000.
TI	5130.	5080.	4760.	4270.
MN	970.	430.	480.	750.
BA	960.	940.	1040.	1100.
CO	44.	32.	34.	32.
CU	48.	41.	34.	23.
GA	28.	28.	23.	24.
LI	14.	14.	12.	10.
MO	2.	0.	2.	0.
PB	14.	21.	8.	11.
RB	121.	133.	91.	39.
S	214.	155.	229.	123.
SR	204.	221.	213.	262.
C&H2O	63100.	52800.	64900.	66000.
ZN	94.	96.	79.	57.
ZR	154.	152.	152.	158.
V	130.	160.	140.	120.
NI	140.	66.	70.	84.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-183 933.0 -933.5	ST-184 933.5 -935.5	ST-185 935.5 -936.0	ST-186 936.0 -938.5
SI	294190.	309460.	307910.	318150.
AL	83770.	94750.	84380.	82500.
FE	50340.	30290.	26150.	31380.
MG	8120.	8000.	5760.	5840.
CA	12390.	8810.	8670.	10450.
NA	14900.	10700.	12400.	12900.
K	13950.	9180.	7560.	9300.
TI	5420.	4490.	4680.	4130.
MN	1230.	530.	410.	470.
BA	930.	900.	920.	760.
CO	40.	36.	34.	52.
CU	60.	24.	20.	20.
GA	27.	21.	17.	20.
LI	13.	11.	13.	15.
MO	1.	7.	1.	2.
PB	7.	8.	5.	12.
RB	92.	60.	57.	62.
S	256.	261.	303.	204.
SR	205.	181.	165.	245.
C&H2O	72400.	73400.	93200.	117700.
ZN	73.	48.	40.	73.
ZR	144.	136.	138.	155.
V	200.	140.	120.	200.
NI	120.	98.	90.	120.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-187 938.5 -939.0	ST-188 939.0 -944.5	ST-189 944.5 -945.7	ST-190 945.7 -947.5
SI	304720.	302660.	305150.	305890.
AL	79070.	83370.	86720.	85750.
FE	31420.	44220.	35640.	36210.
MG	6480.	8360.	6320.	7940.
CA	9160.	10350.	7930.	8080.
NA	22200.	16500.	16400.	16600.
K	8640.	14220.	9350.	9440.
TI	4410.	5060.	5040.	4810.
MN	460.	790.	490.	420.
BA	980.	980.	860.	1060.
CO	30.	40.	36.	38.
CU	22.	33.	19.	23.
GA	20.	30.	22.	23.
LI	12.	13.	13.	12.
MO	2.	0.	1.	1.
PB	11.	9.	7.	14.
RB	77.	104.	92.	81.
S	269.	172.	188.	148.
SR	198.	190.	161.	171.
C&H2O	72610.	66900.	83600.	73700.
ZN	60.	93.	74.	78.
ZR	130.	137.	126.	131.
V	140.	160.	140.	140.
NI	90.	124.	106.	112.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-191 947.5 -954.0	ST-192 959.0 -960.2	ST-193 960.2 -960.5	ST-197 970.0 -971.0
SI	294920.	318640.	302270.	337340.
AL	85590.	82880.	88370.	82390.
FE	53040.	34610.	39430.	13140.
MG	7620.	6960.	8640.	2900.
CA	10260.	7350.	8930.	7350.
NA	30800.	13100.	14400.	15900.
K	9460.	14890.	12680.	46790.
TI	4320.	5140.	4870.	4860.
MN	1060.	440.	640.	430.
BA	860.	900.	1000.	1080.
CO	36.	36.	52.	46.
CU	26.	35.	22.	18.
GA	25.	21.	23.	16.
LI	11.	13.	14.	9.
MO	0.	1.	1.	1.
PB	8.	17.	9.	12.
RB	76.	101.	83.	113.
S	156.	216.	162.	341.
SR	216.	161.	201.	137.
C&H2O	85100.	57600.	63800.	63900.
ZN	89.	75.	100.	63.
ZR	159.	136.	148.	131.
V	120.	160.	140.	140.
NI	136.	102.	142.	82.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-198 971.0 -972.8	ST-199 972.8 -973.5	ST-200 973.5 974.0	ST-201 974.0 -975.0
SI	298710.	201830.	318070.	281930.
AL	86620.	83470.	78660.	80890.
FE	30380.	48540.	19920.	24370.
MG	7980.	18660.	5000.	9880.
CA	14140.	10430.	11560.	8360.
NA	17500.	16100.	18100.	12700.
K	18690.	13450.	10630.	6810.
TI	4160.	4260.	3430.	4980.
MN	690.	1190.	570.	420.
BA	1060.	1240.	980.	820.
CO	36.	42.	38.	36.
CU	14.	25.	13.	6.
GA	19.	27.	16.	14.
LI	10.	12.	9.	156.
MO	1.	2.	1.	6.
PB	26.	14.	17.	5.
RB	62.	30.	39.	30.
S	346.	160.	229.	452.
SR	226.	248.	241.	76.
C&H2O	34500.	63000.	49100.	205800.
ZN	62.	64.	64.	39.
ZR	122.	147.	110.	106.
V	80.	140.	60.	140.
NI	60.	86.	54.	66.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-202 975.0 975.5	ST-203 975.5 -979.2	ST-204 979.2 -980.7	ST-205 980.7 -982.0
SI	306020.	319800.	313630.	314560.
AL	88520.	79700.	87180.	81170.
FE	30440.	31260.	42570.	33480.
MG	9740.	8780.	10240.	12680.
CA	7830.	8270.	9280.	8950.
NA	11500.	16100.	16100.	30100.
K	6260.	5950.	8850.	10130.
TI	4500.	3850.	4410.	4420.
MN	460.	450.	710.	430.
BA	940.	680.	820.	920.
CO	34.	26.	32.	28.
CU	14.	19.	35.	34.
GA	25.	19.	25.	25.
LI	122.	11.	9.	11.
MO	1.	0.	0.	2.
PB	11.	9.	15.	5.
RB	55.	59.	78.	88.
S	47.	78.	99.	84.
SR	147.	153.	209.	189.
C&H2O	74200.	70100.	65800.	62900.
ZN	34.	43.	81.	80.
ZR	117.	125.	128.	123.
V	180.	130.	140.	160.
NI	102.	68.	118.	86.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-206 982.0 -985.2	ST-207 985.2 -988.0	ST-209 989.0 -989.3	ST-211 989.5 -995.5
SI	297340.	302080.	293870.	317100.
AL	80780.	77430.	80950.	88820.
FE	27150.	33630.	29350.	20320.
MG	9320.	7040.	17580.	13220.
CA	9630.	25030.	9830.	10030.
NA	16400.	14900.	13700.	17000.
K	7300.	7570.	2530.	6270.
TI	3930.	3590.	860.	3550.
MN	550.	920.	410.	430.
BA	840.	840.	560.	1100.
CO	18.	30.	16.	15.
CU	23.	28.	9.	16.
GA	22.	20.	20.	21.
LI	9.	14.	8.	10.
MO	0.	1.	0.	1.
PB	6.	9.	7.	14.
RB	49.	36.	0.	23.
S	73.	166.	57.	115.
SR	209.	234.	123.	228.
CGH2O	57100.	99500.	85900.	49100.
ZN	64.	58.	13.	52.
ZR	131.	128.	93.	136.
V	120.	160.	0.	80.
NI	79.	133.	70.	74.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-212 995.5-1001.5	ST-213 1001.5-1004.0	ST-214 1004.0-1005.0	ST-216 1007.5-1013.0
SI	303350.	299990.	250650.	315320.
AL	92880.	92070.	73560.	91800.
FE	24580.	27360.	84590.	38050.
MG	4820.	6620.	5740.	5900.
CA	6650.	6700.	45880.	7010.
NA	11200.	12100.	8200.	12200.
K	51680.	40030.	51580.	20110.
TI	5240.	5560.	3330.	5730.
MN	540.	420.	2790.	610.
BA	900.	780.	1180.	840.
CO	24.	36.	24.	26.
CU	38.	36.	29.	27.
GA	27.	29.	29.	30.
LI	12.	15.	8.	17.
MO	1.	1.	2.	1.
PB	16.	16.	17.	19.
RB	171.	175.	152.	156.
S	192.	252.	234.	122.
SR	118.	130.	143.	164.
C&H2O	29500.	67300.	67500.	56400.
ZN	100.	79.	77.	108.
ZR	124.	142.	113.	146.
V	180.	200.	100.	180.
NI	99.	134.	216.	112.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-217 1013.0-1015.0	ST-218 1015.0 1017.5	ST-219 1017.5-1023.0	ST-220 1023.0-1024.0
SI	302080.	279810.	329200.	313210.
AL	90640.	85490.	86210.	85280.
FE	30660.	66230.	26640.	29360.
MG	9660.	5960.	7260.	4880.
CA	7160.	10650.	7000.	7910.
NA	9700.	13700.	13800.	13700.
K	17680.	20250.	7210.	6600.
TI	5780.	4780.	5230.	4500.
MN	410.	1460.	410.	420.
BA	980.	920.	860.	660.
CO	34.	26.	18.	24.
CU	34.	36.	17.	17.
GA	23.	21.	14.	15.
LI	21.	15.	18.	15.
MO	1.	2.	2.	1.
PB	6.	9.	11.	10.
RB	136.	115.	64.	48.
S	190.	187.	117.	312.
SR	132.	148.	116.	134.
C&H2O	88000.	110500.	61300.	95300.
ZN	110.	97.	28.	61.
ZR	131.	140.	138.	143.
V	200.	120.	100.	100.
NI	102.	152.	70.	76.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-221 1024.0-1030.0	ST-222 1030.0-1035.2	ST-223 1035.2-1036.0	ST-224 1036.0-1040.5
SI	317510.	317860.	311500.	306390.
AL	86000.	82990.	84280.	77080.
FE	24180.	21680.	36210.	20090.
MG	10840.	6900.	8940.	10600.
CA	10400.	12330.	9350.	16530.
NA	33300.	17900.	11600.	15700.
K	6550.	6680.	20420.	5010.
TI	3480.	3530.	4810.	2340.
MN	430.	450.	470.	500.
BA	1420.	1100.	800.	860.
CO	24.	34.	28.	32.
CU	20.	19.	18.	12.
GA	20.	17.	18.	17.
LI	12.	12.	15.	10.
MO	2.	1.	4.	2.
PB	17.	13.	8.	13.
RB	30.	27.	102.	20.
S	82.	168.	271.	78.
SR	237.	227.	150.	219.
C&H2O	49400.	53500.	35200.	59700.
ZN	51.	68.	78.	64.
ZR	129.	132.	232.	126.
V	100.	100.	120.	40.
NI	60.	76.	94.	88.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-225 1040.5-1040.6	ST-226 1040.6-1041.4	ST-227 1041.4-1041.5	ST-228 1041.5-1042.0
SI	289880.	324390.	298640.	359760.
AL	89570.	69410.	75460.	61870.
FE	32510.	22230.	23380.	18830.
MG	6300.	7240.	7780.	4640.
CA	11470.	8420.	64970.	7130.
NA	15700.	9800.	12700.	8700.
K	2560.	5000.	3090.	4270.
TI	2310.	2370.	1180.	6290.
MN	460.	420.	1150.	400.
BA	1060.	700.	760.	620.
CO	26.	38.	12.	14.
CU	11.	18.	19.	12.
GA	19.	12.	21.	6.
LI	12.	16.	11.	18.
MO	2.	2.	1.	4.
PB	20.	10.	12.	7.
RB	10.	35.	0.	25.
S	63.	74.	82.	192.
SR	207.	229.	176.	83.
CO2H2O	68700.	52100.	67300.	77800.
ZN	44.	41.	23.	15.
ZR	127.	92.	101.	77.
V	60.	80.	20.	40.
NI	66.	94.	72.	66.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-229 1042.0-1043.0	ST-230 1043.0-1049.0	ST-231 1049.0-1054.2	ST-232 1054.2-1055.2
SI	265470.	310720.	323430.	305550.
AL	64450.	85120.	82770.	87630.
FE	119060.	31440.	14420.	33990.
MG	16220.	5120.	7440.	4740.
CA	19750.	7480.	10440.	7970.
NA	11300.	13500.	14500.	29100.
K	2850.	12040.	34800.	16620.
TI	6610.	5040.	4070.	5460.
MN	1990.	420.	450.	420.
BA	1180.	860.	1520.	800.
CO	24.	34.	30.	36.
CU	18.	0.	15.	29.
GA	19.	20.	14.	23.
LI	14.	13.	10.	17.
MO	2.	0.	1.	1.
PB	21.	12.	19.	17.
RB	0.	110.	80.	120.
S	215.	142.	74.	132.
SR	173.	147.	176.	185.
C&H2O	96700.	66200.	26200.	56500.
ZN	40.	71.	62.	69.
ZR	119.	138.	123.	154.
V	40.	140.	80.	180.
NI	244.	86.	82.	96.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-233 1055.2-1061.0	ST-234 1061.0-1063.0	ST-235 1063.0-1064.0	ST-236 1064.0-1067.0
SI	310250.	311070.	304670.	324690.
AL	82320.	82170.	84860.	80330.
FE	36630.	31240.	24510.	11830.
MG	5880.	4620.	3860.	1660.
CA	9000.	8170.	7560.	23140.
NA	21300.	14400.	12900.	9000.
K	10280.	11540.	34240.	48980.
TI	4400.	4990.	4530.	3750.
MN	500.	400.	420.	550.
BA	840.	780.	1100.	1420.
CO	42.	36.	39.	46.
CU	24.	22.	23.	20.
GA	21.	23.	18.	18.
LI	13.	10.	16.	6.
MO	1.	0.	0.	1.
PB	12.	14.	8.	14.
RB	93.	113.	131.	163.
S	130.	73.	144.	208.
SR	212.	196.	185.	129.
C&H2O	71800.	50100.	25900.	21000.
ZN	78.	52.	65.	48.
ZR	152.	139.	129.	121.
V	140.	140.	120.	100.
NI	120.	102.	32.	62.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-237 1067.0-1070.5	ST-238 1070.5-1072.0	ST-239 1072.0-1073.0	ST-240 1073.0-1074.0
SI	298440.	313400.	307440.	311050.
AL	79070.	84750.	83470.	82330.
FE	64440.	32310.	33950.	29360.
MG	5700.	4680.	4440.	4340.
CA	8740.	7850.	8040.	8860.
NA	15600.	16200.	15800.	31300.
K	35950.	28760.	30290.	19810.
TI	4490.	4740.	5010.	4710.
MN	1090.	440.	470.	530.
BA	1000.	940.	940.	820.
CO	34.	48.	36.	32.
CU	35.	28.	37.	24.
GA	23.	21.	22.	20.
LI	10.	12.	13.	11.
MO	0.	0.	0.	1.
PB	0.	12.	9.	8.
RB	165.	164.	152.	104.
S	208.	444.	307.	117.
SR	175.	234.	198.	229.
C&H2O	65300.	58200.	72700.	47400.
ZN	68.	106.	115.	68.
ZR	143.	142.	135.	139.
V	120.	140.	140.	120.
NI	116.	96.	96.	72.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-241 1074.0-1075.2	ST-242 1075.2-1078.5	ST-243 1078.5-1079.0	ST-244 1079.0-1080.2
SI	311080.	323700.	312820.	315870.
AL	85640.	85280.	80720.	81950.
FE	33690.	29930.	30470.	20130.
MG	4500.	4160.	3992.	4120.
CA	8520.	7560.	8240.	9850.
NA	17700.	22900.	14700.	18400.
K	22140.	18330.	24510.	13190.
TI	5050.	5150.	5160.	3820.
MN	640.	430.	430.	440.
BA	900.	800.	864.	940.
CO	38.	34.	40.	28.
CU	23.	34.	32.	25.
GA	16.	23.	22.	20.
LI	12.	11.	12.	8.
MO	0.	1.	1.	1.
PB	7.	9.	6.	10.
RB	71.	129.	149.	62.
S	115.	137.	276.	157.
SR	131.	184.	179.	241.
C&H2O	46900.	56900.	84400.	42900.
ZN	53.	68.	82.	57.
ZR	93.	144.	157.	144.
V	140.	140.	160.	80.
NI	84.	90.	82.	60.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-245 1080.2-1081.2	ST-246 1081.2-1082.5	ST-247 1082.5-1083.0	ST-248 1083.0-1083.5
SI	282890.	283460.	296860.	325620.
AL	79410.	79990.	83850.	85950.
FE	78710.	62900.	33150.	28770.
MG	5100.	10860.	13220.	4400.
CA	8930.	12460.	8090.	7770.
NA	11200.	17600.	15000.	15800.
K	18470.	11580.	10830.	11240.
TI	4660.	4440.	4940.	4610.
MN	3470.	1310.	420.	410.
BA	840.	840.	1220.	680.
CO	40.	34.	50.	34.
CU	50.	35.	21.	16.
GA	29.	26.	22.	84.
LI	14.	10.	13.	10.
MO	2.	1.	2.	0.
PB	31.	9.	31.	11.
RB	132.	73.	82.	89.
S	205.	182.	319.	64.
SR	184.	252.	177.	183.
C&H2O	104400.	78900.	95700.	56600.
ZN	65.	95.	115.	28.
ZR	150.	157.	167.	141.
V	180.	120.	120.	100.
NI	180.	144.	100.	70.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-249 1083.5 1085.5	ST-250 1085.5-1087.5	ST-251 1087.5-1093.5	ST-252 1093.5-1096.0
SI	316160.	316980.	306880.	326810.
AL	84440.	84170.	80500.	82550.
FE	29390.	34940.	22860.	31940.
MG	4390.	5280.	4760.	5760.
CA	3120.	8610.	14010.	8070.
NA	15700.	14700.	36300.	19200.
K	11940.	14710.	7680.	13000.
TI	4740.	4870.	3250.	4950.
MN	410.	420.	540.	410.
BA	760.	700.	840.	760.
CO	34.	38.	34.	58.
CU	6.	25.	8.	22.
GA	24.	21.	84.	24.
LI	12.	12.	9.	12.
MO	2.	1.	1.	0.
PB	7.	5.	16.	10.
RB	93.	109.	21.	130.
S	110.	127.	112.	191.
SR	186.	208.	275.	198.
C&H2O	68800.	56000.	39400.	56600.
ZN	54.	71.	48.	51.
ZR	156.	138.	132.	144.
V	120.	160.	80.	140.
NI	66.	94.	70.	116.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-253 1096.0-1097.0	ST-254 1097.0-1101.0	ST-255 1101.0-1104.0	ST-256 1104.0-1105.5
SI	313870.	301920.	312180.	320720.
AL	83310.	84540.	83150.	35380.
FE	33160.	37100.	35490.	30760.
MG	6420.	5220.	4160.	5140.
CA	9230.	8180.	8490.	8490.
NA	13000.	12600.	20300.	15500.
K	10110.	10010.	15700.	17000.
TI	4260.	4720.	5080.	4920.
MN	420.	400.	410.	430.
BA	720.	700.	960.	900.
CO	52.	36.	30.	46.
CU	27.	25.	32.	34.
GA	23.	20.	15.	19.
LI	13.	11.	13.	17.
MO	1.	1.	0.	12.
PB	20.	13.	10.	15.
RB	82.	117.	125.	106.
S	291.	34.	73.	132.
SR	198.	198.	219.	206.
C&H2O	85600.	68100.	55500.	64700.
ZN	120.	61.	55.	82.
ZR	131.	135.	141.	145.
V	100.	120.	140.	120.
NI	96.	92.	76.	94.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-257 1105.5-1108.0	ST-258 1108.0-1109.5	ST-259 1109.5-1112.0	ST-260 1112.0-1112.7
SI	306650.	316570.	320110.	302490.
AL	84280.	86060.	82610.	87380.
FE	40720.	33690.	31820.	39770.
MG	5480.	4600.	4700.	5860.
CA	8430.	7400.	7510.	12650.
NA	15300.	12400.	15800.	17700.
K	15420.	11630.	12120.	8560.
TI	4890.	5270.	4850.	3510.
MN	420.	410.	400.	800.
BA	860.	720.	700.	920.
CO	34.	36.	32.	28.
CU	34.	25.	28.	12.
GA	20.	26.	22.	22.
LI	12.	14.	10.	9.
MO	0.	2.	1.	1.
PB	[illegible]	15.	4.	11.
RB	[illegible]	115.	124.	31.
S	[illegible]	67.	26.	131.
SR	[illegible]	166.	176.	294.
C&H2O	[illegible]	69800.	61700.	48000.
ZN	95.	51.	44.	52.
ZR	143.	132.	125.	131.
V	140.	160.	140.	80.
NI	94.	104.	70.	76.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-261 1112.7-1115.0	ST-262 1115.0-1117.5	ST-263 1117.5-1123.0	ST-264 1123.0 1127.0
SI	343860.	303960.	295490.	303470.
AL	80950.	74970.	82060.	84010.
FE	25830.	34810.	21240.	27240.
MG	3430.	15600.	2600.	3340.
CA	8250.	11210.	56840.	24580.
NA	18500.	11900.	14100.	12200.
K	11720.	12340.	18690.	18120.
TI	4570.	4490.	3580.	4180.
MN	400.	1450.	660.	690.
BA	720.	1020.	1060.	900.
CO	26.	42.	26.	30.
CU	29.	44.	21.	20.
GA	19.	22.	24.	23.
LI	8.	11.	9.	9.
MO	1.	1.	1.	1.
PB	6.	4.	12.	12.
PB	91.	107.	60.	0.
S	81.	131.	43.	77.
SR	216.	215.	282.	284.
C&H2O	44500.	72300.	25500.	30800.
ZN	48.	66.	62.	56.
ZR	140.	144.	102.	114.
V	80.	140.	80.	90.
NI	60.	150.	56.	62.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-265 1127.0-1130.0	ST-266 1130.0-1132.0	ST-267 1132.0-1135.0	ST-268 1135.0-1136.0
SI	313640.	307580.	307990.	320250.
AL	86260.	83370.	84860.	79760.
FE	34090.	29450.	31140.	26940.
MG	[illegible]	11280.	5720.	4340.
CA	9480.	12820.	8270.	7420.
NA	[illegible]	18500.	14100.	9900.
K	9010.	6450.	7590.	10230.
TI	4120.	3700.	4590.	5120.
MN	500.	650.	410.	410.
BA	460.	920.	620.	620.
CO	32.	24.	30.	38.
CU	25.	8.	23.	24.
GA	29.	23.	26.	21.
LI	16.	10.	13.	7.
MO	2.	2.	1.	2.
PB	7.	7.	9.	5.
RB	72.	28.	75.	90.
S	79.	119.	168.	305.
SR	215.	246.	161.	130.
C&H2O	62700.	52700.	88400.	108500.
ZN	72.	61.	77.	45.
ZR	140.	148.	125.	126.
V	120.	80.	120.	160.
NI	82.	86.	74.	72.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-269 1136.0-1137.5	ST-270 1137.5-1140.0	ST-271 1140.0-1141.0	ST-272 1141.0-1142.0
SI	317750.	300610.	310520.	300200.
AL	78430.	81280.	86700.	86700.
FE	22990.	18710.	29020.	26900.
MG	4240.	3620.	3940.	4060.
CA	7150.	6830.	7270.	7860.
NA	13200.	10100.	16000.	15600.
K	34220.	47750.	27140.	42230.
TI	4880.	4980.	4330.	4740.
MN	410.	400.	410.	420.
BA	800.	760.	760.	800.
CO	32.	30.	22.	32.
CU	34.	19.	21.	31.
GA	21.	20.	26.	26.
LI	14.	15.	11.	13.
MO	2.	1.	2.	1.
PB	16.	9.	32.	5.
RB	112.	89.	113.	108.
S	250.	443.	116.	211.
SR	145.	90.	173.	191.
C&H2O	63300.	142600.	39500.	49600.
ZN	117.	66.	30.	117.
ZR	130.	111.	140.	136.
V	100.	100.	80.	100.
NI	80.	68.	50.	64.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-273 1142.0-1143.0	ST-274 1143.0-1150.0	ST-275 1150.0-1151.0	ST-276 1151.0-1154.5
SI	306920.	302360.	297990.	301890.
AL	82920.	90120.	83450.	87700.
FE	15710.	26240.	18470.	25300.
MG	25620.	7200.	5700.	6400.
CA	9900.	8510.	10930.	9570.
NA	19900.	16900.	21500.	19800.
K	15320.	22440.	10400.	12990.
TI	3980.	4930.	4860.	4880.
MN	420.	430.	420.	430.
BA	1620.	780.	760.	720.
CO	26.	30.	26.	26.
CU	20.	37.	20.	45.
GA	21.	24.	22.	27.
LI	9.	12.	7.	10.
MO	1.	0.	1.	19.
PB	14.	7.	4.	12.
RB	50.	100.	45.	80.
S	70.	121.	88.	92.
SR	236.	196.	260.	224.
C&H2O	26300.	57100.	35000.	50600.
ZN	48.	82.	64.	87.
ZR	51.	141.	150.	135.
V	80.	120.	100.	100.
NI	46.	64.	46.	52.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-277 1154.5-1156.5	ST-278 1156.5-1157.5	ST-279 1157.5-1160.0	ST-281 1165.0-1170.0
SI	294540.	289580.	263240.	311650.
AL	82920.	86610.	75620.	85310.
FE	47250.	46190.	106300.	20480.
MG	8040.	3900.	6680.	6780.
CA	9680.	38120.	12700.	12640.
NA	17900.	28000.	19700.	14300.
K	15270.	10660.	11490.	6660.
TI	4690.	4440.	4160.	3330.
MN	910.	650.	2230.	500.
BA	760.	940.	680.	1340.
CO	34.	24.	30.	32.
CU	38.	30.	45.	15.
GA	107.	23.	28.	21.
LI	12.	7.	12.	8.
MO	3.	0.	2.	0.
PB	9.	26.	8.	27.
RB	92.	32.	94.	15.
S	109.	104.	124.	61.
SR	196.	266.	171.	255.
C&H2O	63900.	31300.	129500.	40100.
ZN	79.	65.	70.	51.
ZR	144.	161.	137.	169.
V	120.	60.	140.	60.
NI	64.	68.	72.	46.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-282 1170.0-1175.5	ST-283 1175.5-1176.0	ST-284 1176.0-1179.0	ST-285 1179.0-1180.0
SI	291460.	281160.	293340.	288730.
AL	76690.	71290.	81980.	88940.
FE	41350.	24420.	24910.	26810.
MG	5840.	4100.	4540.	5540.
CA	13470.	7690.	13230.	7680.
NA	19000.	15800.	20100.	16400.
K	7320.	6820.	8490.	14510.
TI	2340.	2790.	2830.	4800.
MN	910.	1390.	660.	410.
BA	1400.	1000.	1180.	840.
CO	36.	32.	22.	44.
CU	18.	24.	13.	27.
GA	24.	23.	19.	15.
LI	8.	8.	8.	13.
MO	1.	0.	0.	0.
PB	23.	19.	10.	35.
RB	17.	24.	23.	93.
S	57.	71.	33.	119.
SR	269.	242.	253.	166.
C&H2O	47000.	52200.	36100.	87800.
ZN	43.	58.	47.	93.
ZR	135.	156.	140.	120.
V	60.	60.	40.	100.
NI	42.	42.	26.	50.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-286 1180.0-1180.5	ST-287 1180.5-1181.0	ST-288 1181.0-1182.0	ST-289 1182.0-1184.0
SI	278260.	277370.	297690.	287540.
AL	83980.	81440.	91010.	88100.
FE	25300.	27800.	30030.	30990.
MG	5640.	7360.	5260.	5940.
CA	8800.	7270.	7170.	7490.
NA	17900.	9300.	10700.	12300.
K	9310.	13020.	12960.	13390.
TI	4240.	5110.	5090.	4870.
MN	420.	410.	410.	420.
BA	940.	490.	860.	700.
CO	38.	64.	36.	46.
CU	27.	26.	31.	33.
GA	16.	14.	18.	20.
LI	10.	22.	14.	15.
MO	1.	2.	0.	1.
PB	13.	8.	8.	8.
RB	69.	92.	114.	111.
S	107.	307.	75.	143.
SR	214.	99.	153.	154.
C&H2O	67500.	175500.	73100.	90500.
ZN	79.	37.	68.	77.
ZR	126.	107.	119.	126.
V	60.	160.	122.	120.
NI	42.	80.	46.	78.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-290 1179.0-1181.5	ST-294 1184.0-1188.0	ST-295 1188.0-1189.0	ST-296 1184.0-1185.5
SI	279040.	272630.	283310.	294010.
AL	80480.	85120.	86610.	87110.
FE	43500.	77400.	45710.	28810.
MG	11360.	20800.	6680.	13680.
CA	13760.	8130.	8330.	7330.
NA	13700.	12000.	17500.	14100.
K	5860.	10370.	11380.	9130.
TI	2170.	4640.	5000.	4840.
MN	850.	1420.	1140.	410.
BA	1260.	1600.	880.	1240.
CO	34.	62.	40.	52.
CU	20.	37.	28.	20.
GA	11.	32.	23.	22.
LI	9.	12.	10.	15.
MO	2.	1.	2.	1.
PB	11.	13.	8.	5.
RB	17.	140.	122.	105.
S	95.	117.	155.	97.
SR	252.	188.	179.	144.
C&H2O	49800.	68700.	61500.	71700.
ZN	77.	129.	122.	132.
ZR	135.	136.	152.	117.
V	40.	80.	60.	100.
NI	42.	102.	50.	46.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-297 1185.5-1189.0	ST-298 1189.0-1190.0	ST-299 1190.0-1192.0	ST-300 1192.0-1193.0
SI	299920.	277820.	274220.	279890.
AL	84650.	83060.	79820.	79150.
FE	32900.	55470.	42340.	51600.
MG	6140.	6980.	64200.	7920.
CA	7540.	8700.	11990.	9280.
NA	16500.	12400.	15800.	10700.
K	7370.	11470.	9200.	20640.
TI	4250.	4880.	3900.	5190.
MN	460.	1330.	1280.	1120.
BA	740.	800.	1000.	920.
CO	38.	54.	46.	68.
CU	10.	28.	29.	48.
GA	23.	29.	26.	27.
LI	11.	15.	10.	15.
MO	1.	1.	0.	0.
PB	9.	8.	16.	20.
RB	88.	127.	65.	107.
S	83.	115.	145.	328.
SR	169.	189.	239.	154.
C&H2O	57000.	89500.	83900.	119800.
ZN	61.	116.	68.	87.
ZR	136.	140.	145.	139.
V	60.	120.	60.	100.
NI	24.	52.	46.	76.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-301 1193.0-1198.0	ST-304 1200.5-1203.5	ST-306 1204.0-1207.5	ST-307 1207.5-1208.5
SI	298700.	276600.	305810.	278230.
AL	88860.	82620.	85730.	30780.
FE	28270.	46010.	16930.	25530.
MG	14940.	6840.	6340.	6600.
CA	7050.	13460.	9820.	8290.
NA	11700.	11000.	14100.	11500.
K	23860.	21200.	10650.	11790.
TI	5280.	5160.	4190.	4630.
MN	600.	900.	460.	590.
BA	920.	890.	920.	400.
CO	64.	50.	46.	64.
CU	46.	47.	21.	36.
GA	28.	24.	16.	18.
LI	17.	13.	9.	18.
MO	0.	0.	0.	1.
PB	9.	17.	22.	30.
RB	140.	116.	45.	53.
S	94.	151.	151.	318.
SR	132.	170.	185.	126.
(H_2O)	54100.	82800.	59800.	151900.
ZN	78.	136.	54.	48.
ZR	116.	173.	110.	125.
V	120.	120.	40.	160.
NI	96.	79.	68.	28.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-308 1208.5-1211.0	ST-309 1211.0-1213.0	ST-310 1213.0-1214.0	ST-312 1217.0-1221.5
SI	273100.	296020.	259030.	270610.
AL	83590.	88410.	85730.	86840.
FE	49290.	24500.	57100.	34000.
MG	13480.	8640.	7600.	8360.
CA	19160.	8910.	8190.	6670.
NA	14100.	16900.	9700.	13500.
K	9850.	13770.	6770.	20630.
TI	3930.	4880.	4020.	5410.
MN	1280.	460.	500.	420.
BA	1020.	840.	640.	760.
CO	44.	48.	56.	38.
CU	28.	30.	20.	45.
GA	22.	17.	21.	21.
LI	8.	13.	18.	17.
MO	2.	1.	2.	0.
PB	19.	20.	83.	9.
RB	49.	73.	78.	62.
S	196.	226.	1697.	95.
SR	243.	189.	165.	133.
C&H2O	82400.	61700.	143400.	71700.
ZN	96.	86.	73.	72.
ZR	148.	137.	132.	123.
V	80.	100.	100.	160.
NI	78.	74.	100.	90.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-313 1221.5-1225.0	ST-314 1225.0-1226.0	ST-315 1226.0 1228.5	ST-317 1232.0-1234.5
SI	273880.	288360.	296090.	290320.
AL	82180.	93230.	88720.	81590.
FE	63150.	21210.	24100.	29450.
MG	11760.	16340.	7320.	6720.
CA	20810.	7430.	6650.	6700.
NA	13900.	16100.	12100.	11200.
K	15790.	22540.	31350.	10380.
TI	4480.	5000.	5620.	4800.
MN	1040.	480.	450.	460.
BA	820.	1260.	720.	640.
CO	38.	58.	58.	38.
CU	34.	30.	38.	31.
GA	22.	16.	23.	26.
LI	11.	12.	17.	15.
MO	2.	1.	2.	1.
PB	14.	12.	9.	5.
RB	74.	86.	124.	106.
S	100.	137.	126.	63.
SR	194.	159.	128.	138.
C&H2O	69100.	54090.	68800.	65400.
ZN	74.	95.	122.	80.
ZR	163.	127.	125.	111.
V	100.	100.	140.	120.
NI	78.	106.	103.	62.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-318 1234.5-1235.5	ST-319 1235.5-1238.0	ST-320 1238.0-1242.5	ST-321 1242.5-1242.8
SI	302430.	300280.	303480.	260710.
AL	82260.	78640.	76430.	94150.
FE	24970.	26470.	22350.	33910.
MG	9460.	9300.	15040.	15220.
CA	7340.	7550.	7340.	8720.
NA	14300.	14900.	13700.	18700.
K	5130.	4240.	5360.	3370.
TI	2690.	2110.	2400.	970.
MN	420.	410.	430.	420.
BA	660.	560.	780.	500.
CO	46.	34.	40.	42.
CU	11.	7.	10.	5.
GA	21.	19.	19.	31.
LI	11.	10.	12.	5.
MO	2.	1.	1.	1.
PB	13.	13.	10.	13.
RB	36.	21.	34.	0.
S	94.	56.	57.	33.
SR	132.	148.	127.	173.
C&H2O	89000.	66200.	70500.	106700.
ZN	90.	63.	58.	131.
ZR	124.	133.	114.	151.
V	40.	40.	60.	200.
NI	82.	79.	80.	98.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-322 1242.8-1244.5	ST-323 1244.5-1245.5	ST-324 1245.5-1247.5	ST-325 1247.5-1249.5
SI	300250.	293500.	286300.	289140.
AL	80230.	87380.	87060.	90250.
FE	28810.	32910.	29180.	35160.
MG	12780.	26440.	29420.	14220.
CA	7000.	7310.	7200.	7080.
NA	11500.	17100.	14400.	13200.
K	9570.	13740.	15430.	17630.
TI	5190.	5170.	5330.	5420.
MN	410.	410.	430.	500.
BA	1060.	1440.	1380.	1000.
CO	48.	56.	52.	40.
CU	32.	28.	34.	35.
GA	21.	23.	22.	22.
LI	16.	13.	16.	15.
MO	1.	1.	0.	1.
PB	2.	18.	8.	13.
RB	112.	121.	111.	143.
S	110.	92.	105.	63.
SR	138.	180.	173.	173.
C&H2O	150000.	53900.	62900.	61200.
ZN	57.	47.	85.	85.
ZR	134.	128.	144.	147.
V	160.	180.	160.	180.
NI	66.	106.	120.	118.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-326 1249.5-1250.5	ST-327 1250.5-1257.0	ST-329 1257.5-1258.0	ST-331 1258.5-1261.0
SI	282990.	287530.	297110.	283720.
AL	89730.	86420.	84460.	84790.
FE	26510.	22860.	22190.	26660.
MG	9000.	10480.	11936.	6040.
CA	7340.	39380.	7050.	7010.
NA	13580.	11800.	15700.	13800.
K	18070.	12510.	12300.	12480.
TI	5580.	4100.	4810.	5230.
MN	510.	670.	410.	410.
BA	720.	1460.	1100.	720.
CO	52.	80.	34.	36.
CU	34.	15.	25.	29.
GA	25.	17.	18.	21.
LI	19.	24.	14.	15.
MO	1.	1.	1.	1.
PB	9.	29.	7.	8.
RB	116.	83.	65.	65.
S	144.	71.	105.	191.
SR	140.	164.	142.	132.
C&H2O	82000.	25300.	99400.	121000.
ZN	78.	63.	72.	46.
ZR	146.	130.	148.	135.
V	180.	120.	100.	140.
NI	126.	96.	88.	88.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PEP MILLION

	ST-132 1261.0-1264.5	ST-333 1264.5-1265.5	ST-325 1266.5-1271.5	ST-326 1271.5-1276.5
SI	295810.	280500.	285870.	297060.
AL	85960.	95120.	87560.	88770.
FE	32680.	68450.	33060.	30550.
MG	3280.	10540.	5820.	8860.
CA	5710.	8860.	6780.	7610.
NA	13200.	9300.	18160.	15900.
K	21040.	36260.	24740.	20100.
TI	5360.	5410.	5420.	5360.
MN	420.	1290.	490.	440.
BA	740.	780.	680.	860.
CO	112.	46.	40.	38.
CU	35.	52.	37.	35.
GA	28.	30.	32.	25.
LI	17.	19.	15.	14.
MO	1.	1.	1.	0.
PB	26.	6.	15.	13.
RB	122.	111.	133.	117.
S	314.	262.	106.	75.
SR	159.	120.	156.	182.
C&H2O	69800.	120400.	62500.	53300.
ZN	151.	113.	72.	73.
ZR	135.	217.	136.	147.
V	140.	160.	140.	120.
NI	348.	198.	166.	110.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-337 1276.5-1281.0	ST-338 1281.0 1285.5	ST-340 1286.0-1286.5	ST-342 1286.7 1288.5
SI	285760.	277170.	276660.	286860.
AL	92910.	89340.	85730.	89250.
FE	31990.	24490.	34980.	26460.
MG	9280.	12790.	9580.	21040.
CA	10030.	16480.	6800.	7720.
NA	15700.	14100.	11600.	14800.
K	20840.	37110.	15260.	14590.
TI	5010.	4900.	5100.	5270.
MN	660.	640.	420.	430.
BA	780.	1240.	760.	1220.
CO	32.	26.	66.	64.
CU	23.	15.	32.	33.
GA	21.	20.	24.	20.
LI	9.	8.	17.	16.
MO	0.	0.	0.	1.
PB	17.	27.	11.	19.
RB	70.	82.	122.	69.
S	105.	52.	137.	158.
SR	186.	164.	133.	153.
C&H2O	50800.	35400.	109600.	97200.
ZN	73.	49.	59.	80.
ZR	154.	133.	98.	122.
V	80.	80.	160.	140.
NI	92.	86.	118.	148.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-343 1283.5-1294.0	ST-344 1288.5-1294.0	ST-345 1294.0-1296.0	ST-347 1298.0-1301.5
SI	290440.	281100.	279950.	270870.
AL	89340.	95960.	85170.	80890.
FE	35220.	33180.	36190.	70010.
MG	12540.	12000.	8800.	11380.
CA	7750.	7700.	7740.	9230.
NA	15500.	16300.	13900.	12200.
K	16560.	14370.	13000.	13260.
TI	5210.	5400.	4900.	5130.
MN	510.	460.	430.	1080.
BA	940.	880.	780.	740.
CO	46.	50.	38.	42.
CU	23.	37.	26.	51.
GA	25.	24.	23.	31.
LI	16.	16.	13.	21.
MO	0.	1.	1.	2.
PB	11.	13.	12.	8.
RB	110.	110.	115.	112.
S	98.	121.	73.	149.
SR	176.	174.	184.	169.
C&H2O	55160.	69500.	62300.	120400.
ZN	91.	82.	68.	121.
ZR	124.	133.	139.	141.
V	140.	140.	140.	160.
NI	123.	94.	104.	112.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-348 1304.5-1305.0	ST-350 1305.5-1305.7	ST-351 1305.7-1306.5	ST-352 1306.5-1306.7
SI	271730.	282080.	267990.	251940.
AL	79820.	80130.	76960.	89770.
FE	30490.	33260.	32670.	33790.
MG	20200.	9840.	11520.	14580.
CA	7950.	7200.	7350.	9490.
NA	12000.	12500.	14400.	19500.
K	11580.	7290.	6710.	3540.
TI	5250.	3780.	3340.	1690.
MN	430.	410.	420.	400.
BA	1220.	720.	820.	620.
CO	60.	36.	38.	46.
CU	28.	17.	19.	10.
GA	15.	27.	20.	22.
LI	22.	13.	14.	9.
MO	1.	0.	0.	0.
PB	10.	9.	12.	24.
RB	63.	85.	77.	0.
S	278.	56.	61.	95.
SR	120.	140.	153.	174.
C&H2O	103400.	104700.	106100.	124600.
ZN	57.	38.	46.	83.
ZR	105.	90.	104.	139.
V	140.	100.	100.	200.
NI	152.	78.	78.	36.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-353 1306.7-1307.2	ST-356 1310.5-1313.0	ST-357 1313.0-1314.0	ST-360 1320.0-1322.5
SI	284300.	272230.	269540.	275930.
AL	79150.	86330.	79770.	93830.
FE	35930.	39550.	45660.	27610.
MG	24760.	6100.	8160.	9860.
CA	6740.	7220.	9080.	7520.
NA	10300.	16900.	11800.	15800.
K	11390.	15860.	14100.	7380.
TI	4390.	4970.	5610.	4220.
MN	410.	550.	880.	420.
BA	1240.	880.	740.	660.
CO	60.	60.	54.	34.
CU	32.	39.	47.	23.
GA	15.	22.	17.	19.
LI	15.	19.	20.	11.
MO	1.	0.	1.	1.
PB	8.	21.	11.	14.
RB	141.	184.	88.	39.
S	222.	156.	265.	69.
SR	136.	175.	137.	181.
C&H2O	141800.	87200.	138300.	73500.
ZN	81.	[illegible]	94.	76.
ZR	[illegible]	[illegible]	110.	[illegible]
V	[illegible]	[illegible]	140.	60.
NI	110.	[illegible]	132.	68.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-361 1322.5-1324.0	ST-362 1324.0-1326.0	ST-363 1326.0-1330.0	ST-364 1330.0 1337.5
SI	283120.	292100.	287250.	287190.
AL	89730.	91140.	87790.	85640.
FE	30120.	18100.	27150.	22150.
MG	6640.	7260.	11020.	11340.
CA	6730.	8440.	7030.	8570.
NA	11200.	18200.	10900.	18900.
K	15460.	15430.	21510.	12870.
TI	5110.	5100.	5650.	4670.
MN	430.	430.	460.	540.
BA	620.	900.	1000.	800.
CO	44.	42.	44.	38.
CU	36.	26.	38.	30.
GA	27.	19.	25.	23.
LI	17.	12.	18.	10.
MO	0.	1.	1.	0.
PR	11.	10.	14.	15.
RB	114.	61.	111.	64.
S	71.	76.	110.	93.
SR	155.	181.	160.	220.
C&H2O	70300.	54000.	72000.	62800.
ZN	134.	95.	105.	64.
ZR	130.	120.	136.	139.
V	220.	180.	280.	220.
NI	90.	122.	130.	132.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-365 1337.5-1337.7	ST-366 1337.7-1340.0	ST-367 1340.0-1341.5	ST-368 1341.5-1345.0
SI	238450.	286590.	269770.	271820.
AL	87740.	90200.	79050.	88280.
FE	26520.	17350.	99040.	23130.
MG	8700.	12460.	9320.	8260.
CA	7940.	11890.	11200.	24680.
NA	12400.	21300.	14200.	20100.
K	15330.	12330.	10060.	12210.
TI	5100.	4530.	4320.	4350.
MN	430.	510.	1700.	590.
BA	900.	960.	800.	960.
CO	40.	38.	36.	38.
CU	30.	15.	34.	20.
GA	20.	21.	27.	23.
LI	15.	8.	8.	6.
MO	1.	2.	3.	2.
PB	16.	18.	21.	16.
RB	84.	45.	67.	41.
S	157.	64.	289.	54.
SR	216.	256.	215.	193.
C&H2O	67100.	48100.	117400.	43900.
ZN	77.	53.	59.	39.
ZR	146.	128.	147.	116.
V	200.	120.	180.	140.
NI	114.	84.	228.	46.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-369 1345.0-1346.0	ST-370 1346.0-1348.0	ST-371 1348.0-1348.5	ST-374 1351.0-1352.5
SI	289110.	291360.	169650.	282440.
AL	93590.	90250.	27730.	83550.
FE	25990.	28330.	15990.	27580.
MG	7260.	7580.	14460.	9160.
CA	8820.	9860.	57950.	7660.
NA	16400.	14000.	2220.	14600.
K	13590.	12260.	3470.	13810.
TI	5410.	5190.	1360.	5400.
MN	520.	730.	272550.	490.
BA	700.	660.	440.	560.
CO	68.	32.	22.	30.
CU	53.	39.	19.	30.
GA	27.	26.	5.	17.
LI	32.	19.	10.	14.
MO	2.	2.	0.	1.
PB	26.	15.	51.	5.
RB	83.	74.	2.	97.
S	210.	111.	423.	159.
SR	213.	226.	50.	165.
C&H2O	71000.	87400.	233200.	110700.
ZN	79.	86.	7.	66.
ZR	146.	135.	38.	126.
V	260.	200.	140.	300.
NI	118.	98.	296.	90.

HORSESHOE CANYON FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-375 1352.5-1355.0	ST-376 1355.0-1360.0	ST-378 1360.2-1364.0
SI	278330.	285060.	255910.
AL	83940.	83790.	78900.
FE	25760.	33600.	29550.
MG	10220.	8860.	7520.
CA	6980.	11710.	7700.
NA	14400.	19300.	12900.
K	19980.	13610.	10680.
TI	5550.	4850.	5400.
MN	450.	790.	420.
BA	640.	600.	560.
CO	28.	24.	30.
CU	40.	33.	30.
GA	19.	18.	10.
LI	11.	9.	16.
MO	2.	2.	9.
PB	15.	13.	13.
RB	110.	285.	61.
S	148.	107.	331.
SR	145.	219.	100.
C&H2O	58300.	69000.	245100.
ZN	92.	69.	56.
ZR	131.	141.	81.
V	300.	260.	300.
NI	92.	96.	120.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-379 1364.0-1368.0	ST-381 1370.0-1371.7	ST-382 1371.7-1372.7	ST-383 1372.7-1376.0
SI	279580.	270610.	265350.	286200.
AL	83790.	84550.	78480.	81140.
FE	47060.	33290.	66220.	33430.
MG	8800.	8700.	9360.	5920.
CA	9040.	8720.	9640.	19100.
NA	15400.	13900.	10700.	18400.
K	14900.	7590.	8430.	7740.
TI	5150.	4290.	4200.	3600.
MN	760.	510.	990.	680.
BA	560.	560.	520.	580.
CO	24.	29.	22.	10.
CU	49.	17.	29.	16.
GA	21.	18.	26.	19.
LI	15.	12.	12.	7.
MO	3.	2.	3.	2.
PB	10.	11.	10.	22.
RB	101.	60.	81.	28.
S	162.	156.	154.	117.
SR	195.	133.	195.	253.
C&H2O	93800.	133900.	102900.	59200.
ZN	122.	76.	79.	58.
ZR	131.	125.	147.	115.
V	200.	220.	280.	160.
NI	108.	84.	86.	50.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-387 1386.0-1386.5	ST-388 1386.5-1392.5	ST-389 1392.5-1393.5	ST-390 1393.5-1398.5
SI	277840.	269090.	271840.	266950.
AL	87380.	73600.	92630.	77960.
FE	36470.	21000.	25300.	23990.
MG	9080.	4800.	15740.	8000.
CA	9290.	41610.	11090.	35400.
NA	16700.	12800.	20100.	18900.
K	12920.	10890.	5690.	7450.
TI	5980.	4530.	3140.	3680.
MN	590.	660.	520.	610.
BA	560.	700.	960.	680.
CO	38.	26.	30.	28.
CU	25.	11.	7.	17.
GA	19.	19.	25.	20.
LI	11.	7.	8.	7.
MO	3.	1.	1.	1.
PB	12.	10.	9.	10.
RB	72.	34.	14.	33.
S	131.	81.	51.	87.
SR	222.	224.	273.	271.
C&H2O	82000.	35300.	61300.	45500.
ZN	65.	43.	51.	49.
ZR	166.	112.	157.	143.
V	440.	160.	120.	140.
NI	92.	60.	38.	62.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-391 1398.5-1402.0	ST-393 1410.0-1412.0	ST-394 1412.0-1418.0	ST-395 1418.0-1425.0
SI	271210.	282080.	252470.	196280.
AL	82280.	77700.	73100.	54520.
FE	29330.	63050.	33600.	32100.
MG	7140.	10940.	9000.	7930.
CA	13650.	13020.	49810.	70420.
NA	17500.	15400.	17500.	8100.
K	10060.	11800.	7240.	5630.
TI	3830.	4600.	5660.	2660.
MN	600.	920.	730.	690.
BA	760.	580.	740.	620.
CO	20.	28.	26.	18.
CU	17.	24.	22.	22.
GA	20.	24.	19.	15.
LI	7.	10.	6.	4.
MO	2.	1.	3.	0.
PB	6.	21.	9.	7.
RB	48.	79.	22.	0.
S	66.	350.	77.	130.
SR	262.	228.	279.	293.
C&H2O	47800.	78200.	49000.	36200.
ZN	61.	75.	65.	50.
ZR	133.	161.	223.	130.
V	120.	270.	140.	140.
NI	50.	108.	72.	56.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-396 1425.0-1430.5	ST-397 1430.5-1437.0	ST-398 1437.0-1441.5	ST-399 1441.5-1442.0
SI	267540.	274670.	264620.	256630.
AL	83500.	84690.	78840.	79510.
FE	42280.	46190.	46640.	61190.
MG	10680.	12140.	10640.	11240.
CA	13920.	13210.	13340.	29310.
NA	14700.	14500.	23000.	14500.
K	15190.	16760.	15840.	10860.
TI	5430.	5360.	5060.	3990.
MN	880.	870.	870.	950.
BA	560.	660.	700.	640.
CO	36.	40.	36.	30.
CU	50.	46.	47.	40.
GA	21.	43.	29.	23.
LI	13.	13.	13.	0.
MO	2.	0.	1.	1.
PB	20.	18.	0.	24.
RB	94.	94.	104.	67.
S	183.	220.	155.	290.
SR	221.	217.	225.	261.
C&H2O	74600.	79700.	77000.	62800.
ZN	95.	104.	109.	86.
ZR	154.	147.	141.	129.
V	220.	220.	200.	120.
NI	116.	130.	122.	120.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-400 1442.0-1450.0	ST-401 1450.0-1456.5	ST-402 1456.5-1461.5	ST-403 1461.5 1466.5
SI	261900.	267690.	270800.	277710.
AL	78740.	77800.	83840.	81190.
FE	59450.	55730.	53110.	49660.
MG	12000.	12200.	10660.	10720.
CA	15110.	14260.	11250.	9030.
NA	11700.	16100.	12900.	10700.
K	16540.	16240.	19720.	25760.
TI	5450.	5270.	5770.	5370.
MN	930.	840.	670.	590.
BA	680.	680.	560.	640.
CO	32.	30.	30.	30.
CU	42.	43.	42.	38.
GA	20.	23.	27.	23.
LI	13.	14.	16.	23.
MO	1.	0.	0.	0.
PB	14.	19.	20.	30.
RB	108.	97.	120.	156.
S	214.	340.	468.	948.
SR	225.	225.	194.	166.
C&H2O	73900.	69300.	68700.	64800.
ZN	104.	101.	105.	123.
ZR	142.	152.	144.	152.
V	200.	200.	220.	260.
NI	126.	110.	114.	90.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-404 1466.5-1471.5	ST-405 1471.5-1477.5	ST-406 1477.5-1483.0	ST-407 1483.0-1483.5
SI	274860.	273290.	288220.	177660.
AL	80480.	82960.	80940.	42470.
FE	51380.	56350.	21880.	51550.
MG	11150.	11300.	21120.	12440.
CA	3970.	8820.	53510.	72530.
NA	10400.	13900.	17500.	6300.
K	27420.	26690.	22980.	7250.
TI	5440.	5610.	4520.	6750.
MN	900.	990.	610.	960.
BA	640.	620.	1060.	580.
CO	37.	46.	40.	30.
CU	40.	46.	23.	25.
GA	30.	26.	18.	12.
LI	24.	20.	8.	11.
MO	[illegible]	3.	1.	1.
PB	25.	25.	13.	32.
RB	177.	131.	58.	9.
S	384.	660.	90.	285.
SR	176.	190.	224.	301.
C&H2O	62200.	68900.	38200.	42800.
ZN	110.	115.	71.	159.
ZR	145.	149.	151.	162.
V	248.	180.	100.	140.
NI	110.	146.	66.	132.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-408 1483.5-1489.0	ST-409 1489.0-1491.5	ST-410 1491.5-1492.0	ST-411 1492.0-1496.5
SI	290230.	302800.	242030.	266220.
AL	83740.	83590.	69920.	79720.
FE	38740.	26440.	98330.	42970.
MG	16240.	8460.	21120.	10400.
CA	29950.	11660.	31590.	32200.
NA	16400.	18400.	15600.	19100.
K	23560.	22650.	11300.	14520.
TI	4310.	4690.	4660.	4570.
MN	700.	550.	1350.	710.
BA	1100.	890.	780.	900.
CO	26.	34.	38.	34.
CU	32.	25.	45.	32.
GA	22.	30.	26.	23.
LI	9.	7.	8.	7.
MO	2.	0.	1.	1.
PB	12.	17.	1.	2.
RB	79.	62.	50.	59.
S	77.	182.	74.	29.
SR	229.	217.	277.	264.
C&H2O	50300.	54000.	80200.	45100.
ZN	79.	66.	190.	71.
ZR	118.	141.	156.	151.
V	100.	190.	160.	140.
NI	86.	76.	178.	88.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-412 1496.5-1499.0	ST-413 1499.0-1505.5	ST-414 1505.5-1506.0	ST-415 1506.0-1511.0
SI	291130.	271300.	224380.	266810.
AL	81290.	83160.	65540.	84310.
FE	38310.	51740.	72610.	48540.
MG	16940.	14340.	10780.	9200.
CA	13570.	11850.	78740.	9670.
NA	17300.	14900.	14900.	13200.
K	16730.	23740.	10550.	29320.
TI	5210.	5400.	3410.	5800.
MN	650.	870.	1030.	870.
BA	1200.	1020.	740.	840.
CO	38.	46.	24.	44.
CU	26.	39.	27.	49.
GA	19.	23.	21.	30.
LI	8.	13.	7.	17.
MO	2.	1.	0.	0.
PB	5.	5.	11.	6.
RB	71.	111.	38.	130.
S	65.	131.	205.	205.
SR	227.	199.	240.	180.
C6H2O	54700.	60800.	46500.	73400.
ZN	68.	89.	64.	100.
ZR	157.	147.	115.	157.
V	160.	180.	100.	200.
NI	96.	138.	134.	136.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-416 1511.0-1514.0	ST-417 1514.0-1515.0	ST-418 1515.0-1519.0	ST-420 1520.0-1529.0
SI	[illegible]	[illegible]	295220.	[illegible]
AL	[illegible]	[illegible]	87290.	[illegible]
FE	54440.	[illegible]	43380.	[illegible]
MG	9600.	11180.	9400.	[illegible]
CA	9610.	7040.	13270.	7350.
NA	10500.	9100.	10300.	9900.
K	30170.	31920.	36730.	36640.
TI	5340.	4380.	5220.	5660.
MN	[illegible]	450.	690.	980.
BA	[illegible]	1120.	940.	780.
CO	[illegible]	[illegible]	42.	38.
CU	[illegible]	[illegible]	[illegible]	33.
GA	[illegible]	[illegible]	[illegible]	32.
LI	[illegible]	17.	17.	20.
MO	1.	[illegible]	1.	1.
PB	15.	39.	15.	30.
RB	146.	161.	133.	161.
S	414.	3104.	821.	554.
SR	173.	168.	152.	149.
C&H2O	81800.	59300.	63300.	65200.
ZN	109.	77.	98.	113.
ZR	155.	194.	166.	152.
V	220.	160.	200.	240.
NI	140.	88.	128.	120.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-421 1529.0-1536.0	ST-422 1536.0-1537.5	ST-423 1537.5-1539.5	ST-424 1539.5-1540.0
SI	287140.	271750.	266440.	297510.
AL	99460.	66990.	86930.	82380.
FE	48930.	98580.	53920.	29920.
MG	22730.	29280.	8980.	5800.
CA	7770.	23450.	7760.	7260.
NA	8700.	5100.	8300.	10600.
K	37490.	17550.	30460.	33320.
TI	5720.	3020.	5180.	5100.
MN	1020.	1120.	770.	440.
BA	1400.	2000.	720.	680.
CO	54.	34.	38.	23.
CU	42.	28.	43.	29.
GA	26.	15.	20.	15.
LI	22.	14.	20.	14.
MO	1.	1.	1.	1.
PB	25.	25.	26.	35.
RB	176.	101.	170.	140.
S	326.	461.	717.	1518.
SR	151.	125.	137.	126.
C&H2O	59400.	50300.	65400.	54700.
ZN	116.	76.	105.	93.
ZR	147.	116.	148.	168.
V	240.	160.	220.	200.
NI	144.	142.	114.	70.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-425 1540.0-1545.5	ST-426 1545.5-1551.0	ST-427 1551.0-1553.0	ST-428 1553.0-1555.0
SI	266990.	276750.	297030.	280270.
AL	88230.	83840.	64450.	88150.
FE	42000.	47160.	82480.	44130.
MG	6800.	6900.	9220.	9260.
CA	6750.	7280.	13020.	6800.
NA	7000.	9750.	8200.	5600.
K	28400.	25090.	7170.	17360.
TI	5510.	5420.	6770.	4950.
MN	730.	910.	1610.	480.
BA	560.	540.	540.	640.
CO	52.	42.	22.	42.
CU	42.	55.	24.	31.
GA	22.	20.	12.	22.
LI	21.	16.	10.	15.
MO	1.	1.	0.	1.
PB	27.	128.	7.	30.
PB	178.	161.	59.	164.
S	1250.	1117.	371.	2221.
SR	138.	150.	140.	158.
C&H2O	90400.	75900.	75600.	117200.
ZN	127.	131.	55.	102.
ZR	137.	141.	88.	141.
V	260.	200.	100.	220.
NI	104.	116.	112.	128.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-429 1555.0-1560.0	ST-430 1560.0-1562.5	ST-431 1562.5-1563.0	ST-433 1564.0-1566.0
SI	313260.	295840.	276560.	294260.
AL	75240.	99790.	85730.	92380.
FE	29150.	45160.	57810.	29490.
MG	5160.	8660.	11380.	7660.
CA	31920.	7040.	7450.	5700.
NA	11000.	9700.	9800.	16900.
K	9540.	21030.	16610.	14360.
TI	2480.	5210.	4870.	5230.
MN	610.	520.	550.	590.
BA	700.	660.	820.	660.
CO	22.	46.	52.	46.
CU	15.	38.	32.	42.
GA	14.	27.	23.	24.
LI	8.	16.	17.	11.
MO	2.	1.	2.	2.
PB	10.	35.	49.	9.
RB	63.	176.	154.	86.
S	528.	1648.	3361.	221.
SR	159.	163.	197.	244.
C&H2O	45500.	90800.	148400.	68500.
ZN	50.	121.	121.	97.
ZR	118.	135.	128.	135.
V	120.	240.	200.	140.
NI	56.	136.	162.	122.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-434 1566.0-1569.0	ST-435 1569.0 1570.5	ST-436 1570.5-1571.0	ST-437 1571.0-1572.5
SI	281970.	280770.	286630.	270280.
AL	87520.	78530.	88370.	81040.
FE	58670.	35020.	21960.	56210.
MG	14800.	6480.	7480.	15080.
CA	16560.	21000.	9340.	15630.
NA	15500.	18700.	19200.	15800.
K	12240.	9150.	12990.	9680.
TI	4980.	4080.	5460.	4530.
MN	1090.	750.	550.	1050.
BA	880.	780.	620.	680.
CO	44.	36.	42.	36.
CU	45.	25.	33.	25.
GA	27.	21.	23.	21.
LI	11.	7.	9.	7.
MO	4.	1.	3.	0.
PB	8.	11.	11.	7.
RB	72.	39.	67.	52.
S	275.	134.	188.	105.
SR	266.	302.	223.	287.
C&H2O	70500.	46300.	56700.	47900.
ZN	100.	76.	81.	83.
ZR	176.	124.	151.	153.
V	140.	100.	140.	120.
NI	124.	94.	94.	110.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-439 1573.5-1577.5	ST-440 1577.5-1582.0	ST-441 1582.0-1585.5	ST-442 1585.5-1590.5
SI	239390.	289080.	297760.	300830.
AL	82260.	53790.	88220.	85910.
FE	63250.	49350.	42920.	29170.
MG	7740.	8680.	20620.	9360.
CA	19120.	8410.	7450.	8270.
NA	15800.	12300.	10100.	10600.
K	9790.	19780.	22030.	17020.
TI	4620.	5540.	5560.	4630.
MN	1150.	810.	630.	570.
BA	780.	680.	1140.	560.
CO	28.	44.	50.	26.
CU	29.	41.	30.	19.
GA	23.	21.	23.	18.
LI	7.	17.	22.	11.
MO	0.	0.	1.	1.
PB	15.	35.	32.	18.
PB	0.	139.	150.	94.
S	162.	962.	1073.	444.
SR	280.	190.	158.	151.
CBH2O	50400.	61200.	76700.	52000.
ZN	90.	115.	107.	74.
ZR	169.	148.	145.	153.
V	140.	200.	220.	140.
NI	166.	122.	92.	74.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-443 1590.5-1595.0	ST-444 1595.0-1597.5	ST-445 1597.5-1600.5	ST-447 1601.0-1601.2
SI	286290.	246490.	279320.	236130.
AL	95070.	89900.	88190.	65480.
FE	43900.	59030.	47160.	69370.
MG	12220.	9000.	23400.	31940.
CA	8900.	7200.	7380.	6790.
NA	11500.	10700.	74700.	7800.
K	15520.	18030.	14780.	10870.
TI	4700.	5400.	5320.	4440.
MN	760.	760.	560.	1860.
BA	840.	590.	1020.	1180.
CO	32.	56.	56.	70.
CU	24.	35.	45.	35.
GA	19.	23.	16.	16.
LI	15.	17.	18.	15.
MO	0.	0.	1.	1.
PB	25.	32.	25.	187.
RB	105.	181.	115.	144.
S	898.	1547.	1474.	12168.
SR	178.	172.	147.	134.
C&H2O	57500.	84900.	160640.	184500.
ZN	88.	139.	91.	86.
ZR	169.	129.	123.	142.
V	140.	220.	200.	260.
NI	84.	156.	148.	276.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-448	ST-449	ST-451	ST-452
	1601.2-1605.0	1605.0-1608.5	1611.5-1613.0	1613.0-1614.0
SI	284410.	282610.	307030.	300530.
AL	78790.	81880.	78690.	83010.
FE	41520.	48640.	29550.	35480.
MG	9260.	25080.	17340.	29520.
CA	7610.	9470.	17970.	33280.
NA	13800.	12200.	8800.	8700.
K	13430.	9480.	12570.	15620.
TI	4710.	3370.	3240.	4150.
MN	950.	850.	460.	570.
BA	600.	1120.	960.	1340.
CO	36.	36.	32.	42.
CU	36.	28.	29.	36.
GA	13.	12.	9.	16.
LI	15.	10.	12.	17.
MO	0.	0.	0.	0.
PB	18.	11.	19.	26.
RB	116.	73.	83.	138.
S	773.	439.	777.	1766.
SR	168.	189.	134.	183.
C&H2O	69700.	61900.	46900.	67000.
ZN	89.	73.	70.	111.
ZR	144.	162.	108.	126.
V	240.	200.	200.	260.
NI	98.	82.	90.	120.

"TRANSITION ZONE"

ALL VALUES IN PARTS PER MILLION

	ST-454 1614.2-1614.5
SI	264280.
AL	102650.
FE	28840.
MG	26080.
CA	9380.
NA	19100.
K	3300.
TI	2500.
MN	430.
BA	1000.
CO	42.
CU	8.
GA	22.
LI	9.
MO	0.
PB	10.
RB	0.
S	251.
SR	219.
C&H2O	114700.
ZN	32.
ZR	127.
V	80.
NI	58.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-456 1617.5-1617.6	ST-458 1622.5-1623.0	ST-459 1623.0-1624.0	ST-462 1625.7-1628.0
SI	253060.	294460.	289310.	277510.
AL	101930.	28860.	85910.	80580.
FE	22680.	47610.	34270.	21450.
MG	18940.	17500.	23920.	17760.
CA	9970.	7880.	9500.	8830.
NA	20110.	12600.	13700.	14900.
K	2410.	15420.	8530.	2410.
TI	5460.	5010.	3850.	1560.
MN	430.	630.	530.	430.
BA	640.	960.	1160.	600.
CO	40.	44.	40.	28.
CU	2.	59.	17.	4.
GA	26.	31.	24.	14.
LI	5.	17.	11.	11.
MO	0.	0.	0.	8.
PR	8.	59.	26.	11.
RB	0.	132.	46.	0.
S	25.	1594.	1781.	302.
SR	186.	168.	205.	124.
C&H2O	127800.	86700.	92500.	168000.
ZN	19.	104.	65.	25.
ZR	72.	139.	154.	85.
V	40.	260.	140.	40.
NI	40.	102.	82.	56.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-464 1631.0-1633.5	ST-465 1633.5-1638.5	ST-466 1638.5-1640.0	ST-468 1641.0-1647.0
SI	273260.	294040.	257160.	267410.
AL	84460.	77540.	85250.	83300.
FE	37050.	43610.	34880.	58390.
MG	22540.	14280.	11000.	12460.
CA	3440.	9570.	9310.	7810.
NA	14000.	16500.	13000.	9200.
K	5630.	9020.	6150.	20350.
TI	3940.	4710.	4710.	5410.
MN	450.	920.	450.	1550.
BA	960.	860.	280.	840.
CO	40.	42.	48.	44.
CU	22.	37.	36.	37.
GA	21.	30.	35.	19.
LI	12.	11.	22.	17.
MO	0.	0.	1.	1.
PB	7.	17.	27.	31.
RB	31.	50.	37.	162.
S	372.	174.	1699.	289.
SR	148.	215.	261.	143.
C&H2O	188600.	82600.	229200.	64200.
ZN	61.	76.	107.	112.
ZR	117.	140.	218.	142.
V	160.	160.	80.	220.
NI	96.	100.	52.	114.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-469 1642.0-1652.0	ST-470 1652.0-1657.0	ST-471 1657.0-1662.0	ST-472 1662.0-1666.0
SI	297610.	293100.	287190.	286160.
AL	92140.	89600.	84550.	87560.
FE	44550.	40120.	40410.	42230.
MG	18960.	21440.	7260.	14600.
CA	7230.	6900.	6690.	6910.
NA	8300.	8700.	7100.	10900.
K	24600.	26320.	24840.	22880.
TI	5840.	5720.	5510.	5530.
MN	1090.	820.	520.	530.
BA	1120.	1150.	560.	920.
CO	56.	52.	48.	52.
CU	35.	29.	30.	33.
GA	21.	24.	22.	23.
LI	19.	15.	19.	18.
MO	1.	2.	2.	2.
PB	20.	31.	18.	24.
RB	157.	172.	147.	163.
S	225.	585.	645.	1202.
SR	132.	135.	138.	153.
C&H2O	56900.	54600.	57800.	55400.
ZN	118.	130.	119.	151.
ZR	147.	144.	133.	148.
V	220.	220.	220.	220.
NI	116.	98.	90.	108.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-473 1660.0-1666.0	ST-474 1666.0-1672.0	ST-475 1672.0-1677.0	ST-476 1677.0-1683.0
SI	96.	276070.	267840.	286830.
AL	147.	86240.	80330.	94740.
FE	160.	36720.	46080.	48230.
MG	90.	5860.	7280.	14820.
CA	0.	13960.	7640.	7560.
NA	0.	14900.	9300.	8200.
K	0.	16770.	25560.	31270.
TI	0.	4460.	5600.	5780.
MN	0.	500.	1420.	1220.
BA	0.	700.	600.	960.
CO	235580.	46.	50.	50.
CU	36880.	34.	37.	37.
GA	39340.	21.	22.	26.
LI	10220.	18.	21.	23.
MO	8050.	2.	0.	0.
PB	6800.	26.	22.	17.
RB	21690.	148.	190.	204.
S	5340.	936.	289.	421.
SR	900.	144.	123.	144.
C&H2O	740.	56000.	57300.	58000.
ZN	40.	127.	115.	130.
ZR	21.	146.	138.	143.
V	21.	200.	240.	240.
NI	12.	112.	120.	140.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-477 1683.0-1684.0	ST-478 1684.0-1688.0	ST-479 1688.0-1689.0	ST-480 1689.0-1693.0
SI	174320.	270830.	190410.	295720.
AL	42330.	94150.	55390.	94270.
FE	183770.	42500.	187960.	39970.
MG	26120.	6840.	22780.	7240.
CA	54850.	7070.	31830.	6630.
NA	3200.	5400.	3100.	6800.
K	6770.	32940.	10410.	34860.
TI	2770.	5840.	3500.	5870.
MN	2950.	790.	1620.	500.
BA	440.	560.	540.	560.
CO	36.	77.	52.	76.
CU	42.	34.	32.	25.
GA	15.	27.	14.	30.
LI	11.	23.	15.	23.
MO	0.	0.	0.	0.
PB	17.	24.	12.	23.
RB	51.	210.	66.	214.
S	667.	959.	1053.	609.
SR	109.	106.	63.	131.
C&H2O	120630.	52600.	126200.	49200.
ZN	51.	146.	65.	0.
ZR	92.	142.	73.	139.
V	120.	240.	140.	260.
NI	555.	120.	218.	110.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-481 1693.0-1694.0	ST-482 1694.0-1697.0	ST-483 1697.0-1698.0	ST-484 1698.0-1702.0
SI	197360.	290800.	206870.	305840.
AL	59120.	91220.	69750.	91220.
FE	184690.	45430.	163960.	44320.
MG	21640.	10860.	22140.	16020.
CA	30910.	7190.	28210.	6830.
NA	2790.	6400.	3600.	8400.
K	10540.	29350.	11300.	34230.
TI	3290.	5760.	3280.	5410.
MN	1930.	530.	2080.	490.
BA	400.	760.	460.	960.
CO	58.	78.	44.	78.
CU	24.	15.	29.	25.
GA	10.	31.	19.	32.
LI	13.	22.	12.	20.
MO	0.	1.	0.	1.
PB	25.	20.	19.	29.
RB	67.	232.	70.	219.
S	1133.	781.	1567.	1071.
SR	59.	131.	54.	146.
C&H2O	109200.	49000.	116400.	50400.
ZN	68.	138.	44.	133.
ZR	74.	138.	66.	142.
V	140.	240.	120.	240.
NI	600.	118.	620.	136.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-485 1702.0-1705.0	ST-486 1705.0-1707.0	ST-487 1707.0-1711.0	ST-488 1711.0-1715.5
SI	296920.	300860.	288540.	285670.
AL	89720.	97700.	84840.	85960.
FE	48920.	42700.	48100.	56730.
MG	17820.	10900.	9480.	9780.
CA	16860.	6850.	16180.	11990.
NA	13300.	9600.	11800.	14400.
K	18540.	29910.	13110.	14550.
TI	5180.	5330.	5010.	5300.
MN	350.	490.	950.	1130.
BA	960.	740.	600.	580.
CO	44.	34.	22.	46.
CU	43.	39.	37.	35.
GA	30.	32.	26.	31.
LI	13.	17.	9.	12.
MO	1.	0.	0.	1.
PB	23.	27.	28.	21.
RB	117.	202.	79.	107.
S	735.	930.	723.	492.
SR	203.	145.	240.	225.
C&H2O	65400.	57500.	68100.	76600.
ZN	96.	120.	66.	92.
ZR	144.	124.	155.	145.
V	100.	140.	80.	100.
NI	140.	154.	158.	164.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-490 1716.0-1721.0	ST-491 1721.0-1725.5	ST-492 1725.5-1728.0	ST-493 1728.0-1730.0
SI	280930.	283840.	279490.	296100.
AL	88410.	83030.	87650.	86840.
FE	46520.	52430.	51980.	48750.
MG	9880.	9700.	10270.	11100.
CA	10410.	9890.	8740.	8240.
NA	15100.	11900.	12290.	13000.
K	15310.	17080.	18060.	16220.
TI	5420.	5530.	5440.	5320.
MN	910.	890.	810.	510.
BA	560.	560.	540.	580.
CO	48.	48.	54.	48.
CU	36.	30.	29.	32.
GA	26.	24.	25.	26.
LI	12.	36.	17.	16.
MO	3.	2.	3.	2.
PB	18.	22.	29.	20.
RB	107.	128.	138.	123.
S	345.	332.	442.	1128.
SR	220.	217.	202.	205.
C&H2O	70600.	74400.	66800.	65800.
ZN	104.	120.	130.	113.
ZR	135.	142.	139.	136.
V	110.	100.	100.	100.
NI	168.	140.	156.	142.

BEARPAW FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-494 1730.0-1735.0
SI	290900.
AL	84746.
FE	48330.
MG	8240.
CA	8130.
NA	15060.
K	12350.
TI	4995.
MN	500.
BA	560.
CR	46.
CU	14.
GA	25.
LI	33.
MO	3.
PB	24.
RB	108.
S	1404.
SR	212.
CAH2O	77700.
ZN	100.
ZR	153.
V	80.
NI	160.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-495 1735.0-1736.0	ST-496 1736.0-1736.2	ST-497 1736.2-1739.5	ST-498 1739.5-1743.0
SI	287980.	261430.	303640.	293100.
AL	88280.	90430.	78530.	91890.
FE	45110.	39520.	42930.	45980.
MG	9320.	32700.	6700.	5960.
CA	9590.	10870.	14680.	7960.
NA	17900.	19200.	12600.	14400.
K	5520.	3100.	8160.	12630.
TI	3900.	2540.	3830.	4950.
MN	480.	470.	600.	510.
BA	540.	400.	550.	520.
CO	42.	46.	34.	38.
CU	1.	24.	33.	26.
GA	25.	25.	14.	24.
LI	11.	7.	10.	14.
MO	2.	5.	1.	1.
PB	21.	35.	28.	31.
RB	221.	0.	59.	106.
S	1056.	1334.	1216.	1666.
SR	257.	280.	257.	215.
C&H2O	77400.	94000.	65600.	69900.
ZN	65.	39.	65.	93.
ZR	180.	156.	179.	161.
V	40.	20.	66.	80.
NI	146.	156.	134.	140.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-499 1749.0-1750.5	ST-500 1750.5-1751.5	ST-503 1753.0-1754.0	ST-504 1754.0-1755.5
SI	299090.	290620.	298170.	296570.
AL	76430.	89770.	92050.	91560.
FE	51350.	51600.	36870.	40990.
MG	5260.	7180.	6620.	6160.
CA	18120.	6730.	6250.	6710.
NA	12000.	10600.	13100.	12900.
K	9760.	19180.	18460.	27490.
TI	3620.	6120.	6070.	6440.
MN	820.	570.	430.	730.
BA	560.	440.	460.	440.
CO	28.	52.	40.	56.
CU	51.	50.	56.	48.
GA	18.	26.	20.	20.
LI	9.	20.	16.	17.
MO	0.	1.	1.	1.
PB	22.	26.	41.	10.
RB	58.	137.	121.	124.
S	1332.	1547.	225.	163.
SR	198.	146.	157.	149.
C&H2O	53500.	74600.	66300.	50700.
ZN	43.	125.	105.	134.
ZR	162.	134.	141.	150.
V	40.	180.	180.	160.
NI	150.	198.	148.	116.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-505 1755.5-1757.5	ST-506 1757.5-1759.0	ST-507 1759.0-1762.0	ST-508 1762.0-1765.0
SI	284820.	287330.	288390.	306280.
AL	87200.	93310.	96810.	92630.
FE	41230.	32200.	21000.	32250.
MG	5100.	5640.	4700.	7820.
CA	45700.	6780.	6570.	6300.
NA	12400.	11500.	9400.	13200.
K	21720.	19420.	16230.	28740.
TI	4820.	6620.	6960.	6050.
MN	390.	570.	440.	450.
BA	560.	420.	380.	520.
CO	34.	52.	52.	46.
CU	48.	41.	46.	55.
GA	16.	18.	16.	17.
LI	12.	16.	16.	15.
MO	2.	1.	1.	1.
PB	14.	5.	8.	10.
RB	87.	102.	93.	116.
S	137.	267.	297.	187.
SR	166.	125.	116.	134.
CGH2O	39700.	130200.	121700.	52600.
ZN	93.	91.	86.	81.
ZR	147.	120.	110.	129.
V	80.	160.	180.	160.
NI	98.	112.	112.	124.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-509 1765.0-1767.0	ST-510 1767.0 1768.0	ST-512 1768.3-1769.0	ST-513 1769.0-1770.0
SI	251910.	279830.	284170.	286100.
AL	81090.	95240.	88410.	94150.
FE	118520.	42020.	16140.	30740.
MG	11020.	6100.	5900.	6580.
CA	33970.	6790.	6470.	6700.
NA	9000.	11920.	9000.	12500.
K	12770.	17320.	17560.	21440.
TI	5660.	4820.	6560.	6410.
MN	1800.	560.	440.	470.
BA	540.	440.	500.	460.
CO	54.	62.	34.	50.
CU	45.	13.	22.	39.
GA	12.	18.	6.	16.
LI	12.	16.	23.	15.
MO	0.	1.	1.	1.
PB	5.	1.	1.	4.
RB	95.	144.	29.	87.
S	247.	226.	185.	229.
SR	177.	161.	60.	146.
C&H2O	67700.	117700.	197700.	91600.
ZN	69.	122.	9.	66.
ZR	143.	123.	65.	115.
V	129.	180.	100.	140.
NI	586.	148.	62.	116.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-515 1771.0-1771.5	ST-516 1771.5-1778.0	ST-517 1778.0-1779.5	ST-518 1779.5-1781.5
SI	291520.	299220.	298680.	312210.
AL	90800.	93680.	92590.	86700.
FE	30620.	29420.	35670.	34640.
MG	5960.	8660.	9080.	6240.
CA	7000.	9380.	6610.	7620.
NA	14700.	15200.	13100.	16100.
K	14550.	13390.	11230.	15190.
TI	5640.	4890.	6350.	5410.
MN	440.	540.	440.	460.
BA	560.	660.	540.	560.
CO	46.	46.	46.	40.
CU	35.	43.	36.	43.
GA	18.	19.	22.	82.
LI	12.	10.	12.	12.
MO	1.	2.	2.	3.
PB	7.	19.	10.	9.
RB	78.	59.	90.	87.
S	278.	150.	209.	98.
SR	185.	256.	195.	233.
CGH2O	36200.	54900.	84700.	45600.
ZN	71.	100.	60.	86.
ZR	127.	141.	126.	149.
V	120.	100.	160.	120.
NI	112.	120.	132.	120.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-519 1781.5-1782.5	ST-520 1782.5-1783.0	ST-521 1783.0 1784.0	ST-522 1784.0-1785.5
SI	338570.	311130.	317670.	303930.
AL	92910.	89120.	87060.	84410.
FE	36010.	38070.	30160.	62960.
MG	6120.	6800.	9640.	8280.
CA	6850.	7230.	7990.	9350.
NA	15200.	18600.	19800.	14300.
K	14150.	13250.	11850.	11100.
TI	5840.	5260.	4590.	5070.
MN	440.	430.	430.	1180.
BA	500.	560.	740.	600.
CO	40.	40.	34.	40.
CU	41.	28.	39.	34.
GA	22.	20.	14.	29.
LI	12.	9.	8.	9.
MO	2.	3.	1.	1.
PB	4.	11.	18.	16.
RB	108.	79.	59.	88.
S	167.	196.	174.	256.
SR	214.	215.	259.	245.
C&H_2O	67300.	48700.	40900.	77400.
ZN	64.	55.	45.	77.
ZR	155.	164.	149.	161.
V	160.	120.	100.	100.
NI	132.	178.	154.	222.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-523 1785.5-1787.0	ST-524 1787.0-1788.5	ST-525 1788.5-1789.0	ST-526 1789.0-1790.5
SI	216260.	317090.	307700.	298840.
AL	90930.	83790.	89160.	89600.
FE	31940.	27550.	42050.	36410.
MG	7440.	6720.	11660.	8640.
CA	7690.	11530.	7720.	9180.
NA	18400.	19300.	15600.	19200.
K	11150.	8170.	13170.	10890.
TI	5470.	5230.	5430.	5040.
MN	450.	690.	450.	670.
BA	540.	580.	640.	520.
CO	36.	30.	54.	48.
CU	23.	28.	27.	25.
GA	25.	23.	30.	29.
LI	10.	7.	11.	8.
MO	2.	2.	2.	2.
PB	12.	15.	14.	18.
RB	78.	32.	93.	61.
S	176.	226.	80.	140.
SR	248.	295.	251.	262.
C&H2O	49200.	46500.	58600.	55200.
ZN	93.	72.	81.	90.
ZR	175.	186.	158.	181.
V	120.	100.	160.	120.
NI	84.	96.	90.	108.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-527 1790.5-1793.0	ST-528 1793.0-1797.0	ST-529 1797.0-1798.5	ST-530 1798.5-1799.0
SI	318940.	306460.	316870.	314610.
AL	85270.	83250.	87060.	89990.
FE	31080.	27680.	36130.	37680.
MG	6240.	5580.	5980.	6420.
CA	9200.	20680.	7070.	7230.
NA	20100.	18900.	13200.	16900.
K	10170.	8380.	11470.	12210.
TI	4670.	4400.	5550.	5590.
MN	460.	660.	440.	440.
BA	540.	480.	400.	380.
CO	48.	46.	46.	62.
CU	10.	19.	35.	36.
GA	26.	25.	23.	21.
LI	7.	7.	9.	10.
MO	0.	2.	2.	1.
PB	14.	24.	11.	11.
RB	59.	25.	99.	114.
S	120.	176.	131.	277.
SR	292.	305.	220.	216.
C&H2O	44100.	34600.	55600.	73300.
ZN	63.	67.	55.	93.
ZR	176.	151.	167.	161.
V	100.	90.	160.	160.
NI	93.	109.	144.	154.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-531 1799.0-1800.5	ST-532 1800.5-1804.0	ST-533 1804.0-1806.0	ST-534 1806.0-1808.0
SI	303170.	302530.	308540.	316260.
AL	87610.	86790.	86010.	84740.
FE	43970.	45480.	37000.	28170.
MG	8600.	7280.	5740.	6360.
CA	8090.	9300.	7920.	9530.
NA	17000.	17700.	16800.	18600.
K	10840.	9320.	14910.	12720.
TI	4930.	4690.	5190.	5070.
MN	440.	640.	490.	520.
BA	1280.	520.	560.	660.
CO	54.	40.	48.	58.
CU	35.	41.	37.	21.
GA	25.	26.	27.	19.
LI	8.	8.	9.	8.
MO	1.	2.	1.	1.
PB	9.	13.	9.	13.
RB	92.	58.	106.	56.
S	221.	200.	130.	169.
SR	270.	283.	273.	270.
C&H2O	57300.	64300.	44500.	40600.
ZN	67.	77.	78.	65.
ZR	179.	194.	201.	249.
V	120.	100.	140.	120.
NI	146.	108.	124.	132.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-535 1808.0-1814.5	ST-536 1814.5-1815.5	ST-537 1815.5-1818.5	ST-538 1818.5-1819.0
SI	296130.	282670.	300250.	288180.
AL	81240.	86470.	91140.	86790.
FE	33850.	43010.	42430.	47910.
MG	7980.	8040.	8320.	8060.
CA	25720.	7290.	7890.	11080.
NA	19100.	14900.	14400.	18300.
K	9790.	15990.	18550.	11360.
TI	3930.	5040.	5550.	4810.
MN	910.	450.	480.	1000.
BA	760.	540.	600.	540.
CO	44.	58.	56.	58.
CU	26.	59.	57.	37.
GA	18.	22.	21.	23.
LI	6.	12.	12.	10.
MO	2.	2.	2.	2.
PB	25.	7.	14.	14.
RB	24.	115.	102.	50.
S	95.	244.	145.	171.
SR	277.	223.	238.	296.
C&H2O	29500.	80400.	53500.	56200.
ZN	49.	78.	90.	103.
ZR	413.	155.	179.	185.
V	60.	160.	140.	80.
NI	118.	172.	178.	188.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-539 1819.0-1821.0	ST-540 1821.0-1823.0	ST-541 1823.0-1825.5	ST-542 1825.5-1827.0
SI	303990.	302250.	306250.	287850.
AL	81590.	91510.	86790.	83500.
FE	55220.	39590.	48420.	42370.
MG	8840.	5740.	7200.	7740.
CA	7960.	6640.	7280.	7750.
NA	13200.	13200.	16700.	12200.
K	15780.	10990.	14750.	14780.
TI	5000.	5810.	5310.	5340.
MN	1020.	450.	450.	460.
BA	500.	520.	600.	500.
CO	50.	32.	46.	50.
CU	55.	46.	44.	45.
GA	21.	20.	23.	17.
LI	14.	14.	11.	15.
MO	2.	3.	1.	2.
PB	19.	9.	34.	17.
RB	94.	83.	96.	89.
S	251.	25.	213.	464.
SR	200.	203.	247.	194.
C&H2O	76300.	58600.	59900.	134300.
ZN	93.	61.	105.	95.
ZR	191.	170.	212.	148.
V	120.	140.	120.	140.
NI	190.	138.	206.	138.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-543 1827.0-1830.0	ST-544 1830.0-1831.5	ST-545 1831.5-1833.0	ST-546 1833.0-1834.0
SI	303330.	298570.	308510.	313620.
AL	85960.	85450.	90250.	88810.
FE	35430.	64820.	36880.	38080.
MG	7860.	16120.	5920.	7760.
CA	9060.	12640.	6840.	7350.
NA	17500.	16200.	14000.	15100.
K	12830.	9000.	11690.	13190.
TI	5140.	4540.	5520.	5240.
MN	490.	2310.	450.	450.
BA	460.	500.	440.	560.
CO	38.	38.	34.	30.
CU	38.	35.	34.	38.
GA	19.	24.	23.	20.
LI	11.	10.	11.	10.
MO	2.	1.	1.	1.
PB	27.	22.	5.	15.
RB	65.	39.	75.	69.
S	162.	107.	52.	83.
SR	271.	293.	215.	234.
C&H2O	59500.	72300.	54300.	57500.
ZN	91.	76.	47.	66.
ZR	197.	264.	309.	176.
V	100.	80.	100.	120.
NI	122.	156.	170.	122.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-547 1834.0-1835.5	ST-548 1835.5-1837.0	ST-549 1837.0-1844.0	ST-550 1844.0-1844.5
SI	303610.	327250.	304750.	309120.
AL	86930.	81040.	83450.	88060.
FE	41950.	26650.	28410.	38100.
MG	8300.	5280.	6120.	22720.
CA	7910.	7840.	15610.	7880.
NA	16500.	19920.	19300.	15400.
K	11380.	8990.	8550.	10600.
TI	5210.	4710.	4770.	5100.
MN	460.	440.	580.	460.
BA	500.	480.	620.	920.
CO	32.	38.	34.	38.
CU	39.	17.	28.	37.
GA	22.	14.	19.	27.
LI	11.	9.	8.	12.
MO	0.	1.	1.	3.
PB	19.	14.	22.	18.
RB	76.	40.	13.	87.
S	129.	510.	103.	195.
SR	253.	224.	329.	235.
H2O	58100.	53800.	35500.	77500.
ZN	118.	42.	68.	59.
ZR	195.	160.	200.	184.
V	100.	60.	80.	200.
NI	132.	102.	124.	124.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-551 1844.5-1845.0	ST-552 1845.0-1846.0	ST-553 1846.0-1847.0	ST-554 1847.0-1850.0
SI	287330.	315600.	323200.	339310.
AL	95470.	83990.	88590.	81290.
FE	37360.	40260.	37150.	28270.
MG	3680.	26100.	9520.	16020.
CA	8060.	7160.	7360.	6670.
NA	15200.	16400.	16400.	17500.
K	6780.	12230.	11630.	3700.
TI	3920.	5140.	5050.	4790.
MN	460.	460.	450.	440.
BA	560.	1000.	720.	980.
CO	34.	34.	32.	26.
CU	14.	36.	56.	26.
GA	19.	23.	21.	16.
LI	9.	13.	11.	8.
MO	2.	1.	1.	3.
PB	7.	6.	19.	9.
RB	34.	104.	84.	55.
S	230.	52.	192.	113.
SR	153.	236.	223.	218.
CGH2O	143900.	58300.	55400.	38400.
ZN	71.	93.	71.	32.
ZR	142.	139.	171.	167.
V	60.	100.	80.	40.
NI	134.	90.	49.	64.

CLOMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-555 1850.0-1851.0	ST-556 1851.0-1853.0	ST-557 1853.0-1853.5	ST-558 1853.5-1855.5
SI	306130.	298650.	304750.	311930.
AL	84220.	82570.	82360.	84590.
FE	38640.	36670.	37300.	32620.
MG	17130.	28400.	7160.	13720.
CA	7860.	8960.	7040.	7100.
NA	16800.	18900.	17100.	18400.
K	10140.	7680.	9230.	6480.
TI	4820.	3770.	4860.	3830.
MN	800.	1100.	460.	440.
BA	900.	840.	580.	840.
CO	38.	42.	36.	26.
CU	31.	34.	33.	23.
GA	21.	21.	17.	13.
LI	12.	11.	12.	8.
MO	2.	2.	2.	1.
PB	6.	19.	22.	2.
RB	74.	36.	63.	29.
S	520.	176.	162.	60.
SR	235.	275.	227.	231.
C&H2O	59300.	56200.	70200.	55400.
ZN	80.	65.	65.	30.
ZR	190.	177.	175.	146.
V	40.	40.	60.	40.
NI	176.	90.	92.	86.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-559 1855.5-1857.0	ST-560 1857.0-1857.5	ST-561 1857.5-1859.0	ST-563 1860.5-1861.5
SI	306480.	313110.	308880.	291940.
AL	79390.	46470.	82470.	86520.
FE	30750.	28620.	29810.	38550.
MG	14720.	9020.	14680.	15000.
CA	7230.	7550.	10420.	8240.
NA	17500.	17900.	20900.	17600.
K	6520.	5910.	5950.	8060.
TI	3640.	3360.	3610.	4020.
MN	440.	440.	510.	460.
BA	900.	720.	820.	900.
CO	30.	22.	32.	42.
CU	27.	18.	16.	26.
GA	14.	18.	18.	22.
LI	9.	10.	10.	10.
MO	1.	0.	2.	2.
PB	8.	10.	18.	21.
RB	33.	23.	14.	47.
S	207.	42.	172.	100.
SR	231.	244.	301.	279.
C&H2O	67500.	44800.	41200.	70800.
ZN	33.	21.	50.	63.
ZR	161.	159.	174.	184.
V	40.	40.	40.	40.
NI	86.	86.	120.	118.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-564 1861.5-1867.0	ST-565 1867.0-1868.0	ST-566 1868.0-1868.5	ST-567 1868.5-1873.0
SI	301760.	314210.	294030.	327490.
AL	88170.	79770.	86840.	78070.
FE	41320.	32390.	38950.	30290.
MG	16280.	10780.	17080.	4880.
CA	7790.	6880.	6760.	6780.
NA	17300.	16900.	14500.	13000.
K	9390.	7210.	9580.	7560.
TI	4320.	4570.	5130.	4600.
MN	460.	440.	450.	440.
BA	940.	740.	1000.	520.
CO	40.	34.	38.	44.
CU	43.	23.	59.	24.
GA	22.	18.	14.	15.
LI	10.	6.	10.	8.
MO	1.	4.	1.	2.
PB	15.	18.	14.	14.
PB	77.	46.	82.	46.
S	79.	93.	158.	114.
SR	265.	221.	199.	199.
(GH2O)	66500.	65100.	90700.	53900.
ZN	67.	43.	95.	60.
ZR	198.	169.	163.	170.
V	80.	40.	120.	40.
NI	152.	70.	80.	124.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-568 1875.0-1878.0	ST-569 1878.0 1683.0	ST-570 1883.0-1886.0	ST-571 1886.0-1887.5
SI	307580.	311460.	295350.	304430.
AL	82310.	86110.	81610.	78130.
FE	43030.	43070.	44300.	31310.
MG	5240.	8480.	9100.	5460.
CA	6870.	8430.	7610.	6650.
NA	16700.	13000.	17100.	16200.
K	9930.	10430.	8960.	8470.
TI	4770.	4750.	4710.	5250.
MN	440.	480.	500.	440.
BA	580.	560.	540.	540.
CO	44.	46.	66.	34.
CU	26.	35.	36.	27.
GA	24.	20.	22.	18.
LI	15.	17.	19.	15.
MO	2.	1.	2.	1.
PB	13.	20.	15.	15.
RB	72.	70.	63.	58.
S	77.	72.	171.	81.
SR	239.	281.	259.	213.
C&H2O	51700.	51000.	67000.	56500.
ZN	69.	92.	90.	56.
ZR	185.	164.	185.	156.
V	60.	60.	100.	80.
NI	106.	126.	190.	96.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-572 1887.5-1892.5	ST-573 1892.5-1893.5	ST-574 1893.5-1895.0	ST-575 1895.0-1896.5
SI	313710.	329250.	294060.	310140.
AL	80150.	84060.	92150.	91150.
FE	40460.	23810.	45910.	48350.
MG	5060.	3280.	7580.	7860.
CA	6850.	6660.	7310.	7090.
NA	15900.	17500.	18100.	15700.
K	10320.	9690.	14610.	15070.
TI	5140.	4810.	5300.	5420.
MN	460.	440.	470.	480.
BA	460.	440.	520.	440.
CO	37.	26.	54.	54.
CU	27.	22.	44.	52.
GA	21.	17.	24.	26.
LI	16.	16.	20.	22.
MO	1.	1.	1.	2.
PB	13.	4.	7.	10.
RB	70.	60.	102.	118.
S	75.	34.	159.	123.
SR	224.	192.	256.	230.
C&H2O	44900.	44800.	61100.	64900.
ZN	62.	37.	133.	108.
ZR	196.	149.	192.	181.
V	60.	40.	140.	160.
NI	96.	70.	158.	184.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-576 1896.5-1898.5	ST-577 1898.5-1900.0	ST-578 1900.0 1906.0	ST-579 1906.0-1910.5
SI	297430.	291070.	286900.	336170.
AL	87810.	90550.	87040.	74500.
FE	41450.	42280.	30630.	26670.
MG	6620.	4860.	6940.	3860.
CA	7310.	8210.	12290.	6510.
NA	17300.	20500.	21500.	16900.
K	10440.	9480.	8600.	8180.
TI	4840.	4390.	4630.	5580.
MN	440.	470.	600.	450.
BA	540.	520.	560.	420.
CO	36.	46.	38.	24.
CU	31.	31.	21.	22.
GA	24.	24.	17.	10.
LI	15.	15.	13.	7.
MO	1.	3.	0.	2.
PB	14.	11.	18.	10.
RB	102.	72.	25.	55.
S	118.	84.	142.	17.
SR	267.	296.	324.	188.
C&H2O	83400.	53700.	39500.	40000.
ZN	64.	90.	67.	36.
ZR	174.	200.	204.	168.
V	120.	100.	80.	60.
NI	124.	164.	100.	90.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-580 1910.5-1912.5	ST-581 1912.5-1914.5	ST-582 1914.5-1916.0	ST-583 1916.0-1920.0
SI	323610.	306260.	290440.	315780.
AL	83430.	85430.	71180.	96150.
FE	30900.	37030.	26730.	33480.
MG	5080.	5480.	3980.	12320.
CA	6600.	7390.	30770.	7290.
NA	15600.	16600.	16400.	18400.
K	10900.	13150.	10350.	13590.
TI	5010.	5200.	4360.	4920.
MN	470.	680.	930.	460.
BA	460.	540.	640.	340.
CO	50.	40.	30.	44.
CU	20.	25.	17.	31.
GA	15.	16.	13.	17.
LI	8.	10.	8.	9.
MO	2.	1.	1.	2.
PB	12.	14.	28.	13.
RB	67.	102.	39.	83.
S	103.	72.	35.	65.
SR	204.	222.	247.	245.
&H2O	45700.	55800.	30400.	47700.
ZN	53.	75.	52.	67.
ZR	177.	192.	204.	195.
V	80.	120.	60.	100.
NI	108.	116.	78.	104.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-584 1920.0-1921.0	ST-585 1921.0-1925.5	ST-586 1925.5-1927.5	ST-587 1927.5-1929.0
SI	300230.	301890.	292490.	285890.
AL	86270.	86370.	87250.	88480.
FE	39520.	40530.	44760.	44770.
MG	7840.	9460.	7485.	7380.
CA	6510.	6430.	6900.	7670.
NA	16400.	14200.	15600.	16600.
K	15470.	48320.	18210.	18630.
TI	5550.	5520.	5860.	5700.
MN	450.	450.	490.	520.
BA	660.	560.	656.	620.
CO	42.	42.	93.	76.
CU	43.	28.	49.	30.
GA	21.	19.	26.	26.
LI	10.	10.	16.	16.
MO	1.	2.	1.	1.
PB	3.	9.	9.	16.
RB	94.	90.	127.	81.
S	44.	55.	169.	474.
SR	233.	213.	245.	252.
CCH2O	59400.	47700.	55900.	57500.
ZN	42.	53.	106.	112.
ZR	132.	186.	194.	197.
V	140.	120.	112.	100.
NI	138.	138.	152.	166.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-588 1929.0-1930.5	ST-589 1930.5-1936.5	ST-590 1936.5-1936.8	ST-591 1936.8-1942.0
SI	223960.	282770.	281150.	294730.
AL	65780.	86840.	98270.	85430.
FE	122570.	47760.	50220.	40280.
MG	13600.	6700.	9340.	13960.
CA	19780.	6710.	7720.	7180.
NA	9500.	15600.	20000.	17200.
K	9820.	13620.	5220.	11180.
TI	4470.	5080.	2880.	5810.
MN	3820.	450.	460.	450.
BA	540.	620.	560.	820.
CO	42.	44.	42.	44.
CU	48.	44.	8.	27.
GA	18.	23.	29.	17.
LI	12.	11.	14.	11.
MO	0.	0.	3.	6.
PB	0.	7.	18.	6.
RB	55.	111.	20.	80.
S	336.	60.	89.	63.
SR	205.	252.	325.	257.
C&H2O	61600.	93300.	84200.	46600.
ZN	85.	71.	82.	54.
ZR	405.	195.	194.	184.
V	80.	100.	20.	60.
NI	372.	118.	90.	88.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-592 1942.0-1943.5	ST-593 1943.5-1944.5	ST-594 1944.5-1945.5	ST-595 1945.5-1947.0
SI	285490.	283030.	350310.	309985.
AL	76850.	65600.	55520.	83270.
FE	38740.	44840.	17140.	36720.
MG	13520.	6940.	11820.	6700.
CA	7930.	6370.	6000.	6080.
NA	16800.	14300.	10100.	12400.
K	11960.	15670.	9470.	15890.
TI	4550.	5880.	5320.	4550.
MN	1059.	480.	430.	450.
BA	360.	580.	700.	580.
CO	52.	50.	26.	40.
CU	22.	35.	23.	15.
GA	20.	16.	8.	14.
LI	11.	12.	6.	10.
MO	2.	1.	2.	2.
PB	35.	9.	10.	17.
RB	60.	90.	57.	104.
S	106.	95.	128.	308.
SR	285.	156.	122.	137.
C&H2O	40100.	47600.	49900.	36200.
ZN	70.	54.	48.	73.
ZR	187.	172.	159.	230.
V	40.	100.	20.	40.
NI	106.	102.	40.	90.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-596 1947.0-1948.0	ST-597 1948.0-1953.0	ST-598 1953.0-1954.0	ST-599 1954.0-1955.5
SI	292640.	308180.	322440.	293250.
AL	83270.	77520.	75230.	79060.
FE	39310.	34600.	29630.	37100.
MG	10780.	8760.	5500.	7460.
CA	6050.	11900.	7090.	10980.
NA	13800.	10300.	14400.	18900.
K	15630.	17150.	15040.	17500.
TI	5710.	4480.	3180.	4550.
MN	460.	540.	500.	490.
BA	720.	600.	640.	620.
CO	46.	32.	28.	36.
CU	44.	25.	18.	23.
GA	15.	8.	9.	17.
LI	12.	10.	13.	10.
MO	2.	4.	0.	2.
PB	11.	6.	11.	12.
RB	163.	106.	89.	110.
S	144.	173.	98.	119.
SR	172.	151.	163.	171.
+H2O	48800.	35400.	21900.	36800.
ZN	91.	70.	36.	64.
ZR	191.	126.	162.	222.
V	30.	60.	40.	60.
NI	92.	82.	38.	66.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-600 1955.5-1956.0	ST-601 1956.0-1958.0	ST-602 1958.0-1959.0	ST-603 1959.0-1959.7
SI	281040.	280110.	218300.	297780.
AL	75460.	71880.	48580.	62470.
FE	37250.	27500.	130590.	45630.
MG	9460.	15960.	15640.	12640.
CA	10630.	21100.	61910.	20470.
NA	12100.	9900.	5400.	8300.
K	10520.	17060.	11120.	15440.
TI	4560.	4150.	2940.	3750.
MN	520.	790.	12260.	550.
BA	600.	720.	500.	540.
CO	40.	36.	40.	28.
CU	24.	19.	32.	32.
GA	17.	13.	8.	11.
LI	10.	11.	9.	14.
MO	8.	2.	0.	2.
PB	16.	13.	10.	7.
RB	116.	105.	88.	100.
S	48.	17.	0.	86.
SR	179.	149.	145.	117.
C&H2O	42300.	36800.	130400.	28900.
ZN	89.	73.	67.	62.
ZR	220.	218.	404.	277.
V	60.	60.	40.	60.
NI	114.	90.	510.	152.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-604 1959.7-1960.7	ST-605 1960.7-1960.9	ST-606 1960.9-1962.0	ST-607 1962.0-1963.3
SI	329230.	282160.	268900.	338810.
AL	78950.	67860.	72560.	68560.
FE	28760.	14410.	34150.	29270.
MG	[illegible]	13240.	6260.	5680.
CA	[illegible]	[illegible]	27190.	10100.
NA	[illegible]	[illegible]	12400.	10300.
K	[illegible]	[illegible]	14340.	10460.
TI	[illegible]	[illegible]	4090.	3150.
MN	[illegible]	[illegible]	1290.	540.
BA	[illegible]	[illegible]	[illegible]	540.
CR	[illegible]	[illegible]	[illegible]	30.
CU	[illegible]	22.	19.	[illegible]
GA	[illegible]	19.	14.	18.
LI	[illegible]	13.	9.	13.
MO	0.	3.	0.	0.
PB	20.	12.	12.	31.
RB	52.	134.	81.	47.
S	29.	9.	48.	246.
SR	[illegible]	142.	180.	152.
CSH2O	[illegible]	42900.	32300.	25300.
ZN	[illegible]	68.	54.	43.
ZR	[illegible]	213.	190.	150.
V	[illegible]	120.	80.	60.
NI	68.	96.	94.	63.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-608 1963.3-1964.0	ST-609 1964.0-1966.0	ST-610 1966.0-1968.0	ST-611 1968.0-1970.5
SI	259900.	263070.	293120.	278710.
AL	92590.	76300.	87350.	78620.
FE	45230.	26570.	38610.	48930.
MG	8300.	7600.	7560.	21020.
CA	6580.	14580.	6960.	6810.
NA	15500.	22600.	18900.	11200.
K	13000.	9960.	13860.	17760.
TI	4950.	5440.	4780.	5160.
MN	470.	620.	460.	510.
BA	640.	780.	640.	880.
CO	52.	42.	26.	50.
CU	44.	16.	30.	45.
GA	35.	27.	26.	28.
LI	12.	11.	8.	13.
MO	1.	2.	1.	2.
PB	12.	13.	12.	33.
RB	92.	26.	72.	123.
S	31.	173.	197.	388.
SR	247.	273.	270.	193.
C&H2O	57500.	28600.	42000.	52200.
ZN	59.	50.	41.	91.
ZR	202.	276.	183.	220.
V	140.	60.	140.	140.
NI	112.	56.	126.	168.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-612 1970.5-1974.0	ST-613 1974.0-1983.0	ST-614 1983.0-1983.5	ST-615 1983.5-1989.0
SI	318040.	291230.	288380.	296310.
AL	72620.	77690.	72740.	79550.
FE	26420.	26650.	31590.	23970.
MG	13300.	17060.	27800.	10560.
CA	5870.	13290.	17250.	13250.
NA	10700.	7200.	9100.	10800.
K	15350.	14860.	16020.	11450.
TI	4550.	4040.	3790.	3130.
MN	440.	570.	470.	470.
BA	660.	600.	620.	480.
CO	16.	18.	30.	26.
CU	21.	15.	17.	14.
GA	17.	18.	15.	13.
LI	0.	9.	12.	1.
MO	2.	3.	2.	0.
PB	23.	9.	10.	4.
RB	111.	69.	117.	48.
S	106.	231.	153.	129.
SR	129.	66.	155.	134.
CGH2O	34800.	20000.	50100.	28700.
ZN	40.	29.	64.	36.
ZR	188.	232.	209.	160.
V	100.	60.	100.	40.
NI	82.	86.	114.	36.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-616 1989.0-1990.5	ST-617 1990.5-1993.5	ST-618 1993.5-1999.5	ST-619 1999.5-2000.5
SI	297080.	281140.	303200.	264970.
AL	67390.	81070.	63140.	67210.
FE	27010.	44500.	30530.	63140.
MG	7600.	14920.	19600.	23780.
CA	17020.	6070.	28210.	39970.
NA	11200.	11700.	5900.	6400.
K	12410.	23020.	20860.	26820.
TI	3510.	5400.	3750.	4290.
MN	760.	470.	540.	1330.
BA	540.	700.	480.	480.
CO	23.	36.	44.	22.
CU	17.	42.	19.	38.
GA	12.	22.	10.	21.
LI	15.	12.	11.	18.
MO	2.	1.	2.	4.
PB	16.	7.	4.	12.
RB	50.	152.	106.	161.
S	106.	118.	244.	202.
SR	135.	181.	81.	107.
C&H2O	21300.	50700.	18800.	43000.
ZN	51.	110.	59.	101.
ZR	161.	197.	250.	307.
V	60.	180.	80.	140.
NI	42.	146.	120.	180.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-620 2005.5-2007.0	ST-621 2007.0-2012.0	ST-622 2012.0-2017.0	ST-624 2019.5-2021.5
SI	334390.	293680.	378480.	303430.
AL	58220.	58530.	50470.	87660.
FE	13820.	33310.	28510.	41850.
MG	21360.	35260.	12100.	20900.
CA	57330.	42840.	37530.	11410.
NA	4700.	5000.	3600.	10100.
K	11990.	11960.	7650.	21800.
TI	2350.	3810.	2080.	4940.
MN	780.	1070.	1440.	590.
BA	420.	400.	460.	980.
CO	8.	14.	10.	34.
CU	14.	10.	11.	27.
GA	8.	10.	6.	19.
LI	6.	11.	10.	16.
MO	2.	7.	1.	1.
PB	6.	6.	9.	7.
RB	83.	66.	11.	112.
S	82.	104.	245.	175.
SR	87.	58.	44.	166.
C&H2O	9700.	18000.	14700.	44000.
ZN	26.	43.	24.	94.
ZR	114.	268.	120.	234.
V	40.	60.	60.	140.
NI	48.	74.	42.	102.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-625 2021.5-2027.0	ST-626 2027.0 2027.5	ST-627 2027.5-2032.5	ST-628 2032.5-2038.0
SI	306830.	277190.	279630.	359050.
AL	86010.	78900.	83060.	74210.
FE	35730.	75790.	28980.	29430.
MG	14400.	30500.	8980.	7680.
CA	24380.	15300.	40070.	9350.
NA	11300.	9930.	11100.	10500.
K	13190.	19810.	16210.	14780.
TI	4400.	4740.	4100.	4280.
MN	960.	3120.	930.	590.
BA	580.	1160.	900.	420.
CR	30.	42.	24.	22.
CU	21.	38.	20.	37.
GA	16.	20.	12.	10.
LI	19.	27.	11.	14.
MO	1.	0.	1.	0.
PB	7.	13.	6.	8.
RB	76.	116.	58.	52.
S	203.	210.	174.	103.
SR	162.	171.	150.	112.
C&H2O	32700.	70800.	25900.	16200.
ZN	72.	101.	63.	55.
ZR	216.	326.	177.	150.
V	80.	140.	80.	40.
NI	44.	158.	94.	36.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-629 2038.0-2040.0	ST-630 2040.0-2041.0	ST-631 2041.0-2044.0	ST-632 2044.0-2045.5
SI	317910.	325040.	295930.	318510.
AL	70950.	79500.	82680.	85120.
FE	28870.	29440.	34920.	27700.
MG	25080.	40020.	17300.	18940.
CA	5960.	6000.	5860.	5800.
NA	11100.	12700.	11500.	10600.
K	14030.	12730.	26460.	26080.
TI	4190.	4180.	4210.	4150.
MN	470.	450.	450.	440.
BA	1040.	1160.	980.	960.
CO	28.	38.	28.	76.
CU	13.	19.	21.	25.
GA	18.	16.	19.	17.
LI	8.	7.	8.	9.
MO	4.	2.	2.	2.
PB	6.	10.	16.	12.
RB	123.	112.	178.	148.
S	0.	34.	47.	153.
SR	135.	149.	154.	121.
C&H2O	34900.	36100.	37300.	44800.
ZN	16.	19.	26.	100.
ZR	195.	192.	209.	198.
V	80.	60.	80.	100.
NI	62.	106.	114.	162.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-633 2045.5-2048.5	ST-634 2048.5-2050.5	ST-635 2050.5-2051.0	ST-636 2051.0-2054.0
SI	291830.	291860.	272840.	325470.
AL	84060.	92150.	82310.	82790.
FE	35770.	34700.	36350.	41010.
MG	43020.	12860.	10760.	11620.
CA	5660.	5870.	5980.	6230.
NA	11700.	11000.	10400.	11500.
K	22320.	16520.	16030.	28680.
TI	4510.	4780.	4780.	3990.
MN	460.	450.	460.	500.
BA	1200.	840.	740.	780.
CO	48.	32.	58.	34.
CU	41.	20.	21.	21.
GA	20.	23.	20.	16.
LI	13.	13.	16.	13.
MO	0.	2.	3.	0.
PB	7.	15.	25.	23.
RB	157.	152.	132.	142.
S	21.	28.	662.	791.
SR	141.	149.	107.	102.
C&H2O	42500.	48600.	92900.	20100.
ZN	23.	45.	151.	53.
ZR	194.	192.	180.	250.
V	100.	100.	100.	80.
NI	134.	120.	158.	154.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-637 2054.0-2055.0	ST-638 2055.0-2056.0	ST-639 2056.0-2057.5	ST-640 2057.5-2059.5
SI	332190.	269240.	309100.	290330.
AL	98130.	68040.	87710.	73530.
FE	47170.	13740.	29450.	31240.
MG	12740.	14920.	35220.	38960.
CA	6160.	78360.	34550.	60580.
NA	7300.	7000.	9600.	10400.
K	49770.	19900.	45600.	30240.
TI	4890.	2450.	4240.	3250.
MN	520.	1700.	570.	590.
BA	740.	620.	600.	460.
CO	44.	18.	40.	36.
CU	41.	16.	34.	23.
GA	27.	13.	24.	15.
LI	38.	7.	27.	20.
MO	0.	1.	1.	0.
PB	25.	10.	19.	16.
RB	253.	73.	216.	118.
S	421.	614.	318.	362.
SR	129.	179.	129.	106.
C&H2O	25500.	5100.	24300.	14900.
ZN	109.	17.	93.	44.
ZR	247.	194.	234.	222.
V	140.	40.	100.	40.
NI	154.	70.	44.	36.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-641 2059.5-2062.5	ST-642 2062.5-2068.5	ST-643 2068.5-2074.5	ST-644 2074.5-2078.0
SI	314060.	298440.	281540.	307220.
AL	82630.	65720.	82200.	85950.
FE	36030.	19100.	19520.	39640.
MG	27220.	13660.	14340.	18940.
CA	23850.	79010.	31300.	15790.
NA	10700.	9100.	11600.	9900.
K	35100.	16500.	17600.	26990.
TI	3910.	2150.	2900.	4000.
MN	550.	950.	620.	520.
BA	570.	420.	440.	480.
CO	42.	26.	28.	38.
CU	22.	14.	15.	27.
GA	21.	12.	16.	17.
LI	18.	10.	12.	19.
MO	1.	0.	0.	0.
PB	8.	5.	10.	16.
RB	172.	72.	77.	165.
S	136.	229.	126.	65.
SR	132.	0.	97.	114.
C&H2O	26500.	5060.	8100.	22800.
ZN	59.	27.	20.	48.
ZR	233.	151.	145.	225.
V	80.	20.	40.	80.
NI	36.	34.	26.	36.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-645 2078.0-2083.0	ST-646 2083.0-2085.5	ST-647 2085.5-2086.0	ST-648 2086.0-2088.0
SI	268710.	266690.	255580.	278290.
AL	78290.	74270.	76300.	72330.
FE	37050.	25600.	44290.	34900.
MG	28700.	27160.	27520.	23200.
CA	41790.	74850.	41890.	73720.
NA	9300.	9000.	9200.	8600.
K	33640.	18210.	30550.	20770.
TI	3770.	3160.	3820.	2640.
MN	560.	980.	630.	840.
BA	560.	440.	520.	400.
CO	40.	32.	42.	34.
CU	31.	21.	31.	21.
GA	27.	13.	24.	20.
LI	20.	16.	25.	18.
MO	0.	4.	2.	2.
PB	10.	12.	16.	9.
RB	190.	93.	176.	119.
S	70.	156.	18.	55.
SR	122.	108.	105.	110.
C&H2O	19200.	10800.	22100.	13300.
ZN	79.	40.	65.	49.
ZR	220.	247.	244.	273.
V	80.	40.	100.	40.
NI	42.	40.	44.	44.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-649 2088.0-2089.0	ST-650 2089.0-2093.5	ST-651 2093.5-2095.5	ST-652 2095.5-2097.0
SI	243000.	288860.	294060.	263640.
AL	66680.	58970.	87400.	84060.
FE	8520.	37520.	46800.	49920.
MG	23620.	14960.	5360.	5680.
CA	65100.	6000.	5960.	5910.
NA	8100.	10000.	9000.	11000.
K	24270.	14470.	13060.	17060.
TI	3530.	5530.	6060.	5730.
MN	3160.	470.	460.	470.
BA	520.	700.	460.	540.
CO	48.	36.	40.	46.
CU	24.	42.	49.	34.
GA	22.	13.	17.	16.
LI	17.	15.	15.	21.
MO	0.	2.	0.	0.
PB	5.	8.	3.	4.
RB	167.	119.	133.	152.
S	0.	54.	24.	84.
SR	101.	140.	169.	168.
LOSS H2O	27220.	33400.	43400.	40600.
ZN	72.	66.	57.	48.
ZR	351.	213.	205.	204.
V	39.	140.	180.	180.
NI	52.	40.	38.	48.

CLOMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-653 2097.0-2099.0	ST-654 2099.0-2101.0	ST-655 2101.0-2104.0	ST-655 2104.0-2108.0
SI	269880.	290150.	275910.	290920.
AL	89700.	79610.	92040.	77740.
FE	46210.	35660.	35690.	29590.
MG	7000.	11040.	15500.	16340.
CA	5810.	6310.	13080.	12750.
NA	11300.	10300.	9800.	9300.
K	19160.	19790.	21450.	11380.
TI	5590.	5020.	4750.	3510.
MN	460.	470.	510.	500.
BA	520.	560.	480.	480.
CO	61.	54.	38.	34.
CU	57.	23.	31.	12.
GA	22.	21.	15.	11.
LI	25.	22.	23.	15.
MO	0.	1.	1.	0.
PB	0.	15.	10.	23.
RB	146.	161.	152.	57.
S	139.	145.	205.	351.
SR	153.	136.	127.	81.
C&H2O	41000.	43500.	37160.	15600.
ZN	166.	76.	97.	33.
ZR	207.	207.	398.	192.
V	200.	140.	140.	80.
NI	80.	66.	46.	33.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-657 2108.0-2114.0	ST-658 2114.0-2119.5	ST-659 2119.5-2125.5	ST-660 2125.5-2127.5
SI	343040.	330160.	335230.	206380.
AL	79770.	74950.	78840.	43140.
FE	23400.	22240.	31030.	59680.
MG	14160.	18320.	7100.	14100.
CA	23680.	41490.	19230.	52570.
NA	10500.	8200.	11400.	4800.
K	12040.	10030.	9390.	9250.
TI	3820.	3190.	3080.	1880.
MN	520.	620.	760.	2540.
BA	340.	380.	420.	300.
CO	26.	24.	30.	38.
CU	9.	19.	25.	32.
GA	14.	14.	14.	15.
LI	14.	15.	15.	11.
MO	2.	1.	0.	0.
PB	10.	11.	11.	8.
RB	56.	48.	39.	137.
S	168.	187.	145.	291.
SR	87.	91.	117.	138.
&H2O	10600.	21900.	11400.	41400.
ZN	31.	41.	45.	32.
ZR	185.	177.	317.	318.
V	60.	60.	80.	60.
NI	28.	30.	32.	54.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-661 2127.5-2128.5	ST-662 2128.5-2133.0	ST-663 2133.0-2135.5	ST-664 2135.5-2136.5
SI	262270.	279820.	269750.	277660.
AL	59470.	91850.	92640.	88270.
FE	29110.	54060.	53240.	43900.
MG	10280.	13160.	11820.	9680.
CA	64060.	6650.	6530.	7640.
NA	6500.	16100.	15100.	18700.
K	5080.	15480.	12290.	8930.
TI	1370.	5730.	5780.	6050.
MN	3160.	490.	610.	550.
BA	420.	620.	660.	540.
CO	32.	60.	60.	44.
CU	4.	38.	41.	20.
GA	12.	28.	23.	23.
LI	13.	22.	28.	19.
MO	0.	1.	0.	0.
PB	20.	8.	11.	2.
RB	19.	136.	86.	38.
S	94.	103.	132.	110.
SR	352.	219.	205.	225.
CGH2O	8800.	76500.	56500.	34200.
ZN	21.	82.	123.	78.
ZR	145.	178.	188.	209.
V	60.	120.	160.	120.
NI	48.	98.	76.	42.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-665 2136.5-2138.5	ST-666 2139.5-2141.5	ST-667 2141.5-2143.5	ST-668 2143.5-2144.0
SI	321840.	272510.	285570.	285280.
AL	82100.	89290.	92100.	88580.
FE	31540.	43310.	33870.	56580.
MG	13000.	11840.	17280.	9220.
CA	5940.	7730.	6010.	6540.
NA	13600.	17200.	12700.	14000.
K	9330.	6560.	10820.	10230.
TI	5940.	5930.	6220.	5800.
MN	590.	620.	460.	850.
BA	740.	790.	960.	520.
CO	62.	50.	56.	52.
CU	40.	19.	44.	23.
GA	19.	21.	22.	24.
LI	21.	19.	22.	24.
MO	0.	1.	0.	0.
PB	5.	6.	7.	10.
RB	65.	31.	99.	55.
S	56.	123.	121.	90.
SR	160.	205.	190.	178.
CSH2O	40500.	26800.	57300.	32100.
ZN	51.	66.	63.	93.
ZR	159.	196.	156.	232.
V	140.	120.	180.	140.
NI	62.	50.	48.	58.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-669 2144.0-2145.0	ST-670 2145.0-2145.5	ST-671 2145.5-2147.0	ST-672 2147.0-2149.5
SI	248800.	258420.	248660.	282260.
AL	85120.	91150.	82260.	106350.
FE	63310.	40100.	108460.	54060.
MG	13320.	7600.	12480.	10240.
CA	6130.	6090.	8100.	6050.
NA	11100.	14500.	10400.	16000.
K	13460.	13690.	11010.	14130.
TI	6050.	6020.	5660.	6290.
MN	880.	500.	800.	530.
BA	540.	480.	360.	400.
CO	76.	68.	68.	56.
CU	62.	65.	71.	50.
GA	24.	26.	19.	47.
LI	40.	25.	28.	27.
MO	0.	0.	0.	1.
PB	12.	8.	10.	17.
RB	99.	125.	86.	92.
S	357.	155.	160.	43.
SR	165.	220.	174.	200.
(C&H2O)	77400.	60200.	109100.	40900.
ZN	142.	116.	147.	99.
ZR	177.	190.	353.	216.
V	260.	220.	180.	180.
NI	108.	76.	90.	62.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-673 2149.5-2150.5	ST-674 2150.5-2151.0	ST-675 2151.0-2152.0	ST-676 2152.0-2153.0
SI	273650.	282490.	279160.	281020.
AL	92050.	95470.	95030.	90300.
FE	59010.	55980.	51480.	55890.
MG	12620.	11600.	11480.	9960.
CA	6100.	6250.	6150.	6080.
NA	17400.	14900.	12400.	14200.
K	15650.	15200.	16040.	13820.
TI	6420.	6380.	6470.	6140.
MN	530.	660.	550.	510.
BA	460.	480.	440.	440.
CO	76.	60.	66.	68.
CU	56.	57.	60.	47.
GA	28.	24.	22.	25.
LI	35.	45.	32.	27.
MO	0.	1.	2.	1.
PB	43.	6.	11.	5.
RB	109.	99.	114.	96.
S	135.	38.	149.	69.
SR	196.	189.	198.	205.
C&H2O	52200.	45800.	57400.	39400.
ZN	130.	122.	129.	104.
ZR	217.	208.	202.	235.
V	220.	290.	200.	160.
NI	94.	76.	72.	79.

OLDMAN FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-677 2153.0-2154.0	ST-678 2154.0-2161.0	ST-679 2161.0-2162.0	ST-680 2162.0-2163.5
SI	276530.	256240.	271740.	271270.
AL	91550.	89800.	101940.	94740.
FE	52920.	36520.	51560.	48870.
MG	11040.	8360.	11400.	10220.
CA	6150.	31420.	6140.	6530.
NA	13800.	15700.	11500.	14800.
K	14140.	10030.	13280.	12380.
TI	6210.	5650.	6300.	5390.
MN	570.	1000.	610.	670.
BA	420.	420.	440.	520.
CO	60.	54.	62.	54.
CU	54.	24.	47.	27.
GA	23.	25.	27.	20.
LI	32.	19.	32.	21.
MO	1.	2.	2.	2.
PB	8.	4.	6.	9.
RB	100.	44.	94.	51.
S	170.	121.	135.	254.
SR	202.	202.	201.	179.
C&H2O	49300.	23400.	48400.	28350.
ZN	108.	64.	106.	84.
ZR	202.	188.	195.	164.
V	180.	120.	180.	120.
NI	72.	58.	80.	50.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-683 2166.0-2166.5	ST-684 2166.5-2167.5	ST-685 2167.5-2169.0	ST-686 2169.0-2172.0
SI	289700.	294430.	266270.	269740.
AL	89000.	89290.	88630.	85950.
FE	36960.	38650.	41390.	45180.
MG	10600.	10500.	9140.	12720.
CA	5920.	5930.	6070.	7150.
NA	11500.	11500.	12200.	11500.
K	12540.	13730.	11260.	12790.
TI	5220.	5400.	5640.	5740.
MN	470.	460.	470.	600.
BA	800.	740.	720.	820.
CO	49.	52.	64.	60.
CU	34.	41.	38.	38.
GA	23.	23.	25.	17.
LI	19.	16.	25.	28.
MO	1.	2.	2.	1.
PB	0.	12.	19.	9.
RB	109.	127.	105.	99.
S	156.	287.	354.	212.
SR	192.	183.	186.	190.
H2O	51400.	57500.	54200.	63700.
ZN	36.	72.	98.	99.
ZR	181.	169.	184.	181.
V	130.	160.	140.	160.
NI	52.	84.	76.	80.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-687 2172.0-2173.5	ST-688 2173.5-2176.5	ST-689 2176.5-2178.0	ST-690 2178.0-2178.5
SI	264280.	249260.	267840.	261700.
AL	95080.	96520.	91750.	87090.
FE	55230.	51430.	53920.	51480.
MG	11700.	14500.	10700.	16980.
CA	5230.	6110.	6460.	6490.
NA	12800.	12200.	15500.	12700.
K	12960.	12620.	12590.	12710.
TI	5020.	6180.	6030.	6450.
MN	530.	540.	740.	590.
BA	600.	760.	560.	720.
CO	64.	76.	63.	70.
CU	45.	50.	48.	50.
GA	17.	22.	21.	16.
LI	29.	27.	28.	31.
MO	7.	2.	1.	2.
PB	5.	15.	3.	8.
RB	69.	93.	62.	64.
S	134.	506.	135.	271.
SR	200.	193.	191.	184.
C&H2O	48300.	98000.	47300.	105700.
ZN	99.	115.	100.	108.
ZR	208.	174.	202.	179.
V	160.	240.	140.	200.
NI	76.	110.	38.	96.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-692 2179.0-2181.5	ST-693 2181.5-2183.5	ST-694 2183.5-2184.0	ST-695 2184.0-2186.0
SI	287250.	27200.	274810.	259600.
AL	84960.	83000.	86470.	92690.
FE	34140.	45190.	42900.	74600.
MG	6760.	13320.	9300.	14180.
CA	5980.	8010.	7950.	9660.
NA	11500.	11200.	12700.	14200.
K	10880.	9800.	8890.	10630.
TI	5360.	4590.	4700.	5460.
MN	450.	680.	750.	1070.
BA	540.	620.	440.	720.
CO	50.	50.	54.	56.
CU	35.	32.	34.	30.
GA	16.	16.	15.	21.
LI	16.	19.	16.	20.
MO	2.	2.	2.	3.
PB	7.	17.	18.	17.
RB	30.	55.	52.	61.
S	153.	178.	325.	221.
SR	190.	183.	165.	210.
SH2O	68800.	48000.	67000.	54400.
ZN	51.	72.	56.	94.
ZR	172.	194.	204.	240.
V	160.	100.	100.	140.
NI	52.	56.	58.	64.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-696 2186.0-2187.5	ST-692 2188.0-2189.0	ST-699 2189.0-2193.0	ST-700 2193.0-2194.0
SI	235930.	249570.	272500.	271760.
AL	92590.	100580.	89550.	97940.
FE	51130.	62910.	41920.	46100.
MG	15740.	7340.	8860.	14820.
CA	6400.	6140.	5950.	6040.
NA	12000.	11500.	15000.	14200.
K	10630.	7970.	11400.	13160.
TI	5550.	5620.	6180.	6430.
MN	1370.	480.	490.	500.
BA	860.	590.	800.	800.
CO	66.	54.	76.	58.
CU	60.	34.	41.	55.
GA	33.	24.	28.	26.
LI	26.	22.	17.	21.
MO	4.	1.	1.	2.
PB	19.	10.	20.	15.
RB	88.	98.	103.	101.
S	179.	63.	190.	93.
SR	222.	208.	224.	216.
H2O	91600.	85600.	58800.	60700.
ZN	211.	35.	86.	130.
ZR	300.	150.	139.	204.
V	220.	160.	220.	220.
NI	110.	50.	86.	70.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-701 2194.0-2196.0	ST-702 2196.0-2199.5	ST-703 2199.5-2201.5	ST-704 2201.5-2203.0
SI	265870.	271310.	266260.	281670.
AL	92150.	91350.	92060.	98030.
FE	53290.	41780.	48540.	46350.
MG	7380.	13940.	9120.	15720.
CA	6140.	6600.	6130.	6170.
NA	13500.	12700.	12900.	13700.
K	9550.	9760.	12690.	14270.
TI	5510.	6100.	5740.	6150.
MN	490.	680.	470.	490.
BA	600.	720.	560.	740.
CO	60.	62.	52.	78.
CU	25.	49.	34.	68.
GA	18.	22.	23.	22.
LI	17.	24.	16.	21.
MO	1.	0.	2.	1.
PB	15.	14.	21.	25.
RB	60.	93.	119.	109.
S	120.	53.	96.	108.
SR	210.	226.	237.	223.
C&H2O	56500.	65200.	59700.	59000.
ZN	86.	125.	130.	115.
ZR	181.	190.	175.	167.
V	140.	220.	220.	200.
NI	70.	70.	54.	88.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-705 2203.0-2209.0	ST-706 2209.0-2213.0	ST-707 2213.0-2214.0	ST-708 2214.0-2218.5
SI	266570.	257440.	222790.	254910.
AL	93430.	91020.	68270.	94360.
FE	53140.	51750.	46930.	37550.
MG	13480.	19500.	8660.	12160.
CA	7140.	22670.	74080.	24340.
NA	16600.	19200.	17100.	21200.
K	12370.	9010.	8770.	6910.
TI	6150.	5280.	3850.	7990.
MN	590.	750.	1330.	1140.
BA	600.	660.	500.	580.
CO	62.	56.	52.	52.
CU	40.	39.	42.	19.
GA	21.	21.	20.	18.
LI	25.	19.	19.	14.
MO	3.	2.	2.	2.
PB	12.	10.	0.	20.
RB	72.	41.	51.	33.
S	152.	7.	196.	0.
SR	247.	292.	289.	208.
CSH2O	48300.	28800.	71800.	18500.
ZN	102.	76.	65.	78.
ZR	204.	202.	253.	191.
V	180.	170.	160.	160.
NI	82.	68.	66.	64.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-709 2218.5-2219.5	ST-710 2219.5-2226.0	ST-711 2226.0-2227.0	ST-712 2227.0-2232.5
SI	229960.	252170.	263960.	273140.
AL	71380.	81180.	84280.	87510.
FE	55990.	60680.	61110.	69690.
MG	64560.	9640.	16520.	18700.
CA	78500.	8560.	7100.	10280.
NA	14300.	19100.	13300.	18200.
K	7430.	9480.	12350.	12050.
TI	4250.	5640.	5820.	5820.
MN	1620.	820.	880.	1050.
BA	930.	480.	560.	680.
CO	93.	58.	62.	64.
CU	31.	23.	60.	53.
GA	23.	23.	26.	25.
LI	18.	19.	27.	25.
MO	3.	1.	0.	0.
PB	8.	32.	6.	12.
RB	25.	35.	80.	49.
S	112.	276.	156.	53.
SR	279.	262.	220.	276.
%H2O	48800.	39000.	65800.	51600.
ZN	72.	76.	121.	113.
ZR	278.	216.	209.	255.
V	160.	140.	180.	180.
NI	112.	30.	96.	80.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-718 2242.5-2244.0	ST-719 2244.0-2246.0	ST-720 2246.0-2247.0	ST-721 2247.0-2248.0
SI	274460.	183960.	284230.	276670.
AL	79440.	81240.	96850.	85120.
FE	53950.	56560.	52900.	40580.
MG	8340.	13040.	10240.	7200.
CA	6330.	6640.	6290.	6140.
NA	14400.	15700.	13500.	14500.
K	7420.	10910.	13460.	9740.
TI	5460.	5800.	5730.	5880.
MN	610.	620.	500.	490.
BA	460.	500.	440.	420.
CO	44.	62.	56.	52.
CU	41.	52.	56.	39.
GA	16.	17.	20.	13.
LI	13.	22.	21.	16.
MO	2.	1.	2.	1.
PB	6.	7.	4.	7.
RB	57.	82.	90.	69.
S	83.	170.	129.	197.
SR	269.	257.	249.	235.
C&H2O	62700.	65400.	62800.	62000.
ZN	54.	106.	99.	84.
ZR	187.	206.	207.	186.
V	180.	220.	220.	200.
NI	52.	80.	74.	54.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-722 2248.0-2252.5	ST-723 2252.5-2255.5	ST-724 2255.5-2256.5	ST-725 2256.5-2259.5
SI	268630.	243510.	233420.	266510.
AL	81610.	78350.	92590.	90000.
FE	44310.	67060.	56330.	52290.
MG	11760.	9300.	13460.	11920.
CA	6140.	10070.	7140.	6330.
NA	24100.	13800.	12400.	13800.
K	9910.	11360.	6010.	11530.
TI	5850.	5460.	5360.	6010.
MN	500.	1050.	760.	520.
BA	440.	440.	560.	500.
CO	66.	70.	68.	58.
CU	32.	58.	44.	24.
GA	15.	22.	32.	24.
LI	21.	21.	22.	22.
MO	2.	2.	13.	0.
PB	5.	5.	15.	8.
RB	83.	79.	30.	82.
S	306.	58.	132.	138.
SR	244.	280.	301.	230.
C&H2O	47900.	55600.	69700.	64600.
ZN	58.	106.	95.	104.
ZR	186.	236.	256.	192.
V	220.	240.	260.	240.
NI	84.	78.	98.	72.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-726 2259.5-2261.0	ST-727 2261.0-2265.5	ST-728 2265.5-2266.5	ST-729 2266.5-2271.0
SI	269550.	262900.	264680.	271010.
AL	84640.	68890.	86370.	90800.
FE	43400.	53840.	55390.	62720.
MG	11360.	12940.	9780.	9360.
CA	6200.	6640.	6370.	7010.
NA	12760.	14100.	14900.	15600.
K	10630.	9560.	10400.	10440.
TI	6050.	5650.	6000.	5930.
MN	640.	620.	730.	1140.
BA	660.	620.	500.	580.
CO	50.	58.	62.	60.
CU	86.	48.	55.	49.
GA	21.	25.	25.	26.
LI	16.	17.	19.	20.
MO	0.	0.	2.	1.
PB	3.	18.	5.	11.
RB	87.	60.	84.	63.
S	131.	69.	73.	102.
SR	235.	255.	249.	255.
C&H2O	54300.	43900.	54300.	60000.
ZN	86.	86.	100.	88.
ZR	193.	223.	221.	231.
V	220.	180.	200.	200.
NI	60.	66.	84.	70.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-730 2271.0-2275.5	ST-731 2275.5-2279.0	ST-732 2279.0-2279.5	ST-733 2279.5-2281.0
SI	253790.	254470.	258580.	257710.
AL	82470.	83220.	88380.	83960.
FE	56130.	57630.	60460.	54300.
MG	8340.	13960.	18200.	12700.
CA	7780.	6330.	6700.	6710.
NA	16000.	11500.	15500.	13200.
K	8730.	12590.	10750.	13030.
TI	5390.	6040.	5840.	6080.
MN	860.	580.	540.	790.
BA	580.	760.	720.	640.
CO	52.	62.	62.	60.
CU	42.	39.	48.	47.
GA	24.	33.	41.	29.
LI	18.	19.	21.	24.
MO	1.	1.	1.	1.
PB	31.	18.	19.	15.
RB	51.	92.	82.	101.
S	140.	59.	61.	78.
SR	285.	253.	335.	258.
C&H2O	43400.	56300.	45800.	57000.
ZN	77.	84.	135.	127.
ZR	215.	217.	270.	205.
V	160.	220.	180.	240.
NI	72.	72.	66.	56.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-734 2281.0-2286.5	ST-735 2286.5-2289.0	ST-736 2289.0-2292.0	ST-737 2292.0-2297.5
SI	259840.	256910.	283520.	258200.
AL	88120.	84060.	84170.	86320.
FE	55280.	52970.	34880.	58350.
MG	15480.	19080.	5960.	12540.
CA	6200.	6370.	6070.	6280.
NA	14600.	12800.	15200.	12900.
K	13170.	11760.	10620.	10360.
TI	6190.	6400.	6440.	6250.
MN	610.	660.	470.	610.
BA	740.	740.	440.	480.
CO	64.	80.	50.	66.
CU	51.	46.	2.	64.
GA	100.	27.	20.	30.
LI	27.	29.	17.	34.
MO	1.	1.	1.	1.
PB	15.	29.	9.	11.
RB	101.	86.	80.	90.
S	106.	226.	16.	145.
SR	240.	209.	215.	227.
C&H2O	55500.	70900.	49500.	60500.
ZN	116.	146.	58.	134.
ZR	201.	186.	167.	204.
V	220.	220.	180.	200.
NI	60.	110.	38.	70.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-738 2297.5-2298.0	ST-739 2298.0-2299.5	ST-740 2298.5-2301.0	ST-741 2301.0-2302.7
SI	253860.	259400.	239030.	259360.
AL	84490.	92000.	78070.	86270.
FE	54990.	51240.	104840.	58720.
MG	10760.	8200.	9800.	12200.
CA	7070.	8260.	8730.	6740.
NA	16500.	17300.	17800.	15500.
K	10570.	9150.	9330.	10780.
TI	5980.	5160.	5390.	6140.
MN	810.	690.	3200.	890.
BA	480.	440.	420.	420.
CO	60.	56.	58.	64.
CU	42.	34.	59.	53.
GA	19.	15.	21.	20.
LI	26.	21.	21.	26.
MO	2.	0.	0.	1.
PB	6.	14.	20.	13.
RB	76.	50.	66.	79.
S	155.	102.	221.	151.
SR	237.	237.	219.	224.
C&H2O	46400.	38000.	49500.	53100.
ZN	90.	85.	104.	99.
ZR	229.	201.	349.	235.
V	160.	140.	140.	180.
NI	52.	44.	52.	60.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-742 2302.7-2303.0	ST-743 2303.0-2304.0	ST-744 2304.0-2310.0	ST-745 2310.0-2315.0
SI	25920.	267940.	273340.	27050.
AL	82950.	87350.	87150.	87660.
FE	41990.	43760.	62200.	51880.
MG	9500.	9420.	10660.	10400.
CA	6300.	6040.	9440.	7980.
NA	13500.	14900.	17900.	13500.
K	10930.	12360.	10590.	9580.
TI	5780.	6060.	5780.	5660.
MN	530.	490.	820.	640.
BA	440.	460.	420.	400.
CO	56.	50.	60.	72.
CU	49.	46.	50.	39.
GA	18.	19.	20.	20.
LI	21.	19.	20.	23.
MO	0.	0.	0.	1.
PB	12.	5.	12.	26.
RB	82.	92.	70.	52.
S	449.	86.	85.	183.
SR	221.	221.	256.	251.
C&H2O	71100.	53300.	42400.	113900.
ZN	81.	100.	84.	84.
ZR	164.	184.	230.	212.
V	200.	220.	180.	160.
NI	48.	42.	56.	66.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-746 2315.0-2319.0	ST-747 2319.0-2324.0	ST-748 2324.0-2325.0	ST-749 2325.0-2325.5
SI	292070.	256430.	283450.	127180.
AL	90350.	83640.	93230.	25680.
FE	39130.	45130.	48820.	94810.
MG	6140.	7600.	10700.	8880.
CA	17680.	52860.	8150.	65270.
NA	20400.	19800.	19200.	5800.
K	7550.	7700.	12410.	3670.
TI	4650.	5520.	5880.	1200.
MN	1070.	970.	570.	116090.
BA	420.	440.	460.	440.
CO	54.	54.	58.	62.
CU	20.	28.	40.	24.
GA	17.	18.	24.	6.
LI	15.	14.	18.	6.
MO	1.	1.	0.	0.
PB	19.	15.	13.	1.
RB	32.	23.	58.	0.
S	114.	122.	237.	125.
SR	210.	298.	307.	346.
C&H2O	19000.	24200.	47400.	107500.
ZN	61.	66.	97.	15.
ZR	198.	249.	211.	375.
V	160.	160.	220.	140.
NI	40.	44.	48.	46.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-750 2325.5-2326.0	ST-751 2326.0-2326.5	ST-752 2326.5-2328.0	ST-753 2328.0-2333.0
SI	272530.	269470.	265860.	264590.
AL	91350.	91650.	91200.	92740.
FE	46610.	35630.	59410.	52180.
MG	9780.	7140.	11320.	9800.
CA	7610.	31620.	7140.	12470.
NA	16400.	17300.	13700.	19500.
K	13720.	7360.	13060.	9860.
TI	5870.	6720.	6140.	6210.
MN	610.	1490.	960.	830.
BA	540.	460.	480.	420.
CO	58.	52.	60.	58.
CU	40.	11.	48.	27.
GA	22.	18.	21.	20.
LI	17.	14.	21.	20.
MO	0.	2.	0.	3.
PB	10.	17.	6.	10.
RB	87.	22.	52.	24.
S	165.	86.	119.	89.
SR	260.	224.	262.	230.
C&H2O	59100.	17200.	54800.	2990.
ZN	87.	51.	106.	85.
ZR	195.	277.	163.	172.
V	200.	140.	220.	160.
NI	52.	38.	50.	42.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-754 2333.0-2335.0	ST-755 2335.0-2337.0	ST-756 2337.0-2339.0	ST-757 2339.0-2342.0
SI	274450.	270920.	272810.	244090.
AL	89390.	92000.	91050.	77800.
FE	45770.	41060.	43990.	81810.
MG	8560.	11560.	9460.	9060.
CA	6600.	6230.	6300.	35150.
NA	14800.	14900.	16400.	18100.
K	11000.	12120.	13350.	10060.
TI	5690.	6070.	5860.	4990.
MN	480.	490.	500.	2340.
BA	500.	540.	540.	480.
CO	42.	54.	46.	48.
CU	37.	48.	41.	58.
GA	22.	21.	21.	20.
LI	16.	21.	17.	16.
MO	1.	1.	1.	0.
PB	10.	18.	5.	5.
RB	49.	51.	51.	35.
S	128.	212.	138.	115.
SR	261.	228.	243.	338.
C&H2O	44700.	51800.	43400.	28400.
ZN	100.	96.	82.	102.
ZR	169.	166.	161.	162.
V	200.	200.	160.	180.
NI	36.	50.	22.	42.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-758 2342.0-2344.0	ST-759 2344.0-2345.0	ST-760 2345.0-2349.0	ST-761 2349.0-2351.5
SI	254640.	271160.	276670.	264040.
AL	85170.	92300.	92640.	87400.
FE	52570.	48820.	43560.	51480.
MG	11960.	10540.	9280.	13440.
CA	24390.	7120.	6610.	8390.
NA	12200.	17800.	17800.	18800.
K	9570.	12780.	12660.	10500.
TI	7190.	5980.	5900.	5680.
MN	1130.	570.	640.	560.
BA	540.	500.	560.	560.
CO	64.	48.	46.	58.
CU	34.	50.	42.	45.
GA	21.	16.	15.	18.
LI	21.	20.	17.	22.
MO	3.	1.	2.	3.
PB	12.	4.	6.	18.
RB	24.	0.	0.	0.
S	108.	85.	141.	174.
SR	205.	243.	252.	288.
C&H2O	70900.	44300.	42000.	38300.
ZN	95.	87.	85.	91.
ZR	110.	165.	167.	174.
V	180.	160.	120.	120.
NI	56.	46.	40.	58.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-762 2351.5-2352.0	ST-763 2352.0-2357.0	ST-764 2357.0-2361.5	ST-765 2361.5-2362.5
SI	262550.	258970.	265920.	275050.
AL	91250.	81020.	85640.	92100.
FE	56150.	38500.	55430.	39300.
MG	17920.	6280.	16300.	20020.
CA	8220.	56870.	8510.	6450.
NA	17200.	16300.	17900.	13800.
K	11760.	8640.	9080.	12410.
TI	6240.	4360.	5860.	5920.
MN	590.	1420.	660.	500.
BA	640.	440.	500.	880.
CO	58.	46.	50.	66.
CU	47.	25.	36.	44.
GA	21.	13.	14.	18.
LI	25.	15.	21.	19.
MO	2.	1.	1.	1.
PB	9.	11.	21.	15.
RB	0.	0.	0.	0.
S	174.	146.	113.	260.
SR	265.	304.	228.	232.
C&H2O	46400.	19100.	29800.	53500.
ZN	108.	66.	71.	94.
ZR	173.	138.	167.	151.
V	140.	100.	120.	160.
NI	56.	42.	44.	70.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-766 2362.5-2364.5	ST-767 2364.5-2369.0	ST-768 2369.0-2370.0	ST-769 2370.0-2371.0
SI	274850.	273940.	288910.	266420.
AL	85900.	93620.	83750.	96420.
FE	42560.	54410.	27290.	53050.
MG	11540.	10420.	5440.	8600.
CA	6570.	6540.	6030.	6210.
NA	16100.	13900.	11800.	11800.
K	11350.	12790.	10590.	17490.
TI	6140.	6340.	6510.	6440.
MN	960.	710.	480.	520.
BA	680.	560.	500.	560.
CO	50.	56.	40.	48.
CU	38.	52.	35.	66.
GA	22.	20.	19.	23.
LI	16.	27.	14.	20.
MO	1.	1.	0.	0.
PB	21.	48.	31.	75.
RB	74.	81.	82.	123.
S	158.	109.	67.	135.
SR	226.	214.	185.	247.
C&H2O	51900.	57400.	45300.	61900.
ZN	67.	104.	56.	71.
ZR	151.	145.	151.	142.
V	120.	160.	140.	240.
NI	50.	68.	36.	62.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-770 2371.0-2372.5	ST-771 2372.5-2374.0	ST-772 2374.0-2375.5	ST-773 2375.5-2377.0
SI	269320.	269700.	255870.	255900.
AL	93870.	91900.	91400.	94160.
FE	59080.	46140.	62440.	59680.
MG	7940.	7920.	9880.	13180.
CA	6490.	6330.	8510.	6720.
NA	13300.	13400.	15800.	14000.
K	13830.	14400.	10610.	13530.
TI	6230.	6190.	6770.	6430.
MN	1450.	680.	670.	770.
BA	540.	540.	460.	500.
CO	110.	52.	56.	72.
CU	55.	50.	31.	35.
GA	24.	23.	26.	26.
LI	20.	20.	22.	32.
MO	2.	0.	2.	1.
PB	23.	14.	6.	27.
RB	108.	97.	45.	87.
S	283.	296.	222.	217.
SR	252.	241.	259.	233.
C&H2O	65400.	62400.	34400.	60700.
ZN	212.	113.	113.	135.
ZR	150.	158.	189.	148.
V	220.	200.	180.	200.
NI	136.	64.	54.	84.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-774 2377.0-2377.5	ST-775 2377.5-2379.0	ST-776 2379.0-2380.0	ST-777 2380.0-2383.5
SI	263280.	257550.	271940.	263970.
AL	95320.	87450.	98220.	89550.
FE	60360.	49170.	62910.	48310.
MG	9380.	10160.	11360.	8380.
CA	6650.	6420.	6690.	6540.
NA	12500.	14300.	15400.	15300.
K	12770.	13210.	13330.	11350.
TI	6290.	6400.	6360.	6080.
MN	1570.	530.	990.	720.
BA	540.	520.	460.	480.
CO	58.	54.	70.	56.
CU	54.	61.	41.	41.
GA	21.	21.	10.	19.
LI	22.	25.	26.	20.
MO	1.	1.	1.	0.
PB	9.	7.	12.	10.
RB	74.	72.	68.	65.
S	124.	132.	105.	114.
SR	251.	237.	228.	228.
C&H2O	63200.	56500.	48400.	48500.
ZN	125.	128.	109.	97.
ZR	152.	150.	159.	151.
V	220.	240.	300.	160.
NI	60.	50.	80.	54.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-778 2383.5-2385.5	ST-779 2385.5-2387.0	ST-780 2387.0-2389.0	ST-781 2389.0-2389.5
SI	267140.	267050.	283520.	260580.
AL	89850.	91750.	89240.	94010.
FE	55830.	55440.	26630.	62150.
MG	11220.	8760.	5040.	11120.
CA	6930.	8490.	6120.	6520.
NA	14100.	15600.	14100.	16300.
K	10490.	10000.	9400.	14720.
TI	5930.	7080.	6370.	6010.
MN	610.	740.	460.	530.
BA	480.	400.	500.	520.
CO	70.	50.	46.	70.
CU	41.	31.	27.	108.
GA	21.	19.	13.	27.
LI	24.	21.	14.	22.
MO	2.	1.	2.	1.
PB	4.	18.	14.	28.
RB	51.	47.	52.	67.
S	161.	114.	76.	102.
SR	216.	204.	193.	240.
C&H2O	35100.	29100.	43700.	46000.
ZN	86.	79.	49.	126.
ZR	164.	182.	118.	145.
V	180.	140.	120.	200.
NI	72.	54.	32.	74.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-782 2389.5-2391.0	ST-783 2391.0-2391.5	ST-784 2391.5-2392.0	ST-785 2392.0-2393.5
SI	259470.	265770.	261440.	265130.
AL	94010.	94450.	94310.	92640.
FE	64580.	63470.	53630.	53140.
MG	11620.	12480.	9920.	8700.
CA	6430.	6640.	6420.	7090.
NA	13000.	13800.	14060.	16300.
K	15240.	12800.	14150.	10960.
TI	6300.	6070.	5920.	5530.
MN	540.	570.	520.	590.
BA	540.	520.	500.	480.
CO	64.	46.	38.	42.
CU	48.	44.	40.	32.
GA	23.	21.	25.	7.
LI	26.	25.	22.	20.
MO	0.	1.	1.	2.
PB	22.	26.	17.	24.
RB	68.	58.	67.	37.
S	77.	100.	113.	148.
SR	238.	231.	242.	257.
C&H2O	52000.	44300.	52700.	41800.
ZN	107.	110.	84.	80.
ZR	425.	149.	136.	141.
V	220.	180.	200.	180.
NI	66.	60.	48.	46.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-786 2393.5-2394.0	ST-787 2394.0-2394.5	ST-788 2394.5-2396.5	ST-789 2396.5-2399.0
SI	260220.	260950.	256920.	259900.
AL	94260.	91350.	91300.	94500.
FE	39470.	43910.	59440.	63730.
MG	7700.	8380.	10260.	7560.
CA	6170.	6360.	6180.	6500.
NA	15200.	14200.	14400.	16000.
K	12230.	13040.	14610.	12900.
TI	5900.	6030.	6150.	6250.
MN	520.	570.	500.	840.
BA	500.	520.	540.	520.
CO	64.	42.	102.	64.
CU	47.	45.	49.	45.
GA	25.	29.	28.	26.
LI	19.	19.	20.	16.
MO	2.	2.	3.	2.
PB	15.	4.	38.	24.
RB	74.	88.	87.	76.
S	161.	43.	69.	27.
SR	233.	243.	246.	243.
C&H2O	57900.	62500.	56400.	59500.
ZN	91.	111.	169.	114.
ZR	135.	163.	158.	180.
V	220.	220.	220.	180.
NI	64.	46.	64.	72.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-790 2399.0-2400.0	ST-791 2400.0-2402.5	ST-792 2402.5-2403.5	ST-793 2403.5-2405.0
SI	256650.	257600.	244100.	252880.
AL	91300.	89140.	84960.	88790.
FE	70590.	71070.	54160.	56640.
MG	12680.	9520.	11320.	10160.
CA	6320.	6530.	6350.	6360.
NA	13200.	14400.	13600.	14300.
K	14140.	11940.	13760.	14780.
TI	6330.	5900.	6150.	6000.
MN	550.	600.	600.	810.
BA	500.	460.	540.	560.
CO	50.	40.	46.	42.
CU	50.	29.	51.	53.
GA	33.	26.	33.	30.
LI	28.	21.	26.	22.
MO	2.	3.	4.	3.
PB	26.	3.	16.	4.
RB	81.	61.	89.	96.
S	64.	98.	67.	92.
SR	228.	243.	241.	249.
C&H2O	56800.	41800.	59800.	57300.
ZN	122.	92.	117.	106.
ZR	158.	170.	154.	156.
V	240.	160.	220.	180.
NI	62.	56.	78.	64.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-794 2405.0-2406.5	ST-795 2406.5-2407.5	ST-796 2407.5-2410.0	ST-797 2410.0-2416.0
SI	250460.	250140.	256630.	250200.
AL	86730.	87760.	88120.	95370.
FE	59490.	59200.	56330.	45900.
MG	10960.	12640.	11760.	6840.
CA	6660.	6420.	6460.	7620.
NA	14900.	14600.	13900.	21200.
K	14320.	13490.	14320.	7600.
TI	6140.	6090.	6220.	5670.
MN	1170.	620.	590.	580.
BA	520.	500.	620.	440.
CO	48.	60.	46.	34.
CU	57.	61.	51.	17.
GA	15.	16.	20.	14.
LI	23.	23.	24.	15.
MO	1.	2.	1.	1.
PB	27.	25.	17.	18.
RB	68.	63.	63.	21.
S	192.	192.	175.	90.
SR	225.	219.	238.	153.
C&H2O	61500.	60900.	55300.	14600.
ZN	111.	116.	110.	64.
ZR	150.	148.	148.	138.
V	200.	200.	200.	120.
NI	66.	126.	64.	44.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-798 2416.0-2419.0	ST-799 2419.0-2425.0	ST-800 2425.0-2427.0	ST-801 2427.0-2428.0
SI	249390.	255620.	230770.	260060.
AL	96380.	84220.	47200.	79440.
FE	42850.	50730.	52850.	37760.
MG	5680.	8300.	5160.	6360.
CA	23880.	7330.	60790.	16940.
NA	18500.	20700.	13000.	16400.
K	7280.	8400.	6230.	8870.
TI	5560.	5590.	4350.	5270.
MN	940.	530.	2290.	820.
BA	480.	420.	460.	540.
CO	32.	34.	44.	40.
CU	23.	22.	26.	23.
GA	10.	14.	13.	18.
LI	14.	16.	10.	12.
MO	0.	1.	1.	5.
PB	41.	37.	60.	37.
RB	24.	18.	11.	37.
S	148.	122.	144.	43.
SR	186.	218.	318.	293.
C&H2O	23900.	26400.	35800.	40000.
ZN	63.	61.	42.	54.
ZR	126.	155.	155.	151.
V	120.	100.	80.	100.
NI	44.	44.	46.	48.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-802 2428.0-2431.0	ST-803 2431.0-2431.5	ST-804 2431.5-2432.5	ST-805 2432.5-2434.0
SI	248480.	190310.	254120.	240330.
AL	83910.	45210.	94790.	79990.
FE	49500.	47780.	56160.	58900.
MG	5200.	3700.	12820.	9300.
CA	30240.	71690.	7670.	15740.
NA	19400.	22620.	13800.	20100.
K	6560.	4670.	13810.	8560.
TI	5020.	2500.	6110.	5480.
MN	1520.	470.	570.	990.
BA	440.	1460.	680.	480.
CO	34.	34.	38.	44.
CU	19.	13.	50.	28.
GA	18.	14.	31.	19.
LI	13.	8.	27.	19.
MO	4.	0.	4.	5.
PB	48.	32.	13.	17.
RB	4.	0.	67.	17.
S	0.	0.	45.	33.
SR	260.	1392.	252.	305.
C&H2O	17900.	52100.	55700.	25200.
ZN	44.	43.	99.	77.
ZR	132.	243.	149.	155.
V	80.	80.	180.	100.
NI	40.	48.	72.	68.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-806 2434.0-2435.5	ST-807 2435.5-2438.0	ST-808 2438.0-2439.5	ST-809 2439.5-2442.0
SI	251950.	236780.	253950.	258770.
AL	91700.	88270.	87810.	94940.
FE	52730.	57210.	59150.	43460.
MG	11620.	12280.	11900.	7560.
CA	6580.	6600.	7820.	6360.
NA	13100.	12600.	17600.	15500.
K	12510.	13410.	11740.	13790.
TI	5970.	5880.	6110.	5840.
MN	700.	720.	730.	460.
BA	640.	480.	520.	580.
CO	40.	42.	44.	36.
CU	58.	53.	45.	41.
GA	23.	28.	23.	17.
LI	20.	23.	23.	18.
MO	4.	4.	2.	1.
PB	19.	43.	21.	45.
RB	62.	78.	63.	82.
S	0.	73.	165.	135.
SR	243.	245.	251.	259.
C&H2O	49600.	58200.	54300.	54900.
ZN	91.	114.	104.	78.
ZR	149.	132.	161.	143.
V	160.	200.	140.	160.
NI	64.	68.	72.	60.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-810 2442.0-2444.0	ST-811 2444.0-2447.5	ST-812 2447.5-2449.0	ST-813 2449.0-2453.0
SI	248720.	256270.	239170.	256070.
AL	87090.	90250.	82950.	89750.
FE	53810.	56330.	58760.	55810.
MG	9220.	14320.	10700.	12340.
CA	12020.	6830.	7030.	6540.
NA	18600.	13400.	19400.	10300.
K	10720.	13550.	10960.	13310.
TI	5100.	6290.	5960.	6400.
MN	800.	620.	570.	570.
BA	520.	560.	560.	480.
CO	36.	50.	42.	58.
CU	36.	51.	41.	55.
GA	19.	22.	14.	19.
LI	16.	24.	23.	23.
MO	2.	1.	0.	1.
PB	24.	16.	15.	22.
RB	39.	69.	45.	75.
S	141.	137.	44.	92.
SR	300.	228.	251.	222.
C&H2O	32900.	48200.	34500.	52600.
ZN	93.	116.	103.	109.
ZR	144.	156.	161.	135.
V	120.	180.	160.	200.
NI	68.	72.	58.	90.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-814 2453.0-2455.0	ST-815 2455.0-2457.5	ST-816 2457.5-2466.0	ST-817 2466.0-2470.0
SI	249200.	264870.	255910.	255440.
AL	79120.	84540.	80260.	90200.
FE	53470.	40900.	35500.	56880.
MG	7640.	5940.	5300.	15940.
CA	11440.	6620.	55040.	7450.
NA	14600.	16800.	19400.	17500.
K	8440.	8270.	6680.	12890.
TI	5440.	6230.	4150.	6010.
MN	1000.	1630.	1540.	540.
BA	440.	440.	400.	680.
CO	40.	32.	32.	58.
CU	34.	22.	16.	43.
GA	17.	14.	13.	21.
LI	17.	14.	11.	21.
MO	1.	1.	1.	1.
PB	27.	3.	14.	2.
RB	38.	60.	22.	63.
S	142.	106.	194.	90.
SR	248.	235.	273.	283.
C&H2O	33800.	44800.	18800.	52900.
ZN	76.	60.	49.	127.
ZR	140.	158.	131.	158.
V	100.	140.	100.	180.
NI	50.	30.	40.	66.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-818 2470.0-2471.5	ST-819 2471.5-2475.0	ST-820 2475.0-2478.0	ST-821 2478.0-2479.5
SI	255090.	260040.	259740.	236160.
AL	83270.	89090.	91550.	83910.
FE	72390.	71820.	55890.	49450.
MG	10180.	11920.	15260.	12200.
CA	13080.	6890.	7380.	24540.
NA	21500.	12800.	16100.	16700.
K	8470.	13320.	13490.	7390.
TI	6180.	6170.	6220.	6010.
MN	920.	560.	610.	900.
BA	440.	520.	640.	520.
CO	46.	48.	50.	60.
CU	29.	45.	54.	24.
GA	18.	18.	22.	14.
LI	17.	20.	24.	20.
MO	0.	1.	0.	0.
PB	3.	12.	15.	10.
RB	28.	69.	65.	9.
S	128.	156.	128.	128.
SR	336.	263.	259.	302.
C&H2O	27000.	51800.	57900.	47900.
ZN	79.	112.	122.	58.
ZR	183.	151.	153.	154.
V	140.	220.	220.	180.
NI	56.	66.	70.	76.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-822 2479.5-2481.0	ST-823 2481.0-2486.0	ST-824 2486.0-2486.5	ST-825 2486.5-2488.0
SI	260850.	253770.	242270.	254780.
AL	94060.	94840.	87760.	85540.
FE	40020.	47270.	55400.	61490.
MG	7620.	8760.	11520.	9540.
CA	6820.	13970.	11330.	9760.
NA	16500.	22600.	17300.	21600.
K	11630.	9590.	9080.	8780.
TI	5280.	5880.	5430.	5420.
MN	680.	740.	560.	610.
BA	560.	540.	680.	520.
CO	36.	46.	52.	42.
CU	33.	29.	42.	27.
GA	20.	26.	19.	23.
LI	11.	15.	17.	18.
MO	0.	0.	0.	0.
PB	9.	32.	66.	28.
RB	55.	12.	5.	6.
S	22.	119.	386.	59.
SR	269.	225.	359.	332.
C&H2O	55300.	33400.	85200.	29500.
ZN	50.	79.	82.	73.
ZR	143.	140.	170.	158.
V	200.	140.	200.	180.
NI	36.	54.	64.	48.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-826 2488.0-2491.0	ST-827 2491.0-2493.0	ST-828 2493.0-2498.5	ST-829 2498.5-2503.5
SI	255120.	268140.	241880.	251420.
AL	87870.	81880.	92100.	91050.
FE	55680.	31970.	40220.	37270.
MG	11520.	6660.	7420.	7120.
CA	7380.	6540.	14400.	10210.
NA	15300.	15900.	24600.	21500.
K	12300.	9190.	8590.	8080.
TI	6060.	5730.	6250.	6630.
MN	620.	470.	720.	570.
BA	480.	516.	500.	580.
CO	50.	36.	46.	46.
CU	46.	26.	25.	23.
GA	29.	19.	25.	18.
LI	18.	10.	12.	11.
MO	0.	1.	1.	0.
PB	18.	8.	15.	22.
RB	44.	32.	11.	11.
S	136.	76.	174.	166.
SR	276.	245.	333.	290.
C&H2O	51500.	40900.	24700.	22700.
ZN	105.	63.	73.	67.
ZR	162.	160.	173.	135.
V	220.	180.	200.	200.
NI	64.	34.	52.	40.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-830 2503.5-2508.5	ST-831 2508.5-2515.0	ST-832 2515.0-2517.0	ST-833 2517.0-2520.0
SI	247100.	214650.	252400.	254920.
AL	85220.	64830.	86680.	85540.
FE	57890.	34650.	46990.	57810.
MG	7380.	6280.	9880.	10260.
CA	8160.	72620.	7080.	7630.
NA	24900.	14500.	9500.	18100.
K	10240.	6290.	10670.	11410.
TI	5570.	2890.	5640.	5650.
MN	640.	1790.	470.	510.
BA	600.	460.	580.	600.
CO	44.	44.	50.	54.
CU	40.	23.	43.	42.
GA	17.	11.	16.	15.
LI	13.	9.	10.	13.
MO	0.	0.	0.	0.
PB	19.	28.	10.	20.
RB	36.	4.	47.	49.
S	109.	12.	61.	38.
SR	268.	321.	269.	325.
C&H2O	19500.	15200.	52100.	46100.
ZN	87.	38.	42.	95.
ZR	146.	129.	137.	148.
V	180.	140.	220.	240.
NI	44.	42.	54.	64.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-834 2520.0-2525.0	ST-835 2525.0-2525.5	ST-836 2525.5-2531.0	ST-837 2531.0-2532.0
SI	246420.	235410.	249700.	254750.
AL	87660.	86890.	84590.	92690.
FE	53870.	67760.	58170.	54690.
MG	9400.	10860.	10260.	12900.
CA	11290.	11510.	16550.	7900.
NA	18100.	23500.	24700.	18000.
K	6970.	6640.	7210.	12160.
TI	6510.	5420.	7770.	6070.
MN	550.	750.	750.	660.
BA	820.	1140.	1020.	520.
CO	58.	68.	56.	60.
CU	27.	37.	30.	52.
GA	18.	17.	15.	18.
LI	13.	12.	14.	20.
MO	0.	0.	1.	1.
PB	28.	41.	35.	1.
RB	10.	12.	0.	54.
S	93.	418.	76.	65.
SR	373.	311.	364.	283.
C&H2O	25700.	49000.	24590.	49700.
ZN	68.	77.	95.	107.
ZR	173.	137.	224.	154.
V	220.	280.	240.	240.
NI	52.	60.	54.	72.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-838 2532.0-2533.5	ST-839 2533.5-2535.0	ST-840 2535.0-2537.0	ST-841 2537.0-2538.0
SI	258620.	260880.	253980.	263630.
AL	90200.	90250.	81340.	88530.
FE	56300.	59960.	52340.	34120.
MG	15008.	14560.	10740.	9040.
CA	7800.	7710.	26870.	6850.
NA	18600.	14700.	16600.	13800.
K	12160.	14450.	8990.	11450.
TI	5970.	6180.	6610.	6010.
MN	620.	610.	1200.	480.
BA	708.	680.	640.	740.
CO	41.	42.	32.	32.
CU	50.	60.	31.	43.
GA	15.	16.	14.	12.
LI	17.	23.	14.	12.
MO	1.	1.	1.	1.
PB	13.	16.	5.	21.
RB	45.	62.	16.	47.
S	19.	134.	20.	277.
SR	304.	274.	351.	246.
C&H2O	47000.	50800.	29600.	90200.
ZN	97.	123.	80.	49.
ZR	155.	146.	211.	139.
V	244.	280.	220.	240.
NI	68.	84.	62.	62.

FOREMOST FORMATION

ALL VALUES IN PARTS PER MILLION

	ST-842 2538.0-2538.7	ST-844 2539.0-2540.0	ST-845 2540.0-2541.0
SI	261150.	255560.	25540.
AL	93970.	95230.	90400.
FE	55990.	52340.	51890.
MG	12240.	14820.	9860.
CA	6640.	6850.	7460.
NA	13900.	15300.	16700.
K	14780.	12620.	10470.
TI	6420.	6110.	5810.
MN	550.	610.	530.
BA	540.	760.	620.
CO	32.	44.	34.
CU	63.	43.	34.
GA	16.	20.	21.
LI	22.	18.	14.
MO	1.	0.	1.
PR	19.	15.	4.
PB	67.	46.	27.
S	185.	178.	75.
SR	256.	257.	297.
C&H2O	58100.	60900.	42800.
ZN	125.	98.	104.
ZR	155.	152.	162.
V	240.	240.	180.
NI	62.	96.	66.

Appendix 2

Classifications for the Standard Groups
Marine vs Continental-Brackish 24 Variables

NUMBER OF VARIABLES 24
SAMPLE SIZES--

GROUP	
1	83
2	25

GROUP CON BRACK MEANS

276009.43750	82603.43750	44479.15625	12478.55078	16309.51563	14430.11719	15161.68359	4718.07031
748.67456	754.69873	37.01204	31.19276	22.45782	12.33735	1.37349	22.38553
92.65059	766.14453	204.91565	79244.56250	86.20482	143.00000	165.30119	113.85541

GROUP MARINE MEANS

268710.75000	81248.00000	67647.56250	13566.00000	12624.79688	8608.00000	22158.79688	5093.19922
1005.19995	716.00000	49.48000	32.35999	22.23999	18.00000	0.64000	24.59999
149.71999	855.43994	141.59999	68660.00000	104.51999	133.59999	203.51999	172.71999

POOLED DISPERSION MATRIX

ROW SI

679947008.00000	169606656.00000	-480516352.00000	-37897376.00000	-226522080.00000	22312720.00000
88354352.00000	6154923.00000	-5639952.00000	1646958.00000	32676.54688	-12804.69531
48432.10938	31942.80078	2062.07959	-9594.14844	639195.00000	-2416194.00000
-86851.06250	-276093952.00000	90396.00000	197521.62500	198586.81250	-1167368.00000

ROW AL

169606656.00000	106019776.00000	-170395760.00000	-6212583.00000	-99432320.00000	15799143.00000
29952864.00000	2847048.00000	-2271410.00000	219987.43750	41849.73438	-8605.73047
32065.91406	14641.12891	2061.34668	-12222.94922	217217.93750	-1313269.00000
-8680.65234	-11557549.00000	41768.46875	-61148.98047	74508.25000	-355604.93750

ROW FE

-480516352.00000	-170395760.00000	824346368.00000	64841264.00000	135343728.00000	-43073264.00000
-58589296.00000	-7947551.00000	8653642.00000	-890494.43750	7173.32813	78998.00000
-39565.86719	-17230.10156	-7025.39844	28036.26172	-310236.06250	5232591.00000
-372805.68750	256015952.00000	-82867.00000	-297148.06250	-344705.31250	2050256.00000

ROW MG

-37897376.00000	-6212583.00000	64841264.00000	40584816.00000	9817160.00000	3083261.00000
-11223262.00000	-2224392.00000	727998.75000	887023.37500	19165.85547	-1504.61133
-5712.25391	-1649.43506	-612.34961	-33427.90234	-76922.18750	240519.00000
-60669.55469	71133792.00000	-27515.60156	-36393.44141	-48720.00781	170216.43750

ROW CA

-226522080.00000	-99432320.00000	135343728.00000	9817160.00000	199742704.00000	-10772847.00000
-37452688.00000	-4505638.00000	1811208.00000	-43979.66016	-52885.14063	-20336.73438
-31429.07422	-30794.69531	-3184.04346	-57087.43359	-376765.12500	-2928439.00000
204732.93750	-122962416.00000	-87086.93750	-57533.38672	-273534.62500	277038.43750

ROW NA

22312720.00000	15799143.00000	-43073264.00000	3083261.00000	-10772847.00000	48173712.00000
-8826206.00000	284068.18750	-572861.25000	71717.50000	1786.54346	-1675.95679
-387.66968	-3638.12305	723.94092	-24033.60156	-37725.85547	-1223542.00000
69572.06250	27200832.00000	-19677.04688	9513.97266	-29599.08203	-100414.56250

ROW K

88354352.00000	29952864.00000	-58589296.00000	-11223262.00000	-37452688.00000	-8826206.00000
66917728.00000	4166800.00000	-570078.93750	583978.25000	34811.17578	33341.60156
23569.51563	24027.35547	-1432.08350	17063.12891	313803.87500	202945.00000
-126053.12500	-96604080.00000	119727.25000	53308.27344	238290.56250	-113229.31250

ROW TI

6154923.00000	2847048.00000	-7947551.00000	-2224392.00000	-4505638.00000	284068.18750
4166800.00000	953963.31250	-52272.28125	-17523.37500	3254.44141	4130.36719
2375.86670	2048.79346	-50.67319	852.46460	24516.18750	-72107.25000
-1071.60059	-4302410.00000	17269.52734	6492.73047	27623.83594	-17414.75391

ROW MN

-5639952.00000	-2271410.00000	8653642.00000	727998.75000	1811208.00000	-572861.25000
-570078.93750	-52272.28125	140548.43750	-3027.01880	-167.93584	1395.96558
-494.72607	-256.25366	-109.54742	1327.38550	-3645.51001	79598.37500
-2782.53760	1488921.00000	-401.11182	-2626.12183	-2336.55420	22771.92188

ROW BA

1646958.00000	219987.43750	-890494.43750	887023.37500	-43979.66016	71717.50000
583978.25000	-17523.37500	-3027.01880	62596.50000	496.91602	-5.65242
18.73138	117.43790	-65.20282	750.26172	1435.07178	42408.98047
-1533.16382	-1698828.00000	463.22803	447.35889	2283.44434	-3819.16724

ROW CO

32676.54688	41849.73438	7173.32813	19165.85547	-52885.14063	1786.54346
34811.17578	3254.44141	-167.93584	496.91602	126.99159	22.64600
26.70425	25.44954	0.00893	84.90852	280.51440	5834.16406
-131.32045	82743.31250	110.18311	17.77158	74.49527	169.72961

ROW CU

-12804.69531	-8605.73047	78998.00000	-1504.61133	-20336.73438	-1675.95679
33341.60156	4130.36719	1395.96558	-5.65242	22.64600	126.24995
-13.99531	-21.67538	-2.31826	-40.84300	175.24464	722.52100
-86.22597	864.85547	184.11195	24.92940	273.65405	238.01540

ROW GA	48432.10938	32065.91406	-39565.86719	-5712.25391	-31429.07422	-387.66968
	23569.51563	2375.86670	-494.72607	18.73138	26.70425	13.99531
	36.69009	11.12428	-1.27389	9.74282	130.03610	-293.79932
	46.81683	-24624.98828	71.16992	59.42735	21.90103	-82.85709
ROW LI	31942.80078	14641.12891	-17230.10156	-1649.43506	-30794.69531	-3638.12305
	24027.35547	2048.79346	-256.25366	117.43790	25.44954	21.67538
	11.12428	18.47684	0.07115	25.51125	162.14732	1300.94092
	-93.67456	34045.51563	73.31264	19.52820	143.39091	-28.18898
ROW MO	2062.07959	2061.34668	-7025.39844	-612.34961	-3184.04346	723.94092
	-1432.08350	-50.67319	-109.54742	-65.20282	0.00893	-2.31826
	-1.27389	0.07115	2.03001	-2.70323	-3.76112	-139.43724
	-3.51861	16216.10156	-1.70434	-3.38290	3.76726	-12.21729
ROW PB	-9594.14844	-12222.94922	28036.26172	33427.90234	-57087.43359	-24033.60156
	17063.12891	852.46460	1327.38550	750.26172	84.90852	40.84300
	9.74282	25.51125	-2.70323	503.82495	317.24707	23377.70703
	-239.99214	194395.12500	123.24995	48.42397	199.10855	313.78906
ROW RB	639195.00000	217217.93750	-310236.06250	-76922.18750	-376765.12500	-37725.85547
	313803.87500	24516.18750	-3645.51001	1435.07178	280.51440	175.24464
	130.03610	162.14732	-3.76112	317.24707	3368.89844	16338.09375
	-814.81348	-260670.62500	823.96045	325.75488	1600.48682	-306.88916
ROW S	-2416194.00000	-1313269.00000	5232591.00000	2405198.00000	-2928439.00000	-1223542.00000
	202945.00000	-72107.25000	79598.37500	42408.98047	5834.16406	722.52100
	-293.79932	1300.94092	-139.43724	23377.70703	16338.09375	1645099.00000
	-16821.05469	17567632.00000	-2951.17920	1215.42847	-7893.41406	28091.94141
ROW SR	-86951.06250	-8680.65234	-372805.68750	-60669.55469	204732.93750	69572.06250
	-126053.12500	-1071.60059	-2782.53760	-1533.16382	-131.32045	-86.22597
	46.81683	-93.67456	-3.51861	-239.99214	-814.81348	-16821.05469
	2206.52759	-686217.93750	56.15709	590.25269	-1048.05713	-1225.26001
ROW C&H2	-276093952.00000	-11557549.00000	256015952.00000	71133792.00000	-122962416.00000	27200832.00000
	-96604080.00000	-4302410.00000	1488921.00000	-1698828.00000	82743.31250	864.85547
	-24624.98828	34045.51563	-16216.10156	-194395.12500	-260670.62500	17567632.00000
	-686217.93750	1364362240.00000	-148282.81250	-285948.06250	212995.87500	820061.87500
ROW ZN	90396.00000	41768.46875	-82867.00000	-27515.60156	-87086.93750	-19677.04688
	119727.25000	17269.52734	-401.11182	-463.22803	110.18311	-184.11195
	71.16992	73.31264	-1.70434	123.24995	823.96045	2951.17920
	56.15709	-148282.81250	962.11841	251.23599	684.07349	-190.16074
ROW ZR	197521.62500	61148.98047	-297148.06250	-36393.44141	-57533.38672	9513.97256
	53308.27344	6492.73047	-2626.12183	447.35889	17.77158	24.92940
	59.42735	19.52820	-3.38290	48.42397	325.75488	1215.42847
	-590.25269	-285948.06250	-251.23599	-631.45142	-91.35092	-789.34717
ROW V	-198586.81250	-74508.25000	-344705.31250	-48720.00781	-273534.62500	-29599.08203
	238290.56250	27623.83594	-2336.55420	2283.44434	74.49527	273.65405
	21.90103	143.39091	3.76726	199.10855	1600.48682	7893.41406
	-1048.05713	212995.87500	684.07349	91.35092	4834.51172	-939.39307
ROW NI	-1167368.00000	-355604.93750	2050256.00000	170216.43750	277038.43750	-100414.56250
	-113229.31250	-17414.75391	22771.92188	-3819.16724	169.72961	238.01540
	-82.85709	-28.18898	-12.21729	-313.78906	-306.88916	28091.94141
	-1225.26001	820061.87500	-190.16074	-789.34717	-939.39307	7113.07813
COMMON MEANS	274319.68750	82289.62500	49842.20313	12730.26563	15456.55469	13082.39453
	16781.36719	4804.90234	808.05493	745.73999	39.89810	31.46295
	22.40739	13.64815	1.20370	22.89813	105.86104	786.81421
	190.25919	76794.37500	90.44437	140.82404	174.14807	127.48140

GENERALIZED MAHALANOBIS D-SQUARE 148.727157593

DISCRIMINANT FUNCTION CON BRACK

CONSTANT * COEFFICIENTS				
-672.121093750 *	0.002302214	0.003894767	0.001746652	-0.000994850
	0.003474343	-0.000355249	0.001326057	0.009732164
	0.031533159	-0.001753531	-0.228197813	-0.696543455
	-2.655446053	2.243256569	-0.197466195	0.588289559
	-0.154583931	-0.002759227	0.705316424	-0.000884702
	-0.016881760	0.041593067	0.208988130	-0.052475989

DISCRIMINANT FUNCTION MARINE

CONSTANT * COEFFICIENTS				
-655.823486328 *	0.002271105	0.003866632	0.001748435	-0.000912193
	0.003435480	-0.000346826	0.001168190	0.009451542
	0.034335159	-0.006129816	-0.117014527	-0.835385680
	-2.722186089	2.798372269	-0.444887400	0.584162354
	-0.155018508	-0.003396020	0.667390287	0.000819143
	-0.004104771	0.058920398	0.213495553	-0.056538284

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION

GROUP CON BRACK

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.95641	1
2	0.97317	1
3	0.99735	1
4	0.99995	1
5	0.99459	1
6	0.97705	1
7	0.94336	1
8	0.99923	1
9	0.92537	1
10	0.56794	1
11	0.57081	1
12	0.90888	1
13	0.96523	1
14	0.99588	1
15	0.91155	1
16	0.98679	1
17	0.98051	1
18	0.99804	1
19	0.98739	1
20	0.99852	1
21	0.97505	1
22	0.98211	1
23	0.99341	1
24	0.99820	1
25	0.96988	1
26	0.99802	1
27	0.99714	1
28	0.99266	1
29	0.53449	1
30	0.99777	1
31	0.58463	2
32	0.99987	1
33	0.99969	1
34	0.99537	1
35	0.99954	1
36	0.99809	1
37	0.96913	1
38	0.99660	1
39	0.96327	1
40	0.86093	1
41	0.95815	1
42	0.78024	1
43	0.72807	1
44	0.50623	1
45	0.87445	1
46	0.73096	2
47	0.94168	1
48	0.93228	2
49	0.94747	1
50	0.58972	2
51	0.98110	1
52	0.94500	1
53	0.96909	1
54	0.99886	1
55	0.99902	1
56	0.99886	1
57	0.99919	1
58	0.99371	1
59	0.97525	1
60	0.99210	1
61	0.98184	1
62	0.99574	1
63	0.86402	2
64	0.99604	1
65	0.92423	1
66	0.99974	1
67	0.97150	1
68	0.97768	1
69	0.64735	1
70	0.85044	2
71	0.80984	1
72	0.81961	1
73	0.79760	1
74	0.99779	1
75	0.99767	1
76	0.94855	1
77	0.99956	1
78	0.68716	2
79	0.99579	1
80	0.99377	1
81	0.99891	1
82	0.98282	1
83	0.97413	1

GROUP MARINE

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.92339	1
2	0.91138	2
3	0.96750	2
4	0.65556	2
5	0.79621	2
6	0.57021	1
7	0.72287	2
8	0.91126	2
9	0.98966	2
10	0.98833	2
11	0.96919	2
12	0.98386	2
13	0.89758	2
14	0.90417	1
15	0.95586	2
16	0.99960	2
17	0.99239	2
18	0.99598	2
19	0.99978	2
20	0.99967	2
21	0.99877	2
22	0.99985	2
23	0.99989	2
24	0.99565	2
25	0.98735	2

Appendix 3

Classifications for the Standard Groups Continental vs Brackish 24 Variables

DISCRIMINANT ANALYSIS.....CONTINENTAL VS BRACKISH TWENTY FOUR

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  NUMBER OF GROUPS          2
  NUMBER OF VARIABLES      24
  SAMPLE SIZES..
           GROUP
             1            20
             2            63
```

GROUP CONTINENTAL MEANS

278755.50000	85059.00000	35611.00000	15079.00000	11172.00000	14500.00000	10005.00000	4391.00000
591.50000	751.00000	33.39999	26.34999	20.34999	12.20000	1.80000	19.59999
73.25000	531.75000	185.39999	111040.00000	71.34999	131.09999	209.00000	83.89999

GROUP BRACKISH	MEANS						
275139.75000	81921.06250	47294.44141	11653.01563	17940.47266	14407.93359	16798.72656	4821.90234
798.57129	755.87280	38.15872	32.73015	23.12698	12.38095	1.23809	23.26984
98.80951	840.55542	211.11110	69150.75000	90.92062	145.77777	151.42856	123.36507

POOLED DISPERSION MATRIX

ROW SI					
439781760.00000	100646448.00000	-70500288.00000	-14420065.00000	-177416560.00000	6594936.00000
57208672.00000	-228813.18750	-1583889.00000	686539.62500	23589.01172	10887.62500
21375.65234	17940.40625	-1522.76685	-21918.67578	484704.75000	-886499.50000
-372876.43750	-140504928.00000	-55487.62891	2934.66260	-95391.25000	-29999.01172
ROW AL					
100646448.00000	78197936.00000	-40449584.00000	2060160.00000	-85957840.00000	14981632.00000
19236896.00000	1042360.68750	-987209.06250	-185258.93750	38346.83594	4120.64063
26355.12109	9802.46484	1099.95288	-13408.16016	146444.12500	-1034004.31250
-62901.97266	38112544.00000	-762.39990	13275.93750	-57827.39453	8957.19922
ROW FE					
-70500288.00000	-40449584.00000	212742800.00000	24960368.00000	-4705845.00000	-18412880.00000
-4587690.00000	1562289.00000	2692035.00000	625944.18750	13778.92578	65903.62500
3963.49146	11975.26353	-2778.89795	52700.20703	90667.75000	3066799.00000
-62830.17188	64081360.00000	163589.25000	-12476.28906	162148.06250	308675.50000
ROW MG					
-14420065.00000	2060160.00000	24960368.00000	40305440.00000	3467573.00000	7341068.00000
-3750905.00000	-1670319.00000	369862.31250	1092921.00000	28525.34375	-832.47900
-643.91504	288.03613	-1038.48047	47061.96094	-39233.46875	3177204.00000
-18257.26953	35697760.00000	-6687.50000	-6822.66016	-62409.41797	64295.52734
ROW CA					
-177416560.00000	-85957840.00000	-4705845.00000	3467573.00000	213051312.00000	-7089466.00000
-38017200.00000	-3579256.00000	305381.50000	321720.68750	-65491.51563	-40283.20703
-30567.89844	-31939.78906	-2559.84082	-76079.31250	-398169.06250	-4674689.00000
313981.81250	-181389840.00000	-68822.50000	-19714.88672	-173146.00000	-152079.87500
ROW NA					
6594936.00000	14981632.00000	-18412880.00000	7341068.00000	-7089466.00000	60084976.00000
-12880257.00000	-90763.93750	-363606.06250	21729.18359	7821.24219	-2048.93115
-2452.64429	-5187.51172	739.26978	-33742.17188	-60736.78906	-1504220.00000
57190.30859	69002832.00000	-39359.67578	-7680.08984	-53107.25781	-22403.10938
ROW K					
57208672.00000	19236896.00000	-4587690.00000	-3750905.00000	-38017200.00000	-12880257.00000
60718384.00000	3118775.00000	-114022.37500	549659.62500	19621.40625	38397.34375
15530.80078	22964.81250	-1429.75830	17320.45313	263564.31250	241811.75000
-224594.93750	-29525664.00000	95588.43750	12881.53906	291954.93750	28987.50391
ROW TI					
-228813.18750	1042360.68750	1562289.00000	-1670319.00000	-3579256.00000	-90763.93750
3118775.00000	962802.31250	40391.55469	-55297.49219	2729.27148	4850.41016
1653.99967	1806.03467	-73.26630	543.38623	13544.17188	-66174.18750
-9779.86328	3347364.00000	15045.12109	1292.75366	23842.25781	10213.52734
ROW MN					
-1583889.00000	-987209.06250	2692035.00000	369862.31250	305381.50000	-363606.06250
-114022.37500	40391.55469	65459.28125	10855.53125	57.68272	1060.30469
-27.76688	4.29925	-63.73509	1751.30225	-391.18164	88074.56250
5.40623	32750.03516	1572.84937	-293.49390	3932.79761	3989.67651
ROW BA					
686539.62500	-185258.93750	626944.18750	1092921.00000	321720.68750	21729.18359
549659.62500	-55297.49219	10855.53125	67344.12500	491.02637	6.82602
-106.22116	52.53119	-110.54297	876.26221	497.47095	62466.64063
-2789.12036	-1469840.00000	-618.48682	-380.49023	1933.22974	258.96973
ROW CO					
23589.01172	38346.83594	13778.92578	28525.34375	-65491.51563	7821.24219
19621.40625	2729.27148	57.68272	491.02637	98.21150	32.97397
21.39410	25.09361	0.31135	108.72159	206.00993	7009.59375
-141.80473	164811.55250	107.04831	21.77055	67.57634	198.77820
ROW CU					
10887.62500	4120.64063	65903.62500	-832.47900	-40283.20703	-2048.93115
38397.34375	4850.41016	1060.30469	6.82602	32.97397	141.56596
17.24321	26.65515	-1.71052	45.88092	212.96150	726.68872
-148.20731	33997.16016	205.84027	20.95697	409.76733	203.60233
ROW GA					
21375.65234	26355.12109	3963.49146	-643.91504	-30567.89844	-2452.64429
15530.80078	1653.99967	-27.76688	-106.22116	21.39410	17.24321
36.93242	9.25600	-1.50005	10.26708	84.97159	-396.13696
18.18893	18387.50391	59.03900	43.22305	-3.14104	34.88612

	[illegible]	[illegible]	11939.26053	288.23613	-31939.78906	-5147.51172
	22964.31250	1406.03467	4.29925	52.53119	25.09361	26.65515
	9.26670	19.18579	0.17389	32.79153	160.52440	1844.39575
	-134.15045	61736.91016	76.33862	9.80155	139.37808	65.89607
ROW MO						
	-1522.76685	1099.95288	-2778.89795	-1038.48047	-2559.84082	739.26978
	-1429.75330	-73.26630	-63.72509	-110.54297	0.31135	-1.71052
	-1.50605	0.17389	2.40281	-3.32892	-3.91530	-142.49623
	-3.74144	19278.64063	-3.44946	-4.94145	-1.91898	1.96447
ROW PB						
	-21918.67578	-13408.16016	52700.20703	47081.96094	-76079.31250	-33742.17188
	17320.45313	543.38623	1751.30225	876.26221	108.72159	45.88092
	10.26708	32.79153	-3.32892	647.00073	382.19897	30347.32031
	-363.14307	289561.43750	132.75346	37.89581	285.65039	417.45532
ROW PB						
	484704.75000	146444.12500	90667.75000	-39233.46875	-398168.06250	-60736.78906
	268564.31250	18544.17188	-391.18164	497.47095	206.00993	212.96150
	84.97150	160.52440	-3.91530	382.19897	3543.91968	21787.80078
	-1388.29150	122996.31250	698.17480	122.62601	1767.77930	824.03003
ROW S						
	-686499.50000	-1934004.31250	3066799.00000	3177204.00000	-4574689.00000	-1504220.00000
	241811.75000	-66174.18750	88074.56250	62466.64063	7009.59375	726.68872
	-386.13696	1844.39575	-142.49623	30347.32031	21787.80078	2089895.00000
	-21991.02344	23859744.00000	3536.01685	2435.87866	15852.55469	27784.14453
ROW SR						
	-372876.43750	-62901.97266	-62830.17188	-18267.26953	313981.81250	57190.30859
	-224594.93750	-9779.86328	5.40623	-2788.12036	-141.80473	-143.20731
	16.18693	-134.15045	-3.74144	-363.14307	-1388.29150	-21991.02344
	2317.88037	-515544.87500	-200.11333	429.90869	-1306.06250	-439.88428
ROW CSH2						
	-14253492 8.00000	3811254 4.00000	64081360.00000	35697760.00000	-181389840.00000	49002832.00000
	-2953566 4.00000	3347264.00000	32750.03516	-1449840.00000	164811.56250	33997.16016
	18387.50391	61736.91016	19278.64063	289561.43750	122996.31250	23859744.00000
	-515544.87500	1284139776.00000	88137.75000	-77354.75000	42055.29297	442460.62500
ROW ZN						
	-55487.62991	-762.39990	163589.25000	-6687.50000	-68822.50000	-39359.67578
	95588.43750	15045.12109	1572.84937	-618.48682	107.04831	205.84027
	59.03900	76.33862	-3.44946	132.75346	698.17480	3536.01685
	-200.11333	88137.75000	795.00000	119.58105	852.02295	494.06641
ROW ZR						
	2934.66260	13275.93750	-12476.28906	-6822.66016	-19714.88672	-7680.08984
	12881.53906	1292.75366	-293.49390	-380.49023	21.77055	20.95697
	43.22305	9.80155	-4.94145	37.89581	122.62601	2435.87866
	429.90869	-77354.75000	119.58105	560.54956	77.55405	-5.09491
ROW V						
	-95391.25000	-57827.39453	162148.06250	-62409.41797	-173146.00000	-53107.25781
	291954.93750	29842.25781	3932.79761	1933.22974	67.57634	409.76733
	-3.14104	139.37808	-1.91898	285.65039	1767.77930	15852.55469
	-1306.06250	42055.29297	852.02295	77.55405	5098.13672	565.36841
ROW NI						
	-29999.01172	8957.19922	308675.50000	64295.52734	-152079.87500	-23403.10938
	28987.50391	10213.52734	3989.67651	258.96973	198.77820	203.60233
	34.88612	65.89607	1.96447	417.45532	824.03003	27784.14453
	-439.88428	442460.62500	494.06641	-5.09491	565.36841	1334.34009
COMMON MEANS						
	276010.93750	82693.43750	44479.14453	12478.55078	16309.50391	14430.10547
	15161.67188	4718.06641	748.67432	754.69849	37.01202	31.19275
	22.45782	12.33734	1.37349	22.38553	92.65054	766.14429
	204.91556	79244.50000	86.20471	142.99989	165.30115	113.85532

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GENERALIZED MAHALANOBIS D-SQUARE 233.293853760

DISCRIMINANT FUNCTION CONTINENTAL
CONSTANT * COEFFICIENTS
-663.836914063 *

0.001965966	0.005069651	0.000623142	-0.000061675
0.003445059	-0.000779842	-0.000536584	0.011025891
0.065531731	0.023381993	-1.435041428	-0.745163262
-2.457198606	4.810051918	-0.248349905	0.515569746
-0.103220462	-0.004675575	0.558767855	0.000838356
0.031175487	0.107873261	0.228050411	-0.009582460

DISCRIMINANT FUNCTION BRACKISH
CONSTANT * COEFFICIENTS
-642.076416016 *

0.001900019	0.004972760	0.000759674	-0.000585826
0.003435484	-0.000576482	0.000025592	0.010647856
0.065516114	0.024494164	-1.177947998	-0.711669028
-2.512971878	4.544336319	0.307203293	0.489494443
-0.107948840	-0.003040926	0.578331649	0.000766255
0.006873950	0.111444116	0.181617081	0.012258112

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.99997	1
2	0.98845	1
3	0.36388	1
4	1.00000	1
5	0.99781	1
6	0.99994	1
7	0.99811	1
8	0.90011	1
9	0.99998	1
10	0.99781	1
11	0.99798	1
12	0.99999	1
13	0.99978	1
14	0.99948	1
15	0.99929	1
16	0.99947	1
17	0.99990	1
18	1.00000	1
19	0.61642	1
20	0.99948	1

GROUP BRACKISH

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.98431	2
2	0.93210	1
3	0.98352	2
4	0.98786	2
5	0.72448	2
6	0.99789	2
7	0.99972	2
8	0.92537	2
9	1.00000	2
10	0.99945	2
11	0.99996	2
12	0.99999	2
13	0.99997	2
14	0.99995	2
15	0.99998	2
16	0.99797	2
17	0.99990	2
18	1.00000	2
19	0.99999	2
20	0.99998	2
21	0.99998	2
22	1.00000	2
23	0.99971	2
24	0.99849	2
25	0.99761	2
26	0.99990	2
27	0.99986	2
28	0.99957	2
29	0.99110	2
30	0.96418	2
31	0.51525	2
32	0.82915	2
33	0.99267	2
34	0.99642	2
35	0.99945	2
36	0.99987	2
37	0.99998	2
38	0.99917	2
39	0.99955	2
40	1.00000	2
41	0.99898	2
42	0.99998	2
43	0.70370	1
44	0.99990	2
45	0.99932	2
46	0.99638	2
47	0.99999	2
48	1.00000	2
49	0.99997	2
50	1.00000	2
51	0.99996	2
52	0.99999	2
53	0.99986	2
54	0.91469	2
55	0.99996	2
56	0.99994	2
57	1.00000	2
58	0.99994	2
59	0.75160	2
60	0.99664	2
61	0.99988	2
62	0.98917	2
63	0.95941	2

Appendix 4

Classifications for the Standard Groups
Marine vs Continental-Brackish 12 Variables

DISCRIMINANT ANALYSIS.....CON BRACK VS MARINE TWELVE VAR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 12
SAMPLE SIZES..

GROUP	
1	83
2	25

GROUP CON BRACK MEANS

4718.07031	748.67456	754.69873	37.01204	31.19276	22.45782	12.33735	204.91565
79244.56250	86.20482	143.00000	165.30119				

GROUP MARINE MEANS

5093.19922	1005.19995	716.00000	49.48000	32.35999	22.23999	18.00000	141.59999
68660.00000	104.51999	133.59999	203.51999				

POOLED DISPERSION MATRIX

ROW						
ROW TI	953963.31250	-52272.28125	-17523.37500	3254.44141	4130.36719	2375.86670
	2048.79346	-1071.60059	-4302410.00000	17269.52734	6492.73047	27623.83594
ROW MN	-52272.28125	140548.43750	-3027.01880	-167.93584	1395.96558	-494.72607
	-256.25366	-2782.53760	1488921.00000	-401.11182	-2626.12183	-2336.55420
ROW BA	-17523.37500	-3027.01880	62596.50000	496.91602	-5.65242	18.73138
	117.43790	-1533.16382	-1698828.00000	463.22803	447.35889	2283.44434
ROW CO	3254.44141	-167.93584	496.91602	126.99159	22.64600	26.70425
	25.44954	-131.32045	82743.31250	110.18311	17.77158	74.49527
ROW CU	4130.36719	1395.96558	-5.65242	22.64600	126.24995	13.99531
	21.67538	-86.22597	864.85547	184.11195	24.92940	273.65405
ROW GA	2375.86670	-494.72607	18.73138	26.70425	13.99531	36.69009
	11.12428	46.81683	-24624.98828	71.16992	59.42735	21.90103
ROW LI	2048.79346	-256.25366	117.43790	25.44954	21.67538	11.12428
	18.47684	-93.67456	34045.51563	73.31264	19.52820	143.39091
ROW SR	-1071.60059	-2782.53760	-1533.16382	-131.32045	-86.22597	46.81683
	-93.67456	2206.52759	-686217.93750	56.15709	590.25269	-1048.05713
ROW C&H2	-4302410.00000	1488921.00000	-1698828.00000	82743.31250	864.85547	-24624.98828
	34045.51563	-686217.93750	1364362240.00000	-148282.81250	-285948.06250	212995.87500
ROW ZN	17269.52734	-401.11182	463.22803	110.18311	184.11195	71.16992
	73.31264	56.15709	-148282.81250	962.11841	251.23599	684.07349
ROW ZR	6492.73047	-2626.12183	447.35889	17.77158	24.92940	59.42735
	19.52820	590.25269	-285948.06250	251.23599	631.45142	91.35092
ROW V	27623.83594	-2336.55420	2283.44434	74.49527	273.65405	21.90103
	143.39091	-1048.05713	212995.87500	684.07349	91.35092	4834.51172

COMMON MEANS

4804.90234	808.05493	745.73999	39.89810	31.46295	22.40739
13.64815	190.25919	76794.37500	90.44437	140.82404	174.14807

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GENERALIZED MAHALANOBIS D-SQUARE 122.741928101

DISCRIMINANT FUNCTICN CON BRACK
CONSTANT * COEFFICIENTS
-66.758499146 *

0.005764309	0.014571335	0.020955570	0.082721114
-0.028128639	-0.038343370	1.050294876	0.216511965
0.000167535	-0.130207002	0.104708612	0.023740549

DISCRIMINANT FUNCTION MARINE
CONSTANT * COEFFICIENTS
-64.052871704 *

0.005346049	0.018250937	0.017059784	0.164994419
-0.164303243	-0.140111923	1.512454033	0.199439049
0.000122587	-0.119072437	0.101185918	0.027622953

GROUP CON BRACK

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.95854	1
2	0.97834	1
3	0.98898	1
4	0.99870	1
5	0.98540	1
6	0.97258	1
7	0.95964	1
8	0.99123	1
9	0.92803	1
10	0.91468	1
11	0.64542	1
12	0.84556	1
13	0.99433	1
14	0.99901	1
15	0.94694	1
16	0.99171	1
17	0.94283	1
18	0.99938	1
19	0.99441	1
20	0.99915	1
21	0.90603	1
22	0.99096	1
23	0.98445	1
24	0.99368	1
25	0.95908	1
26	0.99826	1
27	0.99575	1
28	0.99027	1
29	0.69591	2
30	0.98081	1
31	0.77290	1
32	0.99657	1
33	0.99620	1
34	0.99550	1
35	0.99848	1
36	C.99729	1
37	0.95827	1
38	0.98015	1
39	0.95551	1
40	0.71470	1
41	0.76579	1
42	0.72182	2
43	0.73765	2
44	0.57523	2
45	0.95493	1
46	0.78195	2
47	0.70054	1
48	0.92126	2
49	0.89402	1
50	0.63533	2
51	0.93288	1
52	0.71523	1
53	0.87325	1
54	0.96834	1
55	0.99486	1
56	0.99639	1
57	0.99389	1
58	0.99030	1
59	0.97099	1
60	0.99127	1
61	0.93948	1
62	0.57382	2
63	0.76776	2
64	0.98825	1
65	0.79371	1
66	0.99830	1
67	0.92920	1
68	0.93501	1
69	0.51221	1
70	0.88285	2
71	0.70003	1
72	0.64638	1
73	0.73521	1
74	0.99757	1
75	C.98756	1
76	0.87312	1
77	0.99844	1
78	0.59250	2
79	0.99749	1
80	0.99405	1
81	0.99560	1
82	0.97428	1
83	0.98010	1

GROUP MARINE

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.94813	1
2	0.86087	2
3	0.94102	2
4	0.50631	2
5	0.60324	2
6	0.61216	1
7	0.50224	2
8	0.82237	2
9	0.97510	2
10	0.96633	2
11	0.92571	2
12	0.97215	2
13	0.80822	2
14	0.74701	1
15	0.94568	2
16	0.99876	2
17	0.99274	2
18	0.99313	2
19	0.99951	2
20	0.99188	2
21	0.99836	2
22	0.99923	2
23	0.99973	2
24	0.99428	2
25	0.98737	2

Appendix 5

Classifications for the Standard Groups Continental vs Brackish 16 Variables

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 16
SAMPLE SIZES..

GROUP	
1	20
2	63

GROUP CONTINENTAL MEANS

15079.00000	14500.00000	10005.00000	4391.00000	591.50000	751.00000	33.39999	26.34999
20.34999	12.20000	73.25000	185.39999	111040.00000	71.34999	131.09999	209.00000

GROUP BRACKISH MEANS

11653.01563	14407.93359	16798.72656	4821.90234	798.57129	755.87280	38.15872	32.73015
23.12698	12.38095	98.80951	211.11110	69150.75000	90.92062	146.77777	151.42856

POOLED DISPERSION MATRIX

ROW MG

40305440.00000	7341068.00000	-3750905.00000	-1670319.00000	369862.31250	1092921.00000
28525.34375	-832.47900	-643.91504	288.03613	-39233.46875	-18267.26953
35597760.00000	-5587.50000	-6822.66016	-62409.41797		

ROW NA

7341068.00000	60084976.00000	-12880257.00000	-90763.93750	-363606.06250	21729.18359
7821.24219	-2048.93115	-2452.64429	-5187.51172	-60736.78906	57190.30859
49002832.00000	-39359.67578	-7680.08984	-53107.25781		

ROW K

-3750905.00000	-12880257.00000	60718384.00000	3118775.00000	-114022.37500	549659.62500
19621.40625	38397.34375	15530.80078	22964.81250	268564.31250	-224594.93750
-2955564.00000	95588.43750	12861.53906	291954.93750		

ROW TI

-1670319.00000	-90763.93750	3118775.00000	962802.31250	40391.55469	-55297.49219
2729.27143	4850.41016	1653.90967	1806.03467	18544.17188	-9779.86328
3347364.00000	15045.12109	1292.75366	29842.25781		

ROW MN

369862.31250	-363606.06250	-114022.37500	40391.55469	65459.28125	10855.53125
57.68272	1060.30469	-27.76688	4.29925	-391.18164	5.40623
32750.03516	1572.84937	-293.49390	3932.79761		

ROW BA

1092921.00000	21729.18359	549659.62500	-55297.49219	10855.53125	67344.12500
491.02637	6.82602	-106.22116	52.53119	497.47095	-2788.12036
-1449840.00000	-618.48682	-380.49023	1933.22974		

ROW CO

28525.34375	7821.24219	19621.40625	2729.27148	57.68272	491.02637
98.21130	32.97397	21.39410	25.09361	206.00993	-141.80473
164811.56250	107.04831	21.77055	67.57634		

ROW CU

-832.47900	-2048.93115	38397.34375	4850.41016	1060.30469	6.82602
32.97397	141.56596	17.24321	26.65515	212.96150	-148.20731
33997.16016	205.84027	20.95697	409.76733		

	[illegible]	[illegible]	[illegible]	1653.90967	-27.76688	-106.22116
	21.39410	17.24221	36.93242	9.26600	84.97159	18.18893
	18387.50391	59.03900	43.22305	-3.14104		
ROW LI						
	288.03613	-5187.51172	22964.81250	1806.03467	4.29925	52.53119
	25.09361	26.65515	9.26600	19.18579	160.52440	-134.15045
	61736.91016	76.33862	9.80155	139.37808		
ROW RB						
	-39233.46875	-60736.78906	268564.31250	18544.17188	-391.18164	497.47095
	206.00993	212.96150	84.97159	160.52440	3543.91968	-1388.29150
	122996.31250	698.17480	122.62601	1767.77930		
ROW SR						
	-18267.26953	57190.30859	-224594.93750	-9779.86328	5.40623	-2788.12036
	-141.80473	-148.20731	18.18893	-134.15045	-1388.29150	2312.88037
	-515544.87500	-200.11333	429.90869	-1306.06250		
ROW C&H2						
	35697760.00000	49002832.00000	-29535664.00000	3347364.00000	32750.03516	-1449840.00000
	164311.56250	33997.16016	18387.50391	61736.91016	122996.31250	-515544.87500
	1284139776.00000	88137.75000	-77354.75000	42055.29297		
ROW ZN						
	-6687.50000	-39359.67578	95588.43750	15045.12109	1572.84937	-618.48682
	107.04831	205.84027	59.03900	76.33862	698.17480	-200.11333
	88137.75000	795.00000	119.58105	852.02295		
ROW ZR						
	-6822.66016	-7680.08984	12881.53906	1292.75366	-293.49390	-380.49023
	21.77055	20.95697	43.22305	9.80155	122.62601	429.90869
	-77354.75000	119.58105	560.54956	77.55405		
ROW V						
	-62409.41797	-53107.25781	291954.93750	29842.25781	3932.79761	1933.22974
	67.57634	409.76733	-3.14104	139.37808	1767.77930	-1306.06250
	42055.29297	852.02295	77.55405	5098.13672		
COMMON MEANS						
	12478.55078	14630.10547	15161.67188	4718.06641	748.67432	754.69849
	37.01202	31.19275	22.45782	12.33734	92.65054	204.91556
	79244.50000	86.20471	142.99989	165.30115		

GENERALIZED MAHALANOBIS D-SQUARE 161.353622437

DISCRIMINANT FUNCTION CONTINENTAL
CONSTANT * COEFFICIENTS
-73.719589233 *

0.000157554	-0.000037940	0.000290756	0.007028900
0.003115894	0.026661061	-0.282357547	0.039703250
-0.197733819	1.965940475	0.041430663	0.329023361
0.000189272	-0.213716447	0.029654499	0.022531826

DISCRIMINANT FUNCTION BRACKISH
CONSTANT * COEFFICIENTS
-79.568618774 *

-0.000245353	0.000070451	0.000716941	0.006231286
0.011671495	0.027534287	-0.028423373	0.043120325
-0.400927782	1.719291687	0.043033693	0.351169348
0.000167543	-0.190811217	0.041280117	-0.014962699

GROUP CONTINENTAL

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.99957	1
2	0.99128	1
3	0.62326	1
4	1.00000	1
5	0.99123	1
6	0.99842	1
7	0.99867	1
8	0.80878	1
9	0.99969	1
10	0.84175	1
11	0.96943	1
12	0.99908	1
13	0.99251	1
14	0.99797	1
15	0.99649	1
16	0.99034	1
17	0.99872	1
18	0.99997	1
19	0.78490	2
20	0.96423	1

GROUP BRACKISH

OBSERVATION	PROBABILITY ASSOCIATED WITH LARGEST DISCRIMINANT FUNCTION	LARGEST FUCTION NO.
1	0.91934	2
2	0.72808	1
3	0.95548	2
4	0.94436	2
5	0.54569	1
6	0.96095	2
7	0.99801	2
8	0.93523	2
9	0.99990	2
10	0.99976	2
11	0.99195	2
12	0.99996	2
13	0.99996	2
14	0.99961	2
15	0.99806	2
16	0.98336	2
17	0.99976	2
18	0.99846	2
19	0.99972	2
20	0.99984	2
21	0.99169	2
22	0.99994	2
23	0.99965	2
24	0.99779	2
25	0.57899	2
26	0.99762	2
27	0.99744	2
28	0.99841	2
29	0.99814	2
30	0.98332	2
31	0.78944	1
32	0.93423	2
33	0.76590	2
34	0.86270	2
35	0.99923	2
36	0.99963	2
37	0.99995	2

38	0.99669	2
39	0.99954	2
40	0.99978	2
41	0.95672	2
42	0.98477	2
43	0.95087	2
44	0.99897	2
45	0.96418	2
46	0.99182	2
47	0.99996	2
48	0.99990	2
49	0.99996	2
50	0.99998	2
51	0.99561	2
52	0.99796	2
53	0.99772	2
54	0.90069	1
55	0.99966	2
56	0.99544	2
57	0.99981	2
58	0.97403	2
59	0.69459	1
60	0.96903	2
61	0.99660	2
62	0.94884	2
63	0.79110	2

Appendix 6

Classifications for the Unknown Samples in the Groups Marine vs Continental-Brackish 12 Variables

DISCRIMINANT ANALYSIS.....CON BRACK VS MARINE TWELVE VAR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 12
SAMPLE SIZES..

GROUP	
1	189
2	189

DISCRIMINANT FUNCTION CONTINENTAL BRACKISH

CONSTANT *	COEFFICIENTS *			
-66.7584991455	0.0057643093	0.0145713352	0.0209555700	0.0827211142
	-0.0281286389	-0.0383433700	1.0502948761	0.2165119648
	0.0001675350	-0.1302070022	0.1047086120	0.0237405486

DISCRIMINANT FUNCTION MARINE

CONSTANT *	COEFFICIENTS *			
-64.0528717041	0.0053460486	0.0182609372	0.0170597844	0.1649944186
	-0.1643032432	-0.1401119232	1.5124540329	0.1994390488
	0.0001225870	-0.1190724373	0.1011859179	0.0276229531

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL BRACKISH

SAMPLE NO.	DEPTH		PROBABILITY	SAMPLE CLASSIFICATION
ST -1	599.5	0.0	0.69157	CONTINENTAL BRACKISH
ST -2	600.0	0.0	0.74658	MARINE
ST -3	600.0	-602.0	0.89213	MARINE
ST -4	602.0	-603.2	0.96704	MARINE
ST -5	603.2	-603.4	0.95970	MARINE
ST -6	603.4	-605.7	0.97907	MARINE
ST -7	605.7	-607.2	0.93879	CONTINENTAL BRACKISH
ST -9	607.4	-611.5	0.98927	MARINE
ST -10	611.5	-612.0	0.99856	MARINE
ST -11	612.0	-616.3	0.99309	MARINE
ST -12	616.3	-618.0	0.99948	MARINE
ST -13	618.0	-622.0	0.99530	MARINE
ST -14	622.0	-623.0	0.91538	MARINE
ST -15	623.0	-624.0	0.98823	MARINE
ST -16	624.0	-631.0	0.50136	CONTINENTAL BRACKISH
ST -17	631.0	-632.3	1.00000	MARINE
ST -18	632.3	-633.8	0.99998	MARINE
ST -19	633.8	-635.0	0.78337	CONTINENTAL BRACKISH
ST -20	635.0	-638.0	0.93614	CONTINENTAL BRACKISH
ST -21	638.0	-640.0	0.99272	CONTINENTAL BRACKISH
ST -22	640.0	-644.5	0.99541	CONTINENTAL BRACKISH
ST -23	644.5	-645.0	0.99750	CONTINENTAL BRACKISH
ST -24	645.0	-648.0	0.99932	CONTINENTAL BRACKISH
ST -25	645.0	-650.5	0.99824	CONTINENTAL BRACKISH
ST -26	650.5	-652.0	0.87459	CONTINENTAL BRACKISH
ST -27	652.0	-653.5	0.99456	MARINE
ST -28	653.5	-657.0	0.99995	CONTINENTAL BRACKISH
ST -29	657.0	-658.0	0.95819	CONTINENTAL BRACKISH
ST -30	658.0	-660.5	0.99656	CONTINENTAL BRACKISH
ST -31	659.5	-661.0	0.99985	CONTINENTAL BRACKISH
ST -32	661.0	-662.0	0.99963	CONTINENTAL BRACKISH
ST -33	662.0	-662.5	0.99912	CONTINENTAL BRACKISH
ST -34	662.5	-663.5	0.82669	CONTINENTAL BRACKISH
ST -35	663.5	-667.5	0.99937	CONTINENTAL BRACKISH
ST -36	667.5	-667.7	0.99393	CONTINENTAL BRACKISH
ST -37	667.7	-667.9	0.98652	MARINE
ST -38	667.9	-668.1	0.98501	CONTINENTAL BRACKISH
ST -39	668.1	-673.0	0.70276	CONTINENTAL BRACKISH
ST -40	673.0	-673.5	0.65312	MARINE
ST -41	673.5	-674.5	0.73385	CONTINENTAL BRACKISH
ST -42	674.5	-675.5	0.91572	CONTINENTAL BRACKISH
ST -43	675.5	-677.0	0.81943	CONTINENTAL BRACKISH
ST -44	677.0	-679.0	0.64756	CONTINENTAL BRACKISH
ST -45	679.0	-679.5	0.59394	CONTINENTAL BRACKISH
ST -46	679.5	-682.0	0.93135	CONTINENTAL BRACKISH
ST -47	682.0	-685.0	0.76736	MARINE
ST -48	685.0	-685.2	1.00000	MARINE
ST -49	685.2	-693.0	0.73771	CONTINENTAL BRACKISH
ST -50	693.0	-697.0	0.99793	CONTINENTAL BRACKISH
ST -51	697.0	-699.0	1.00000	MARINE
ST -52	699.0	-700.5	0.51138	CONTINENTAL BRACKISH
ST -53	700.5	-702.0	0.97423	CONTINENTAL BRACKISH
ST -54	702.0	-703.0	0.71347	CONTINENTAL BRACKISH
ST -55	703.0	-704.5	0.97884	CONTINENTAL BRACKISH
ST -56	704.5	-705.5	0.96765	MARINE

[illegible]	[illegible]	0.65078	MARINE
ST -59	709.5 -710.5	0.95366	CONTINENTAL BRACKISH
ST -60	710.5 -711.0	0.97507	CONTINENTAL BRACKISH
ST -61	711.0 -712.0	0.97555	CONTINENTAL BRACKISH
ST -62	712.0 -713.0	0.95593	CONTINENTAL BRACKISH
ST -63	713.0 -713.5	0.97167	CONTINENTAL BRACKISH
ST -64	713.5 -718.0	0.84652	CONTINENTAL BRACKISH
ST -65	718.0 -719.2	0.64719	MARINE
ST -66	719.2 -719.4	0.88806	CONTINENTAL BRACKISH
ST -69	721.0 -730.0	0.64952	CONTINENTAL BRACKISH
ST -70	730.0 -732.0	0.97255	CONTINENTAL BRACKISH
ST -71	732.0 -732.6	0.98304	CONTINENTAL BRACKISH
ST -72	732.6 -733.2	0.99605	MARINE
ST -73	733.2 -734.5	0.91541	CONTINENTAL BRACKISH
ST -74	734.5 -735.0	0.98986	CONTINENTAL BRACKISH
ST -75	735.0 -737.2	0.99871	CONTINENTAL BRACKISH
ST -76	737.2 -737.5	1.00000	CONTINENTAL BRACKISH
ST -77	737.5 -738.0	0.99804	CONTINENTAL BRACKISH
ST -78	738.0 -739.2	0.95834	CONTINENTAL BRACKISH
ST -79	739.2 -743.0	0.94420	CONTINENTAL BRACKISH
ST -80	743.0 -744.3	0.99683	CONTINENTAL BRACKISH
ST -81	744.3 -746.5	0.98481	CONTINENTAL BRACKISH
ST -82	746.5 -747.4	0.98684	CONTINENTAL BRACKISH
ST -83	747.4 -750.8	0.91489	CONTINENTAL BRACKISH
ST -84	750.8 -752.5	0.99855	CONTINENTAL BRACKISH
ST -85	752.5 -754.0	0.99705	CONTINENTAL BRACKISH
ST -86	754.0 -755.2	0.99908	CONTINENTAL BRACKISH
ST -87	755.2 -757.5	0.99957	CONTINENTAL BRACKISH
ST -88	757.5 -758.5	0.99372	CONTINENTAL BRACKISH
ST -90	759.2 -763.8	0.99917	CONTINENTAL BRACKISH
ST -91	763.8 -765.8	0.98502	CONTINENTAL BRACKISH
ST -92	765.8 -770.1	1.00000	CONTINENTAL BRACKISH
ST -93	770.1 -770.8	0.99721	CONTINENTAL BRACKISH
ST -94	770.8 -775.5	0.99262	CONTINENTAL BRACKISH
ST -95	775.5 -780.0	0.79114	CONTINENTAL BRACKISH
ST -97	782.3 -782.9	0.99382	CONTINENTAL BRACKISH
ST -98	782.9 -784.8	0.97439	CONTINENTAL BRACKISH
ST -99	784.8 -785.3	0.99841	CONTINENTAL BRACKISH
ST-100	785.3 -786.5	0.76263	CONTINENTAL BRACKISH
ST-101	786.5 -787.2	0.93967	CONTINENTAL BRACKISH
ST-102	787.2 -791.2	0.99720	CONTINENTAL BRACKISH
ST-103	791.2 -791.5	0.96694	CONTINENTAL BRACKISH
ST-104	791.5 -792.0	0.82829	CONTINENTAL BRACKISH
ST-105	792.0 -792.5	0.97790	CONTINENTAL BRACKISH
ST-107	794.0 -794.5	0.99526	CONTINENTAL BRACKISH
ST-108	794.5 -795.5	0.91230	CONTINENTAL BRACKISH
ST-109	795.5 -796.0	0.94236	CONTINENTAL BRACKISH
ST-110	796.0 -797.0	0.99077	CONTINENTAL BRACKISH
ST-111	797.0 -798.0	0.87496	MARINE
ST-112	798.0 -799.0	0.99984	CONTINENTAL BRACKISH
ST-113	799.0 -801.0	0.98883	CONTINENTAL BRACKISH
ST-114	801.0 -801.5	0.99171	CONTINENTAL BRACKISH
ST-115	801.5 -805.5	0.99953	CONTINENTAL BRACKISH
ST-116	805.5 -806.0	0.98612	CONTINENTAL BRACKISH
ST-117	806.0 -807.5	0.99982	CONTINENTAL BRACKISH
ST-118	807.5 -809.0	0.99418	CONTINENTAL BRACKISH
ST-119	809.0 -810.2	0.99156	CONTINENTAL BRACKISH
ST-120	810.2 -810.5	0.96974	CONTINENTAL BRACKISH
ST-122	812.5 -813.0	0.77434	MARINE
ST-124	814.2 -816.7	0.99946	CONTINENTAL BRACKISH
ST-125	816.7 -817.7	0.95125	CONTINENTAL BRACKISH
ST-126	817.7 -820.0	0.97535	CONTINENTAL BRACKISH
ST-127	820.0 -821.5	0.99658	CONTINENTAL BRACKISH
ST-128	821.5 -823.0	0.99192	CONTINENTAL BRACKISH
ST-129	823.0 -825.0	0.99948	CONTINENTAL BRACKISH
ST-130	825.0 -826.0	0.99203	CONTINENTAL BRACKISH
ST-131	826.0 -827.0	0.95662	CONTINENTAL BRACKISH
ST-132	827.0 -829.5	0.96855	CONTINENTAL BRACKISH
ST-133	829.5 -832.0	0.97771	CONTINENTAL BRACKISH
ST-134	832.0 -832.5	0.99014	CONTINENTAL BRACKISH
ST-135	832.5 -833.0	0.99647	CONTINENTAL BRACKISH
ST-136	833.0 -833.2	0.97771	CONTINENTAL BRACKISH
ST-137	833.2 -833.5	0.99494	CONTINENTAL BRACKISH
ST-138	833.5 -834.0	0.98727	CONTINENTAL BRACKISH
ST-139	834.0 -838.0	0.99035	CONTINENTAL BRACKISH
ST-140	838.0 -838.5	0.97903	CONTINENTAL BRACKISH
ST-141	838.5 -840.0	0.99154	CONTINENTAL BRACKISH
ST-142	840.0 -841.0	0.94619	CONTINENTAL BRACKISH
ST-143	841.0 -844.2	0.95120	CONTINENTAL BRACKISH
ST-144	844.2 -845.5	0.99690	CONTINENTAL BRACKISH
ST-145	845.5 -846.8	0.98045	CONTINENTAL BRACKISH
ST-146	846.8 -848.0	0.99294	CONTINENTAL BRACKISH
ST-147	848.0 -849.0	0.99888	CONTINENTAL BRACKISH
ST-148	849.0 -850.5	0.99864	CONTINENTAL BRACKISH
ST-149	850.5 -854.0	0.99912	CONTINENTAL BRACKISH
ST-150	854.0 -857.0	0.99765	CONTINENTAL BRACKISH
ST-151	857.0 -858.5	0.99534	CONTINENTAL BRACKISH

[illegible]	[illegible]-859.5	0.97687	CONTINENTAL BRACKISH
ST-154	859.5 -860.5	0.97429	CONTINENTAL BRACKISH
ST-156	860.7 -865.5	0.97560	CONTINENTAL BRACKISH
ST-158	866.0 866.2	1.00000	MARINE
ST-159	866.2 -870.0	0.95787	CONTINENTAL BRACKISH
ST-160	870.0 -871.0	0.95431	CONTINENTAL BRACKISH
ST-161	871.0 -871.3	0.99834	CONTINENTAL BRACKISH
ST-162	871.3 -872.5	0.97055	CONTINENTAL BRACKISH
ST-163	872.5 -876.5	0.99732	CONTINENTAL BRACKISH
ST-164	876.5 -879.2	0.91643	CONTINENTAL BRACKISH
ST-165	879.2 -880.0	0.98404	CONTINENTAL BRACKISH
ST-166	880.0 -882.8	0.98141	CONTINENTAL BRACKISH
ST-167	882.8 -884.5	0.81108	CONTINENTAL BRACKISH
ST-168	884.5 -885.5	0.99860	CONTINENTAL BRACKISH
ST-169	885.5 -887.0	0.99363	CONTINENTAL BRACKISH
ST-170	887.0 891.4	0.98287	CONTINENTAL BRACKISH
ST-171	891.4 -892.5	0.95565	CONTINENTAL BRACKISH
ST-172	892.5 -899.0	0.89749	CONTINENTAL BRACKISH
ST-173	904.0 -905.2	0.98052	CONTINENTAL BRACKISH
ST-174	905.2 -907.7	0.67759	CONTINENTAL BRACKISH
ST-175	907.7 -909.5	0.80862	CONTINENTAL BRACKISH
ST-176	909.5 -912.5	0.97708	CONTINENTAL BRACKISH
ST-177	912.5 -917.5	0.92529	CONTINENTAL BRACKISH
ST-178	917.5 920.0	0.95928	MARINE
ST-179	920.0 921.5	0.98408	CONTINENTAL BRACKISH
ST-180	921.5 924.8	0.99596	CONTINENTAL BRACKISH
ST-181	924.8 -929.6	0.99715	CONTINENTAL BRACKISH
ST-182	929.6 -933.0	0.99702	CONTINENTAL BRACKISH
ST-183	933.0 -933.5	0.99784	CONTINENTAL BRACKISH
ST-184	933.5 -935.5	0.97963	CONTINENTAL BRACKISH
ST-185	935.5 -936.0	0.96974	CONTINENTAL BRACKISH
ST-186	936.0 -938.5	0.90262	CONTINENTAL BRACKISH
ST-187	938.5 -939.0	0.98505	CONTINENTAL BRACKISH
ST-188	939.0 -944.5	0.97702	CONTINENTAL BRACKISH
ST-189	944.5 -945.7	0.91560	CONTINENTAL BRACKISH
ST-190	945.7 -947.5	0.98144	CONTINENTAL BRACKISH
ST-191	947.5 -954.0	0.96234	CONTINENTAL BRACKISH
ST-192	959.0 -960.2	0.97417	CONTINENTAL BRACKISH
ST-193	960.2 -960.5	0.64966	CONTINENTAL BRACKISH
ST-197	970.0 -971.0	0.92492	CONTINENTAL BRACKISH
ST-198	971.0 -972.8	0.76278	CONTINENTAL BRACKISH
ST-199	972.8 -973.5	0.95991	CONTINENTAL BRACKISH
ST-200	973.5 974.0	0.91052	CONTINENTAL BRACKISH
ST-201	974.0 -975.0	1.00000	MARINE
ST-202	975.0 975.5	1.00000	MARINE

GROUP MARINE

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-203	975.5 -979.2	0.92608	CONTINENTAL BRACKISH
ST-204	979.2 -980.7	0.99687	CONTINENTAL BRACKISH
ST-205	980.7 -982.0	0.99728	CONTINENTAL BRACKISH
ST-206	982.0 -985.2	0.99368	CONTINENTAL BRACKISH
ST-207	985.2 -988.0	0.96213	CONTINENTAL BRACKISH
ST-209	989.0 -989.3	0.94709	CONTINENTAL BRACKISH
ST-211	989.5 -995.5	0.99611	CONTINENTAL BRACKISH
ST-212	995.5-1001.5	0.96737	CONTINENTAL BRACKISH
ST-213	1001.5-1004.0	0.95904	CONTINENTAL BRACKISH
ST-214	1004.0-1005.0	0.66629	CONTINENTAL BRACKISH
ST-216	1007.5-1013.0	0.80135	CONTINENTAL BRACKISH
ST-217	1013.0-1015.0	0.76030	CONTINENTAL BRACKISH
ST-218	1015.0 1017.5	0.94010	CONTINENTAL BRACKISH
ST-219	1017.5-1023.0	0.55444	MARINE
ST-220	1023.0-1024.0	0.75774	CONTINENTAL BRACKISH
ST-221	1024.0-1030.0	0.99666	CONTINENTAL BRACKISH
ST-222	1030.0-1035.2	0.94708	CONTINENTAL BRACKISH
ST-223	1035.2-1036.0	0.65438	MARINE
ST-224	1036.0-1040.5	0.89051	CONTINENTAL BRACKISH
ST-225	1040.5-1040.6	0.87688	CONTINENTAL BRACKISH
ST-226	1040.6-1041.4	0.95133	MARINE
ST-227	1041.4-1041.5	0.50365	MARINE
ST-228	1041.5-1042.0	0.81732	MARINE
ST-229	1042.0-1043.0	0.59203	CONTINENTAL BRACKISH
ST-230	1043.0-1049.0	0.96232	MARINE
ST-231	1049.0-1054.2	0.96193	CONTINENTAL BRACKISH
ST-232	1054.2-1055.2	0.80268	CONTINENTAL BRACKISH
ST-233	1055.2-1061.0	0.92232	CONTINENTAL BRACKISH
ST-234	1061.0-1063.0	0.96951	CONTINENTAL BRACKISH
ST-235	1063.0-1064.0	0.60823	CONTINENTAL BRACKISH
ST-236	1064.0-1067.0	0.88983	CONTINENTAL BRACKISH
ST-237	1067.0 1070.5	0.98089	CONTINENTAL BRACKISH
ST-238	1070.5-1072.0	0.91842	CONTINENTAL BRACKISH
ST-239	1072.0-1073.0	0.99279	CONTINENTAL BRACKISH
ST-240	1073.0-1074.0	0.96762	CONTINENTAL BRACKISH
ST-241	1074.0-1075.2	0.54439	CONTINENTAL BRACKISH
ST-242	1075.2-1078.5	0.99313	CONTINENTAL BRACKISH
ST-243	1078.5-1079.0	0.99231	CONTINENTAL BRACKISH
ST-244	1079.0-1080.2	0.99746	CONTINENTAL BRACKISH

[illegible]	[illegible]	0.98978	CONTINENTAL BRACKISH
ST-247	1082.5-1083.0	0.97601	CONTINENTAL BRACKISH
ST-248	1083.0-1083.5	0.99989	CONTINENTAL BRACKISH
ST-249	1083.5 1085.5	0.80086	CONTINENTAL BRACKISH
ST-250	1085.5-1087.5	0.92299	CONTINENTAL BRACKISH
ST-251	1087.5-1093.5	0.99983	CONTINENTAL BRACKISH
ST-252	1093.5-1096.0	0.77794	CONTINENTAL BRACKISH
ST-253	1096.0-1097.0	0.90709	CONTINENTAL BRACKISH
ST-254	1097.0-1101.0	0.97554	CONTINENTAL BRACKISH
ST-255	1101.0-1104.0	0.99285	CONTINENTAL BRACKISH
ST-256	1104.0-1105.5	0.85210	CONTINENTAL BRACKISH
ST-257	1105.5-1108.0	0.98945	CONTINENTAL BRACKISH
ST-258	1108.0-1109.5	0.93441	CONTINENTAL BRACKISH
ST-259	1109.5-1112.0	0.98965	CONTINENTAL BRACKISH
ST-260	1112.0-1112.7	0.97218	CONTINENTAL BRACKISH
ST-261	1112.7-1115.0	0.99731	CONTINENTAL BRACKISH
ST-262	1115.0-1117.5	0.97434	CONTINENTAL BRACKISH
ST-263	1117.5-1123.0	0.99191	CONTINENTAL BRACKISH
ST-264	1123.0 1127.0	0.98433	CONTINENTAL BRACKISH
ST-265	1127.0-1130.0	0.98965	CONTINENTAL BRACKISH
ST-266	1130.0-1132.0	0.95083	CONTINENTAL BRACKISH
ST-267	1132.0-1135.0	0.96526	CONTINENTAL BRACKISH
ST-268	1135.0-1136.0	0.99698	CONTINENTAL BRACKISH
ST-269	1136.0-1137.5	0.94863	CONTINENTAL BRACKISH
ST-270	1137.5-1140.0	0.96438	CONTINENTAL BRACKISH
ST-271	1140.0-1141.0	0.97687	CONTINENTAL BRACKISH
ST-272	1141.0-1142.0	0.96607	CONTINENTAL BRACKISH
ST-273	1142.0-1143.0	0.99892	CONTINENTAL BRACKISH
ST-274	1143.0-1150.0	0.99501	CONTINENTAL BRACKISH
ST-275	1150.0-1151.0	0.99688	CONTINENTAL BRACKISH
ST-276	1151.0-1154.5	0.99962	CONTINENTAL BRACKISH
ST-277	1154.5-1156.5	0.99999	CONTINENTAL BRACKISH
ST-278	1156.5-1157.5	0.99925	CONTINENTAL BRACKISH
ST-279	1157.5-1160.0	0.91043	CONTINENTAL BRACKISH
ST-281	1165.0-1170.0	0.99717	CONTINENTAL BRACKISH
ST-282	1170.0-1175.5	0.99378	CONTINENTAL BRACKISH
ST-283	1175.5-1176.0	0.93809	CONTINENTAL BRACKISH
ST-284	1176.0-1179.0	0.98998	CONTINENTAL BRACKISH
ST-285	1179.0-1180.0	0.91807	CONTINENTAL BRACKISH
ST-286	1180.0 1180.5	0.99147	CONTINENTAL BRACKISH
ST-287	1180.5-1181.0	0.85276	MARINE
ST-288	1181.0-1182.0	0.95149	CONTINENTAL BRACKISH
ST-289	1182.0-1184.0	0.89459	CONTINENTAL BRACKISH
ST-290	1179.0-1181.5	0.94606	CONTINENTAL BRACKISH
ST-294	1184.0-1188.0	0.78766	CONTINENTAL BRACKISH
ST-295	1188.0-1189.0	0.83387	CONTINENTAL BRACKISH
ST-296	1184.0-1185.5	0.65114	CONTINENTAL BRACKISH
ST-297	1185.5-1189.0	0.72821	CONTINENTAL BRACKISH
ST-298	1189.0-1190.0	0.74663	MARINE
ST-299	1190.0-1192.0	0.97491	CONTINENTAL BRACKISH
ST-300	1192.0-1193.0	0.94379	CONTINENTAL BRACKISH
ST-301	1193.0-1198.0	0.65114	CONTINENTAL BRACKISH
ST-304	1200.5-1203.5	0.97569	CONTINENTAL BRACKISH
ST-306	1204.0-1207.5	0.95050	CONTINENTAL BRACKISH
ST-307	1207.5-1208.5	0.50641	CONTINENTAL BRACKISH
ST-308	1208.5-1211.0	0.98051	CONTINENTAL BRACKISH
ST-309	1211.0-1213.0	0.87054	CONTINENTAL BRACKISH
ST-310	1213.0-1214.0	0.52130	CONTINENTAL BRACKISH
ST-312	1217.0-1221.5	0.94015	CONTINENTAL BRACKISH
ST-313	1221.5-1225.0	0.95094	CONTINENTAL BRACKISH
ST-314	1225.0-1226.0	0.88607	CONTINENTAL BRACKISH
ST-315	1226.0 1228.5	0.62421	MARINE
ST-317	1232.0-1234.5	0.77500	CONTINENTAL BRACKISH
ST-318	1234.5-1235.5	0.56433	MARINE
ST-319	1235.5-1238.0	0.63925	MARINE
ST-320	1238.0-1242.5	0.71732	MARINE
ST-321	1242.5-1242.8	0.90151	CONTINENTAL BRACKISH
ST-322	1242.8-1244.5	0.99729	CONTINENTAL BRACKISH
ST-323	1244.5-1245.5	0.97141	CONTINENTAL BRACKISH
ST-324	1245.5-1247.5	0.96195	CONTINENTAL BRACKISH
ST-325	1247.5-1249.5	0.95125	CONTINENTAL BRACKISH
ST-326	1249.5-1250.5	0.57704	MARINE
ST-327	1250.5-1257.0	0.99977	MARINE
ST-329	1257.5-1258.0	0.98623	CONTINENTAL BRACKISH
ST-331	1258.5-1261.0	0.98335	CONTINENTAL BRACKISH
ST-332	1261.0-1264.5	0.98883	MARINE
ST-333	1264.5-1265.5	0.80188	CONTINENTAL BRACKISH
ST-335	1266.5-1271.5	0.95609	CONTINENTAL BRACKISH
ST-336	1271.5-1276.5	0.97600	CONTINENTAL BRACKISH
ST-337	1276.5-1281.0	0.96605	CONTINENTAL BRACKISH
ST-338	1281.0 1285.5	0.98302	CONTINENTAL BRACKISH
ST-340	1286.0-1286.5	0.64931	CONTINENTAL BRACKISH
ST-342	1286.7 1288.5	0.92488	CONTINENTAL BRACKISH
ST-343	1288.5-1294.0	0.81898	CONTINENTAL BRACKISH
ST-344	1288.5-1294.0	0.91398	CONTINENTAL BRACKISH
ST-345	1294.0-1296.0	0.93544	CONTINENTAL BRACKISH
ST-347	1298.0-1301.5	0.89114	CONTINENTAL BRACKISH

ST-348	1301.5-1305.0	0.94691	CONTINENTAL BRACKISH
ST-350	1305.5-1305.7	0.91322	CONTINENTAL BRACKISH
ST-351	1305.7-1306.5	0.90109	CONTINENTAL BRACKISH
ST-352	1306.5-1306.7	0.88689	CONTINENTAL BRACKISH
ST-353	1306.7-1307.2	0.98279	CONTINENTAL BRACKISH
ST-356	1310.5-1313.0	0.51219	MARINE
ST-357	1313.0-1314.0	0.74532	CONTINENTAL BRACKISH
ST-360	1320.0-1322.5	0.95867	CONTINENTAL BRACKISH
ST-361	1322.5-1324.0	0.58706	CONTINENTAL BRACKISH
ST-362	1324.0-1326.0	0.88116	CONTINENTAL BRACKISH
ST-363	1326.0-1330.0	0.86139	CONTINENTAL BRACKISH
ST-364	1330.0-1337.5	0.98956	CONTINENTAL BRACKISH
ST-365	1337.5-1337.7	0.90061	CONTINENTAL BRACKISH
ST-366	1337.7-1340.0	0.98702	CONTINENTAL BRACKISH
ST-367	1340.0-1341.5	0.99162	CONTINENTAL BRACKISH
ST-368	1341.5-1345.0	0.98945	CONTINENTAL BRACKISH
ST-369	1345.0-1346.0	0.99047	CONTINENTAL BRACKISH
ST-370	1346.0-1348.0	0.99825	CONTINENTAL BRACKISH
ST-371	1348.0-1348.5	1.00000	MARINE
ST-374	1351.0-1352.5	0.95854	CONTINENTAL BRACKISH
ST-375	1352.5-1355.0	0.97834	CONTINENTAL BRACKISH
ST-376	1355.0-1360.0	0.98898	CONTINENTAL BRACKISH
ST-378	1360.2-1364.0	0.99870	CONTINENTAL BRACKISH
ST-379	1364.0-1368.0	0.98541	CONTINENTAL BRACKISH
ST-381	1370.0-1371.7	0.97258	CONTINENTAL BRACKISH
ST-382	1371.7-1372.7	0.95964	CONTINENTAL BRACKISH
ST-383	1372.7-1376.0	0.99123	CONTINENTAL BRACKISH
ST-387	1386.0-1386.5	0.92803	CONTINENTAL BRACKISH
ST-388	1386.5-1392.5	0.90603	CONTINENTAL BRACKISH
ST-389	1392.5-1393.5	0.99096	CONTINENTAL BRACKISH
ST-390	1393.5-1398.5	0.98445	CONTINENTAL BRACKISH
ST-391	1398.5-1402.0	0.99368	CONTINENTAL BRACKISH
ST-393	1410.0-1412.0	0.95908	CONTINENTAL BRACKISH
ST-394	1412.0-1418.0	0.99826	CONTINENTAL BRACKISH
ST-395	1418.0-1425.0	0.99575	CONTINENTAL BRACKISH
ST-396	1425.0-1430.5	0.99027	CONTINENTAL BRACKISH
ST-397	1430.5-1437.0	0.99749	CONTINENTAL BRACKISH
ST-398	1437.0-1441.5	0.99405	CONTINENTAL BRACKISH
ST-399	1441.5-1442.0	0.99560	CONTINENTAL BRACKISH
ST-400	1442.0-1450.0	0.97428	CONTINENTAL BRACKISH
ST-401	1450.0-1456.5	0.98010	CONTINENTAL BRACKISH
ST-402	1456.5-1461.5	0.94813	CONTINENTAL BRACKISH
ST-403	1461.5-1466.5	0.86086	MARINE
ST-404	1466.5-1471.5	0.94102	MARINE
ST-405	1471.5-1477.5	0.69591	MARINE
ST-406	1477.5-1483.0	0.98081	CONTINENTAL BRACKISH
ST-407	1483.0-1483.5	0.77290	CONTINENTAL BRACKISH
ST-408	1483.5-1489.0	0.99657	CONTINENTAL BRACKISH
ST-409	1489.0-1491.5	0.99620	CONTINENTAL BRACKISH
ST-410	1491.5-1492.0	0.99550	CONTINENTAL BRACKISH
ST-411	1492.0-1496.5	0.99848	CONTINENTAL BRACKISH
ST-412	1496.5-1499.0	0.99729	CONTINENTAL BRACKISH
ST-413	1499.0-1505.5	0.95827	CONTINENTAL BRACKISH
ST-414	1505.5-1506.0	0.98015	CONTINENTAL BRACKISH
ST-415	1506.0-1511.0	0.95552	CONTINENTAL BRACKISH
ST-416	1511.0-1514.0	0.71470	CONTINENTAL BRACKISH
ST-417	1514.0-1515.0	0.76579	CONTINENTAL BRACKISH
ST-418	1515.0-1519.0	0.72181	MARINE
ST-420	1520.0-1529.0	0.73764	MARINE
ST-421	1529.0-1536.0	0.57523	MARINE
ST-422	1536.0-1537.5	0.95493	CONTINENTAL BRACKISH
ST-423	1537.5-1539.5	0.78195	MARINE

DISCRIMINANT ANALYSIS.....CON BRACK VS MARINE TWELVE VAR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 12
SAMPLE SIZES..

GROUP	
1	199
2	199

DISCRIMINANT FUNCTION CONTINENTAL BRACKISH

CONSTANT * COEFFICIENTS
-66.7584991455 *

0.0057643093	0.0145713352	0.0205557011	0.0827211142
-0.0281286389	-0.0383433700	1.0502948761	0.2165119648
0.0001675350	-0.1302070022	0.1047086120	0.0237405486

DISCRIMINANT FUNCTION MARINE

CONSTANT * COEFFICIENTS
-64.0528717041 *

0.0053460486	0.0182609372	0.0170597844	0.1649944186
-0.1643032432	-0.1401119232	1.5124540329	0.1994390488
0.0001225870	-0.1190724373	0.1011859179	0.0276229531

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-424	1539.5-1540.0	0.64060	CONTINENTAL BRACKISH
ST-425	1540.0-1545.5	0.93605	MARINE
ST-426	1545.5-1551.0	0.87176	CONTINENTAL BRACKISH
ST-427	1551.0-1553.0	0.68374	MARINE
ST-428	1553.0-1555.0	0.91497	CONTINENTAL BRACKISH
ST-429	1555.0 1560.0	0.65498	CONTINENTAL BRACKISH
ST-430	1560.0-1562.5	0.84106	CONTINENTAL BRACKISH
ST-431	1562.5-1563.0	0.95660	CONTINENTAL BRACKISH
ST-433	1564.0-1566.0	0.99332	CONTINENTAL BRACKISH
ST-434	1566.0-1569.0	0.99487	CONTINENTAL BRACKISH
ST-435	1569.0 1570.5	0.99167	CONTINENTAL BRACKISH
ST-436	1570.5-1571.0	0.98761	CONTINENTAL BRACKISH
ST-437	1571.0-1572.5	0.96226	CONTINENTAL BRACKISH
ST-439	1573.5-1577.5	0.98812	CONTINENTAL BRACKISH
ST-440	1577.5-1582.0	0.57375	MARINE
ST-441	1582.0-1585.5	0.70575	MARINE
ST-442	1585.5-1590.5	0.55786	CONTINENTAL BRACKISH
ST-443	1590.5-1595.0	0.58536	MARINE
ST-444	1595.0-1597.5	0.85376	MARINE
ST-445	1597.5-1600.5	0.98426	CONTINENTAL BRACKISH
ST-447	1601.0-1601.2	0.68335	MARINE
ST-448	1601.2-1605.0	0.80777	MARINE
ST-449	1605.0-1608.5	0.87262	CONTINENTAL BRACKISH
ST-451	1611.5-1613.0	0.55357	CONTINENTAL BRACKISH
ST-452	1613.0-1614.0	0.76212	CONTINENTAL BRACKISH
ST-454	1614.2-1614.5	0.99157	CONTINENTAL BRACKISH
ST-456	1617.5-1617.6	0.99872	CONTINENTAL BRACKISH
ST-458	1622.5-1623.0	0.92399	CONTINENTAL BRACKISH
ST-459	1623.0-1624.0	0.98688	CONTINENTAL BRACKISH
ST-462	1625.7-1628.0	0.92843	CONTINENTAL BRACKISH
ST-464	1631.0-1633.5	0.99910	CONTINENTAL BRACKISH
ST-465	1633.5-1638.5	0.99214	CONTINENTAL BRACKISH
ST-466	1638.5-1640.0	0.99905	CONTINENTAL BRACKISH
ST-468	1641.0-1647.0	0.98208	MARINE
ST-469	1642.0-1652.0	0.97822	MARINE
ST-470	1652.0-1657.0	0.95196	MARINE
ST-471	1657.0-1662.0	0.97761	MARINE
ST-472	1662.0-1666.0	0.85892	MARINE
ST-473	1666.0-1668.0	1.00000	MARINE
ST-474	1668.0-1672.0	0.89889	MARINE
ST-475	1672.0-1677.0	0.99902	MARINE
ST-476	1677.0-1683.0	0.99504	MARINE
ST-477	1683.0-1684.0	0.99424	MARINE
ST-478	1684.0-1688.0	0.99961	MARINE
ST-479	1688.0-1689.0	0.99345	MARINE
ST-480	1689.0-1693.0	0.99869	MARINE
ST-481	1693.0-1694.0	0.99934	MARINE
ST-482	1694.0-1697.0	0.99980	MARINE
ST-483	1697.0-1698.0	0.99524	MARINE
ST-484	1698.0-1702.0	0.99136	MARINE
ST-485	1702.0-1705.0	0.98284	CONTINENTAL BRACKISH
ST-486	1705.0-1707.0	0.74107	CONTINENTAL BRACKISH
ST-487	1707.0-1711.0	0.99784	CONTINENTAL BRACKISH
ST-488	1711.0-1715.5	0.91234	CONTINENTAL BRACKISH
ST-490	1716.0-1721.0	0.92001	CONTINENTAL BRACKISH

		0.94364	
ST-492	1725.5-1728.0	0.90340	MARINE
ST-493	1728.0-1730.0	0.64920	MARINE
ST-494	1730.0-1735.0	0.59369	CONTINENTAL BRACKISH
ST-495	1735.0-1736.0	0.69111	CONTINENTAL BRACKISH
ST-496	1736.0-1736.2	0.99715	CONTINENTAL BRACKISH
ST-497	1736.2-1739.5	0.98448	CONTINENTAL BRACKISH
ST-498	1739.5-1743.0	0.84825	CONTINENTAL BRACKISH
ST-499	1743.0-1750.5	0.99805	CONTINENTAL BRACKISH
ST-500	1750.5-1751.5	0.63419	CONTINENTAL BRACKISH
ST-503	1753.0-1754.0	0.95770	MARINE
ST-504	1754.0-1755.5	0.86075	CONTINENTAL BRACKISH
ST-505	1755.5-1757.5	0.83148	MARINE
ST-506	1757.5-1759.0	0.67002	CONTINENTAL BRACKISH
ST-507	1759.0-1762.0	0.90985	CONTINENTAL BRACKISH
ST-508	1762.0-1765.0	0.90067	CONTINENTAL BRACKISH
ST-509	1765.0-1767.0	0.93579	CONTINENTAL BRACKISH
ST-510	1767.0-1768.0	0.94580	MARINE
ST-512	1768.3-1769.0	0.79495	MARINE
ST-513	1769.0-1770.0	0.81444	CONTINENTAL BRACKISH
ST-515	1771.0-1771.5	0.97009	CONTINENTAL BRACKISH
ST-516	1771.5-1778.0	0.99236	CONTINENTAL BRACKISH
ST-517	1778.0-1779.5	0.98683	CONTINENTAL BRACKISH
ST-518	1779.5-1781.5	0.99997	CONTINENTAL BRACKISH
ST-519	1781.5-1782.5	0.99135	CONTINENTAL BRACKISH
ST-520	1782.5-1783.0	0.97398	CONTINENTAL BRACKISH
ST-521	1783.0-1784.0	0.99820	CONTINENTAL BRACKISH
ST-522	1784.0-1785.5	0.98625	CONTINENTAL BRACKISH
ST-523	1785.5-1787.0	0.96962	CONTINENTAL BRACKISH
ST-524	1787.0-1788.5	0.99878	CONTINENTAL BRACKISH
ST-525	1788.5-1789.0	0.96438	CONTINENTAL BRACKISH
ST-526	1789.0-1790.5	0.98060	CONTINENTAL BRACKISH
ST-527	1790.5-1793.0	0.98220	CONTINENTAL BRACKISH
ST-528	1793.0-1797.0	0.93861	CONTINENTAL BRACKISH
ST-529	1797.0-1798.5	0.98468	CONTINENTAL BRACKISH
ST-530	1798.5-1799.0	0.92739	CONTINENTAL BRACKISH
ST-531	1799.0-1800.5	0.99966	CONTINENTAL BRACKISH
ST-532	1800.5-1804.0	0.99830	CONTINENTAL BRACKISH
ST-533	1804.0-1806.0	0.99478	CONTINENTAL BRACKISH
ST-534	1806.0-1808.0	0.87294	CONTINENTAL BRACKISH
ST-535	1808.0-1814.5	0.98108	CONTINENTAL BRACKISH
ST-536	1814.5-1815.5	0.99838	CONTINENTAL BRACKISH
ST-537	1815.5-1818.5	0.99473	CONTINENTAL BRACKISH
ST-538	1818.5-1819.0	0.90615	CONTINENTAL BRACKISH
ST-539	1819.0-1821.0	0.85452	CONTINENTAL BRACKISH
ST-540	1821.0-1823.0	0.98959	CONTINENTAL BRACKISH
ST-541	1823.0-1825.5	0.99352	CONTINENTAL BRACKISH
ST-542	1825.5-1827.0	0.99062	CONTINENTAL BRACKISH
ST-543	1827.0-1830.0	0.99131	CONTINENTAL BRACKISH
ST-544	1830.0-1831.5	0.52395	MARINE
ST-545	1831.5-1833.0	0.99230	CONTINENTAL BRACKISH
ST-546	1833.0-1834.0	0.99728	CONTINENTAL BRACKISH
ST-547	1834.0-1835.5	0.99490	CONTINENTAL BRACKISH
ST-548	1835.5-1837.0	0.86744	CONTINENTAL BRACKISH
ST-549	1837.0-1844.0	0.99559	CONTINENTAL BRACKISH
ST-550	1844.0-1844.5	0.99885	CONTINENTAL BRACKISH
ST-551	1844.5-1845.0	0.99038	CONTINENTAL BRACKISH
ST-552	1845.0-1846.0	0.99621	CONTINENTAL BRACKISH
ST-553	1846.0-1847.0	0.99970	CONTINENTAL BRACKISH
ST-554	1847.0-1850.0	0.99742	CONTINENTAL BRACKISH
ST-555	1850.0-1851.0	0.97046	CONTINENTAL BRACKISH
ST-556	1851.0-1853.0	0.82934	CONTINENTAL BRACKISH
ST-557	1853.0-1853.5	0.98312	CONTINENTAL BRACKISH
ST-558	1853.5-1855.5	0.99497	CONTINENTAL BRACKISH
ST-559	1855.5-1857.0	0.99709	CONTINENTAL BRACKISH
ST-560	1857.0-1857.5	0.97802	CONTINENTAL BRACKISH
ST-561	1857.5-1859.0	0.96885	CONTINENTAL BRACKISH
ST-563	1860.5-1861.5	0.99717	CONTINENTAL BRACKISH
ST-564	1861.5-1867.0	0.99974	CONTINENTAL BRACKISH
ST-565	1867.0-1868.0	0.99802	CONTINENTAL BRACKISH
ST-566	1868.0-1868.5	0.99993	CONTINENTAL BRACKISH
ST-567	1868.5-1873.0	0.92315	CONTINENTAL BRACKISH
ST-568	1873.0-1878.0	0.76168	CONTINENTAL BRACKISH
ST-569	1873.0-1883.0	0.74981	CONTINENTAL BRACKISH
ST-570	1883.0-1886.0	0.72240	MARINE
ST-571	1886.0-1887.5	0.79001	CONTINENTAL BRACKISH
ST-572	1887.5-1892.5	0.67947	CONTINENTAL BRACKISH
ST-573	1892.5-1893.5	0.58358	MARINE
ST-574	1893.5-1895.0	0.52799	CONTINENTAL BRACKISH
ST-575	1895.0-1896.5	0.52576	CONTINENTAL BRACKISH
ST-576	1896.5-1898.5	0.98361	CONTINENTAL BRACKISH
ST-577	1898.5-1900.0	0.87465	CONTINENTAL BRACKISH
ST-578	1900.0-1906.0	0.80207	CONTINENTAL BRACKISH
ST-579	1906.0-1910.5	0.96105	CONTINENTAL BRACKISH
ST-580	1910.5-1912.5	0.72811	CONTINENTAL BRACKISH
ST-581	1912.5-1914.5	0.83781	CONTINENTAL BRACKISH
ST-582	1914.5-1916.0	0.70821	CONTINENTAL BRACKISH
ST-583	1916.0-1920.0	0.99098	CONTINENTAL BRACKISH

ST-585	1921.0-1925.5	0.94918	CONTINENTAL BRACKISH
ST-586	1925.5-1927.5	0.56639	CONTINENTAL BRACKISH
ST-587	1927.5-1929.0	0.73947	CONTINENTAL BRACKISH
ST-588	1929.0-1930.5	0.99928	MARINE
ST-589	1930.5-1936.5	0.99686	MARINE
ST-590	1936.5-1936.8	0.86994	CONTINENTAL BRACKISH
ST-591	1936.8-1942.0	0.98074	CONTINENTAL BRACKISH
ST-592	1942.0-1943.5	0.54528	CONTINENTAL BRACKISH
ST-593	1943.5-1944.5	0.76215	CONTINENTAL BRACKISH
ST-594	1944.5-1945.5	0.97559	CONTINENTAL BRACKISH
ST-595	1945.5-1947.0	0.71828	CONTINENTAL BRACKISH
ST-596	1947.0-1948.0	0.95966	MARINE
ST-597	1948.0-1953.0	0.54748	CONTINENTAL BRACKISH
ST-598	1953.0-1954.0	0.89528	CONTINENTAL BRACKISH
ST-599	1954.0-1955.5	0.77656	MARINE
ST-600	1955.5-1956.0	0.73431	CONTINENTAL BRACKISH
ST-601	1956.0-1958.0	0.82959	CONTINENTAL BRACKISH
ST-602	1958.0-1959.0	1.00000	MARINE
ST-603	1959.0-1959.7	0.77320	MARINE
ST-604	1959.7-1960.7	0.56523	MARINE
ST-605	1960.7-1960.9	0.57045	MARINE
ST-606	1960.9-1962.0	0.65216	CONTINENTAL BRACKISH
ST-607	1962.0-1963.3	0.95784	MARINE
ST-608	1963.3-1964.0	0.99948	MARINE
ST-609	1964.0-1966.0	0.98569	CONTINENTAL BRACKISH
ST-610	1966.0-1968.0	0.99896	CONTINENTAL BRACKISH
ST-611	1968.0-1970.5	0.98741	CONTINENTAL BRACKISH
ST-612	1970.5-1974.0	0.95782	CONTINENTAL BRACKISH
ST-613	1974.0-1983.0	0.62248	CONTINENTAL BRACKISH
ST-614	1983.0-1983.5	0.58081	MARINE
ST-615	1983.5-1989.0	0.94052	MARINE
ST-616	1989.0-1990.5	0.99204	CONTINENTAL BRACKISH
ST-617	1990.5-1993.5	0.97928	MARINE
ST-618	1993.5-1999.5	0.98798	CONTINENTAL BRACKISH
ST-619	1999.5-2000.5	0.97779	MARINE
ST-620	2000.5-2007.0	0.94730	MARINE
ST-621	2007.0-2012.0	0.99587	MARINE
ST-622	2012.0-2017.0	0.99947	MARINE
ST-624	2019.5-2021.5	0.51852	MARINE
ST-625	2021.5-2027.0	0.99527	CONTINENTAL BRACKISH
ST-626	2027.0 2027.5	0.99877	MARINE
ST-627	2027.5-2032.5	0.74131	MARINE
ST-628	2032.5-2038.0	0.80955	MARINE
ST-629	2038.0-2040.0	0.90140	MARINE
ST-630	2040.0-2041.0	0.97564	CONTINENTAL BRACKISH
ST-631	2041.0-2044.0	0.98296	CONTINENTAL BRACKISH
ST-632	2044.0-2045.5	0.77550	CONTINENTAL BRACKISH
ST-633	2045.5-2048.5	0.97579	MARINE
ST-634	2048.5-2050.5	0.81886	CONTINENTAL BRACKISH
ST-635	2050.5-2051.0	0.92560	CONTINENTAL BRACKISH
ST-636	2051.0-2054.0	0.86381	MARINE
ST-637	2054.0-2055.0	0.76411	MARINE
ST-638	2055.0-2056.0	0.95704	MARINE
ST-639	2056.0-2057.5	0.99903	MARINE
ST-640	2057.5-2059.5	0.99894	MARINE

GROUP MARINE

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-641	2059.5-2062.5	0.98858	MARINE
ST-642	2062.5-2068.5	0.99917	MARINE
ST-643	2068.5-2074.5	0.98874	MARINE
ST-644	2074.5-2078.0	0.99227	MARINE
ST-645	2078.0-2083.0	0.98623	MARINE
ST-646	2083.0-2085.5	0.99878	MARINE
ST-647	2085.5-2086.0	0.99941	MARINE
ST-648	2086.0-2088.0	0.99887	MARINE
ST-649	2088.0-2089.0	1.00000	MARINE
ST-650	2089.0-2093.5	0.68925	MARINE
ST-651	2093.5-2095.5	0.89510	CONTINENTAL BRACKISH
ST-652	2095.5-2097.0	0.96115	CONTINENTAL BRACKISH
ST-653	2097.0-2099.0	0.97524	MARINE
ST-654	2099.0-2101.0	0.99778	MARINE
ST-655	2101.0-2104.0	0.99511	MARINE
ST-656	2104.0-2108.0	0.99816	MARINE
ST-657	2108.0-2114.0	0.99686	MARINE
ST-658	2114.0-2119.5	0.99145	MARINE
ST-659	2119.5-2125.5	0.98912	MARINE
ST-660	2125.5-2127.5	0.99960	MARINE
ST-661	2127.5-2128.5	1.00000	MARINE
ST-662	2128.5-2133.0	0.64648	MARINE
ST-663	2133.0-2135.5	0.99582	MARINE
ST-664	2135.5-2136.5	0.88655	MARINE
ST-665	2136.5-2138.5	0.96217	MARINE
ST-666	2138.5-2141.5	0.97483	MARINE
ST-667	2141.5-2143.5	0.50520	MARINE
ST-668	2143.5-2144.0	0.99954	MARINE
ST-669	2144.0-2145.0	0.99998	MARINE

[illegible]	[illegible]	[illegible]	MARINE
ST-671	2145.5-2147.0	0.97870	MARINE
ST-672	2147.0-2149.5	0.88870	MARINE
ST-673	2149.5-2150.5	0.99951	MARINE
ST-674	2150.5-2151.0	1.00000	MARINE
ST-675	2151.0-2152.0	0.99710	MARINE
ST-676	2152.0-2153.0	0.99498	MARINE
ST-677	2153.0-2154.0	0.99817	MARINE
ST-678	2154.0-2161.0	0.99782	MARINE
ST-679	2161.0-2162.0	0.99921	MARINE
ST-680	2162.0-2163.5	0.99762	MARINE
ST-683	2166.0-2166.5	0.53495	CONTINENTAL BRACKISH
ST-684	2166.5-2167.5	0.82851	CONTINENTAL BRACKISH
ST-685	2167.5-2169.0	0.98103	MARINE
ST-686	2169.0-2172.0	0.99594	MARINE
ST-687	2172.0-2173.5	0.99805	MARINE
ST-688	2173.5-2176.5	0.95431	MARINE
ST-689	2176.5-2178.0	0.99830	MARINE
ST-690	2178.0-2178.5	0.99161	MARINE
ST-692	2179.0-2181.5	0.62914	CONTINENTAL BRACKISH
ST-693	2181.5-2183.5	0.96425	MARINE
ST-694	2183.5-2184.0	0.89228	MARINE
ST-695	2184.0-2186.0	0.98515	MARINE
ST-696	2186.0-2187.5	0.98572	MARINE
ST-698	2188.0-2189.0	0.67262	MARINE
ST-699	2189.0-2193.0	0.62541	CONTINENTAL BRACKISH
ST-700	2193.0-2194.0	0.80647	CONTINENTAL BRACKISH
ST-701	2194.0-2196.0	0.91735	MARINE
ST-702	2196.0-2199.5	0.90158	MARINE
ST-703	2199.5-2201.5	0.56494	CONTINENTAL BRACKISH
ST-704	2201.5-2203.0	0.84166	CONTINENTAL BRACKISH
ST-705	2203.0-2209.0	0.96372	MARINE
ST-706	2209.0-2213.0	0.77175	MARINE
ST-707	2213.0-2214.0	0.86512	MARINE
ST-708	2214.0-2218.5	0.98669	MARINE
ST-709	2218.5-2219.5	0.99913	MARINE
ST-710	2219.5-2226.0	0.94350	MARINE
ST-711	2226.0-2227.0	0.95783	MARINE
ST-712	2227.0-2232.5	0.94550	MARINE
ST-713	2232.5-2235.0	0.98853	MARINE
ST-714	2235.0-2236.0	0.92988	MARINE
ST-716	2236.2-2237.0	0.93598	CONTINENTAL BRACKISH
ST-717	2237.0-2242.5	0.83537	MARINE
ST-718	2242.5-2244.0	0.96403	CONTINENTAL BRACKISH
ST-719	2244.0-2246.0	0.77868	MARINE
ST-720	2246.0-2247.0	0.64096	CONTINENTAL BRACKISH
ST-721	2247.0-2248.0	0.52935	CONTINENTAL BRACKISH
ST-722	2248.0-2252.5	0.98950	MARINE
ST-723	2252.5-2255.5	0.88957	MARINE
ST-724	2255.5-2256.5	0.67207	MARINE
ST-725	2256.5-2259.5	0.98485	MARINE
ST-726	2259.5-2261.0	0.99939	CONTINENTAL BRACKISH
ST-727	2261.0-2265.5	0.80930	CONTINENTAL BRACKISH
ST-728	2265.5-2266.5	0.64354	CONTINENTAL BRACKISH
ST-729	2266.5-2271.0	0.72181	MARINE
ST-730	2271.0-2275.5	0.50258	MARINE
ST-731	2275.5-2279.0	0.70264	CONTINENTAL BRACKISH
ST-732	2279.0-2279.5	0.93652	CONTINENTAL BRACKISH
ST-733	2279.5-2281.0	0.89785	MARINE
ST-734	2281.0-2286.5	0.99125	CONTINENTAL BRACKISH
ST-735	2286.5-2289.0	0.99732	MARINE
ST-736	2289.0-2292.0	0.99126	MARINE
ST-737	2292.0-2297.5	0.99327	MARINE
ST-738	2297.5-2298.0	0.99593	MARINE
ST-739	2298.0-2299.5	0.99133	MARINE
ST-740	2298.5-2301.0	0.99993	MARINE
ST-741	2301.0-2302.7	0.99137	MARINE
ST-742	2302.7-2303.0	0.65596	MARINE
ST-743	2303.0-2304.0	0.55438	MARINE
ST-744	2304.0-2310.0	0.84918	MARINE
ST-745	2310.0-2315.0	0.87138	MARINE
ST-746	2315.0-2319.0	0.99821	MARINE
ST-747	2319.0-2324.0	0.88176	MARINE
ST-748	2324.0-2325.0	0.55935	CONTINENTAL BRACKISH
ST-749	2325.0-2325.5	1.00000	MARINE
ST-750	2325.5-2326.0	0.61802	CONTINENTAL BRACKISH
ST-751	2326.0-2326.5	0.99882	MARINE
ST-752	2326.5-2328.0	0.90655	MARINE
ST-753	2328.0-2333.0	0.99900	MARINE
ST-754	2333.0-2335.0	0.77716	CONTINENTAL BRACKISH
ST-755	2335.0-2337.0	0.64593	MARINE
ST-756	2337.0-2339.0	0.73101	CONTINENTAL BRACKISH
ST-757	2339.0-2342.0	0.96087	MARINE
ST-758	2342.0-2344.0	0.99235	MARINE
ST-759	2344.0-2345.0	0.54575	MARINE
ST-760	2345.0-2349.0	0.58157	CONTINENTAL BRACKISH
ST-761	2349.0-2351.5	0.82665	MARINE
ST-762	2351.5-2352.0	0.91296	MARINE

ST-763	2352.0-2357.0	0.99430	MARINE
ST-764	2357.0-2361.5	0.97957	MARINE
ST-765	2361.5-2362.5	0.53886	MARINE
ST-766	2362.5-2364.5	0.52856	CONTINENTAL BRACKISH
ST-767	2364.5-2369.0	0.97633	MARINE
ST-768	2369.0-2370.0	0.81642	CONTINENTAL BRACKISH
ST-769	2370.0-2371.0	0.98093	CONTINENTAL BRACKISH
ST-770	2371.0-2372.5	0.99937	MARINE
ST-771	2372.5-2374.0	0.58213	CONTINENTAL BRACKISH
ST-772	2374.0-2375.5	0.98145	MARINE
ST-773	2375.5-2377.0	0.99992	MARINE
ST-774	2377.0-2377.5	0.98224	MARINE
ST-775	2377.5-2379.0	0.72354	MARINE
ST-776	2379.0-2380.0	0.99988	MARINE
ST-777	2380.0-2383.5	0.92901	MARINE
ST-778	2383.5-2385.5	0.99680	MARINE
ST-779	2385.5-2387.0	0.99126	MARINE
ST-780	2387.0-2389.0	0.64156	MARINE
ST-781	2389.0-2389.5	0.99665	CONTINENTAL BRACKISH
ST-782	2389.5-2391.0	0.92580	MARINE
ST-783	2391.0-2391.5	0.95793	MARINE
ST-784	2391.5-2392.0	0.60711	MARINE
ST-785	2392.0-2393.5	0.96599	MARINE
ST-786	2393.5-2394.0	0.56172	MARINE
ST-787	2394.0-2394.5	0.86008	CONTINENTAL BRACKISH
ST-788	2394.5-2396.5	0.95164	MARINE
ST-789	2396.5-2399.0	0.55724	CONTINENTAL BRACKISH
ST-790	2399.0-2400.0	0.92514	MARINE
ST-791	2400.0-2402.5	0.90584	MARINE
ST-792	2402.5-2403.5	0.68322	MARINE
ST-793	2403.5-2405.0	0.71454	CONTINENTAL BRACKISH
ST-794	2405.0-2406.5	0.94295	MARINE
ST-795	2406.5-2407.5	0.80212	MARINE
ST-796	2407.5-2410.0	0.71920	MARINE
ST-797	2410.0-2416.0	0.98726	MARINE
ST-798	2416.0-2419.0	0.97333	MARINE
ST-799	2419.0-2425.0	0.90369	MARINE
ST-800	2425.0-2427.0	0.98660	MARINE
ST-801	2427.0-2428.0	0.69649	CONTINENTAL BRACKISH
ST-802	2428.0-2431.0	0.98454	MARINE
ST-803	2431.0-2431.5	1.00000	CONTINENTAL BRACKISH
ST-804	2431.5-2432.5	0.50317	CONTINENTAL BRACKISH
ST-805	2432.5-2434.0	0.96778	MARINE
ST-806	2434.0-2435.5	0.91829	CONTINENTAL BRACKISH
ST-807	2435.5-2438.0	0.50627	MARINE
ST-808	2438.0-2439.5	0.77121	MARINE
ST-809	2439.5-2442.0	0.88117	CONTINENTAL BRACKISH
ST-810	2442.0-2444.0	0.59380	CONTINENTAL BRACKISH
ST-811	2444.0-2447.5	0.85913	MARINE
ST-812	2447.5-2449.0	0.94269	MARINE
ST-813	2449.0-2453.0	0.85720	MARINE
ST-814	2453.0-2455.0	0.89402	MARINE
ST-815	2455.0-2457.5	0.97991	MARINE
ST-816	2457.5-2466.0	0.98828	MARINE
ST-817	2466.0-2470.0	0.65442	MARINE
ST-818	2470.0-2471.5	0.84101	MARINE
ST-819	2471.5-2475.0	0.58824	MARINE
ST-820	2475.0-2478.0	0.59379	MARINE
ST-821	2478.0-2479.5	0.99076	MARINE
ST-822	2479.5-2481.0	0.97549	CONTINENTAL BRACKISH
ST-823	2481.0-2486.0	0.68954	MARINE
ST-824	2486.0-2486.5	0.98611	CONTINENTAL BRACKISH
ST-825	2486.5-2488.0	0.64320	MARINE
ST-826	2488.0-2491.0	0.82874	CONTINENTAL BRACKISH
ST-827	2491.0-2493.0	0.94459	CONTINENTAL BRACKISH
ST-828	2493.0-2496.5	0.80747	CONTINENTAL BRACKISH
ST-829	2498.5-2503.5	0.73343	CONTINENTAL BRACKISH
ST-830	2503.5-2508.5	0.76995	CONTINENTAL BRACKISH
ST-831	2508.5-2515.0	0.98750	MARINE
ST-832	2515.0-2517.0	0.99176	CONTINENTAL BRACKISH
ST-833	2517.0-2520.0	0.94380	CONTINENTAL BRACKISH
ST-834	2520.0-2525.0	0.89137	CONTINENTAL BRACKISH
ST-835	2525.0-2525.5	0.92113	CONTINENTAL BRACKISH
ST-836	2525.5-2531.0	0.88000	CONTINENTAL BRACKISH
ST-837	2531.0-2532.0	0.63780	MARINE
ST-838	2532.0-2533.5	0.94813	CONTINENTAL BRACKISH
ST-839	2533.5-2535.0	0.67666	CONTINENTAL BRACKISH
ST-840	2535.0-2537.0	0.67560	CONTINENTAL BRACKISH
ST-841	2537.0-2538.0	0.99887	CONTINENTAL BRACKISH
ST-842	2538.0-2538.7	0.92054	CONTINENTAL BRACKISH
ST-844	2539.0-2540.0	0.86363	CONTINENTAL BRACKISH
ST-845	2540.0-2541.0	0.95882	CONTINENTAL BRACKISH

Appendix 7

Classification for the Unknown Samples in the Groups
Continental vs. Brackish 16 Variables

DISCRIMINANT ANALYSIS.....CONTINENTAL VS BRACKISH SIXTEEN VAR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 16
SAMPLE SIZES..

GROUP	
1	189
2	189

DISCRIMINANT FUNCTION CONTINENTAL

CONSTANT *	COEFFICIENTS			
-73.7195892334 *	0.0001575540	-0.0000379400	0.0002907659	0.0070289001
	0.0031158940	0.0266610608	-0.2823676467	0.0397032499
	-0.1977338195	1.9659404755	0.0414306633	0.3290233612
	0.0001892720	-0.2137164474	0.0296544991	0.0225318260

DISCRIMINANT FUNCTION BRACKISH

CONSTANT *	COEFFICIENTS			
-79.5686187744 *	-0.0002453530	0.0000704510	0.0007169410	0.0062312856
	0.0116714947	0.0275342874	-0.0284233727	0.0431203246
	-0.4009277821	1.7192916870	0.0430336930	0.3511693478
	0.0001675430	-0.1908112168	0.0412801169	-0.0149626993

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST -1	599.5 0.0	0.78264	BRACKISH
ST -2	600.0 0.0	0.65060	BRACKISH
ST -3	600.0 -602.0	0.98262	CONTINENTAL
ST -4	602.0 -603.2	0.98353	CONTINENTAL
ST -5	603.2 -603.4	0.81975	CONTINENTAL
ST -6	603.4 -605.7	0.88956	CONTINENTAL
ST -7	605.7 -607.2	0.99163	CONTINENTAL
ST -9	607.4 -611.5	0.99992	CONTINENTAL
ST -10	611.5 -612.0	0.99999	CONTINENTAL
ST -11	612.0 -616.3	0.99997	CONTINENTAL
ST -12	616.3 -618.0	0.69065	CONTINENTAL
ST -13	618.0 -622.0	0.98748	CONTINENTAL
ST -14	622.0 -623.0	0.84252	BRACKISH
ST -15	623.0 -624.0	0.99181	CONTINENTAL
ST -16	624.0 -631.0	0.68053	CONTINENTAL
ST -17	631.0 -632.3	1.00000	CONTINENTAL
ST -18	632.3 -633.8	1.00000	CONTINENTAL
ST -19	633.8 -635.0	0.99319	CONTINENTAL
ST -20	635.0 -638.0	0.99780	CONTINENTAL
ST -21	638.0 -640.0	0.97232	BRACKISH
ST -22	640.0 -644.5	0.90523	CONTINENTAL
ST -23	644.5 -645.0	0.81126	CONTINENTAL
ST -24	645.0 -648.0	0.59616	CONTINENTAL
ST -25	645.0 -650.5	0.98913	CONTINENTAL
ST -26	650.5 -652.0	1.00000	CONTINENTAL
ST -27	652.0 -653.5	1.00000	CONTINENTAL
ST -28	653.5 -657.0	0.98207	CONTINENTAL
ST -29	657.0 -658.0	1.00000	CONTINENTAL
ST -30	658.0 -660.5	0.94275	CONTINENTAL
ST -31	660.5 -661.0	0.99948	CONTINENTAL
ST -32	661.0 -662.0	0.74260	CONTINENTAL
ST -33	662.0 -662.5	0.99894	CONTINENTAL
ST -34	662.5 -663.5	0.97996	BRACKISH
ST -35	663.5 -667.5	0.99975	CONTINENTAL
ST -36	667.5 -667.7	0.91976	CONTINENTAL
ST -37	667.7 -667.9	1.00000	CONTINENTAL
ST -38	667.9 -668.1	0.94271	CONTINENTAL
ST -39	668.1 -673.0	1.00000	CONTINENTAL
ST -40	673.0 -673.5	0.99863	CONTINENTAL
ST -41	673.5 -674.5	0.61141	BRACKISH
ST -42	674.5 -675.5	0.53493	BRACKISH
ST -43	675.5 -677.0	0.98578	CONTINENTAL
ST -44	677.0 -679.0	0.82027	CONTINENTAL
ST -45	679.0 -679.5	0.83626	CONTINENTAL
ST -46	679.5 -682.0	0.83340	CONTINENTAL
ST -47	682.0 -685.0	0.99046	CONTINENTAL
ST -48	685.0 -685.2	1.00000	CONTINENTAL
ST -49	685.2 -693.0	0.99983	CONTINENTAL
ST -50	693.0 -697.0	0.99970	CONTINENTAL
ST -51	697.0 -699.0	0.99993	BRACKISH
ST -52	699.0 -700.5	1.00000	CONTINENTAL
ST -53	700.5 -702.0	0.99681	CONTINENTAL
ST -54	702.0 -703.0	0.99982	CONTINENTAL
ST -55	703.0 -704.5	0.99753	CONTINENTAL
ST -56	704.5 -705.5	1.00000	CONTINENTAL
ST -57	705.5 -709.0	1.00000	CONTINENTAL
ST -58	709.0 -709.5	1.00000	CONTINENTAL
ST -59	709.5 -710.5	1.00000	CONTINENTAL
ST -60	710.5 -711.0	0.99979	CONTINENTAL
ST -61	711.0 -712.0	0.99989	CONTINENTAL
ST -62	712.0 -713.0	0.98512	CONTINENTAL
ST -63	713.0 -713.5	0.98950	CONTINENTAL
ST -64	713.5 -718.0	0.99857	CONTINENTAL
ST -65	718.0 -719.2	0.75406	CONTINENTAL
ST -66	719.2 -719.4	0.99349	CONTINENTAL
ST -69	721.0 -730.0	0.99999	CONTINENTAL
ST -70	730.0 -732.0	0.99989	CONTINENTAL
ST -71	732.0 -732.6	0.99991	CONTINENTAL
ST -72	732.6 -733.2	0.99990	CONTINENTAL
ST -73	733.2 -734.5	0.99959	CONTINENTAL
ST -74	734.5 -735.0	0.99849	CONTINENTAL
ST -75	735.0 -737.2	0.96827	CONTINENTAL
ST -76	737.2 -737.5	1.00000	BRACKISH

ST -77	737.5 -738.0	0.90823	CONTINENTAL
ST -78	738.0 -739.2	0.92039	BRACKISH
ST -79	739.2 -743.0	0.99974	CONTINENTAL
ST -80	743.0 -744.3	0.98719	CONTINENTAL
ST -81	744.3 -746.5	0.99570	CONTINENTAL
ST -82	746.5 -747.4	0.99676	CONTINENTAL
ST -83	747.4 -750.8	0.99674	CONTINENTAL
ST -84	750.8 -752.5	0.93601	CONTINENTAL
ST -85	752.5 -754.0	0.78194	CONTINENTAL
ST -86	754.0 -755.2	0.81645	CONTINENTAL
ST -87	755.2 -757.5	0.92788	CONTINENTAL
ST -88	757.5 -758.5	0.97211	CONTINENTAL
ST -90	759.2 -763.8	0.99725	CONTINENTAL
ST -91	763.8 -765.8	0.94332	CONTINENTAL
ST -92	765.8 -770.1	0.99992	CONTINENTAL
ST -93	770.1 -770.8	0.99794	CONTINENTAL
ST -94	770.8 -775.5	0.99868	CONTINENTAL
ST -95	775.5 -780.0	1.00000	CONTINENTAL
ST -97	782.3 -782.9	1.00000	BRACKISH
ST -98	782.9 -784.8	0.95452	BRACKISH
ST -99	784.8 -785.3	0.99505	BRACKISH
ST-100	785.3 -786.5	0.99848	CONTINENTAL
ST-101	786.5 -787.2	0.74383	CONTINENTAL
ST-102	787.2 -791.2	0.99722	BRACKISH
ST-103	791.2 -791.5	0.99236	BRACKISH
ST-104	791.5 -792.0	0.96278	BRACKISH
ST-105	792.0 -792.5	0.96698	BRACKISH
ST-107	794.0 -794.5	0.55749	CONTINENTAL
ST-108	794.5 -795.5	0.79109	CONTINENTAL
ST-109	795.5 -796.0	0.65544	BRACKISH
ST-110	796.0 -797.0	0.76807	BRACKISH
ST-111	797.0 -798.0	1.00000	CONTINENTAL
ST-112	798.0 -799.0	0.53602	CONTINENTAL
ST-113	799.0 -801.0	0.65649	CONTINENTAL
ST-114	801.0 -801.5	0.92916	BRACKISH
ST-115	801.5 -805.5	0.87558	BRACKISH
ST-116	805.5 -806.0	0.99944	BRACKISH
ST-117	806.0 -807.5	0.85493	BRACKISH
ST-118	807.5 -809.0	0.99941	BRACKISH
ST-119	809.0 -810.2	0.99929	BRACKISH
ST-120	810.2 -810.5	0.95500	BRACKISH
ST-122	812.5 -813.0	0.94578	BRACKISH
ST-124	814.2 -816.7	0.87504	BRACKISH
ST-125	816.7 -817.7	0.99997	CONTINENTAL
ST-126	817.7 -820.0	0.96895	CONTINENTAL
ST-127	820.0 -821.5	1.00000	CONTINENTAL
ST-128	821.5 -823.0	0.99999	CONTINENTAL
ST-129	823.0 -825.0	0.94631	CONTINENTAL
ST-130	825.0 -826.0	0.99981	CONTINENTAL
ST-131	826.0 -827.0	0.99996	CONTINENTAL
ST-132	827.0 -829.5	1.00000	CONTINENTAL
ST-133	829.5 -832.0	0.99988	CONTINENTAL
ST-134	832.0 -832.5	0.75018	CONTINENTAL
ST-135	832.5 -833.0	0.98689	CONTINENTAL
ST-136	833.0 -833.2	0.98999	CONTINENTAL
ST-137	833.2 -833.5	0.79848	BRACKISH
ST-138	833.5 -834.0	0.87390	CONTINENTAL
ST-139	834.0 -838.0	0.99803	CONTINENTAL
ST-140	838.0 -838.5	0.79207	CONTINENTAL
ST-141	838.5 -840.0	0.96797	CONTINENTAL
ST-142	840.0 -841.0	0.95687	CONTINENTAL
ST-143	841.0 -844.2	0.99991	CONTINENTAL
ST-144	844.2 -845.5	0.98141	CONTINENTAL
ST-145	845.5 -846.8	0.90131	CONTINENTAL
ST-146	846.8 -848.0	0.93618	CONTINENTAL
ST-147	848.0 -849.0	0.66423	CONTINENTAL
ST-148	849.0 -850.5	0.97616	CONTINENTAL
ST-149	850.5 -854.0	0.95176	CONTINENTAL
ST-150	854.0 -857.0	0.99300	CONTINENTAL
ST-151	857.0 -858.5	0.99950	CONTINENTAL
ST-152	858.5 -859.0	0.99984	CONTINENTAL
ST-153	859.0 -859.5	0.81397	CONTINENTAL
ST-154	859.5 -860.5	0.99919	CONTINENTAL
ST-156	860.7 -865.5	0.99911	CONTINENTAL
ST-158	866.0 866.2	1.00000	CONTINENTAL
ST-159	866.2 -870.0	0.98631	CONTINENTAL
ST-160	870.0 -871.0	0.59643	CONTINENTAL
ST-161	871.0 -871.3	0.98815	BRACKISH
ST-162	871.3 -872.5	0.58540	CONTINENTAL
ST-163	872.5 -876.5	0.99996	CONTINENTAL
ST-164	876.5 -879.2	1.00000	CONTINENTAL
ST-165	879.2 -880.0	0.96257	CONTINENTAL
ST-166	880.0 -882.8	0.98287	BRACKISH
ST-167	882.8 -884.5	0.82606	BRACKISH
ST-168	884.5 -885.5	0.77090	CONTINENTAL
ST-169	885.5 -887.0	0.93937	CONTINENTAL
ST-170	887.0 891.4	0.99957	CONTINENTAL
ST-171	891.4 -892.5	0.84823	CONTINENTAL

ST-173	904.0 -905.2	0.99683	CONTINENTAL
ST-174	905.2 -907.7	0.99969	CONTINENTAL
ST-175	907.7 -909.5	0.99494	CONTINENTAL
ST-176	909.5 -912.5	0.99968	CONTINENTAL
ST-177	912.5 -917.5	0.99845	CONTINENTAL
ST-178	917.5 920.0	1.00000	CONTINENTAL
ST-179	920.0 921.5	0.99978	CONTINENTAL
ST-180	921.5 924.8	0.85099	CONTINENTAL
ST-181	924.8 -929.6	0.91522	CONTINENTAL
ST-182	929.6 -933.0	0.98737	CONTINENTAL
ST-183	933.0 -933.5	0.99780	CONTINENTAL
ST-184	933.5 -935.5	0.51908	BRACKISH
ST-185	935.5 -936.0	0.76671	BRACKISH
ST-186	936.0 -938.5	0.95270	CONTINENTAL
ST-187	938.5 -939.0	0.55212	CONTINENTAL
ST-188	939.0 -944.5	0.97324	CONTINENTAL
ST-189	944.5 -945.7	0.59209	BRACKISH
ST-190	945.7 -947.5	0.51809	BRACKISH
ST-191	947.5 -954.0	0.99983	CONTINENTAL
ST-192	959.0 -960.2	0.75443	CONTINENTAL
ST-193	960.2 -960.5	0.99952	CONTINENTAL
ST-197	970.0 -971.0	1.00000	CONTINENTAL
ST-198	971.0 -972.8	0.99999	CONTINENTAL
ST-199	972.8 -973.5	0.99789	CONTINENTAL
ST-200	973.5 974.0	0.99998	CONTINENTAL
ST-201	974.0 -975.0	1.00000	BRACKISH
ST-202	975.0 975.5	1.00000	BRACKISH

GROUP BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-203	975.5 -979.2	0.95215	BRACKISH
ST-204	979.2 -980.7	0.76478	CONTINENTAL
ST-205	980.7 -982.0	0.94073	BRACKISH
ST-206	982.0 -985.2	0.92431	BRACKISH
ST-207	985.2 -988.0	0.87966	CONTINENTAL
ST-209	989.0 -989.3	0.99856	BRACKISH
ST-211	989.5 -995.5	0.97532	BRACKISH
ST-212	995.5-1001.5	1.00000	CONTINENTAL
ST-213	1001.5-1004.0	0.99910	CONTINENTAL
ST-214	1004.0-1005.0	1.00000	CONTINENTAL
ST-216	1007.5-1013.0	0.61461	BRACKISH
ST-217	1013.0-1015.0	0.99127	BRACKISH
ST-218	1015.0 1017.5	0.99999	CONTINENTAL
ST-219	1017.5-1023.0	0.99903	BRACKISH
ST-220	1023.0-1024.0	0.96260	BRACKISH
ST-221	1024.0-1030.0	0.64761	CONTINENTAL
ST-222	1030.0-1035.2	0.97282	CONTINENTAL
ST-223	1035.2-1036.0	0.98039	CONTINENTAL
ST-224	1036.0-1040.5	0.97686	CONTINENTAL
ST-225	1040.5-1040.6	0.97212	CONTINENTAL
ST-226	1040.6-1041.4	0.71663	CONTINENTAL
ST-227	1041.4-1041.5	0.94042	CONTINENTAL
ST-228	1041.5-1042.0	0.99971	BRACKISH
ST-229	1042.0-1043.0	0.98539	CONTINENTAL
ST-230	1043.0-1049.0	0.70845	BRACKISH
ST-231	1049.0-1054.2	1.00000	CONTINENTAL
ST-232	1054.2-1055.2	0.92179	CONTINENTAL
ST-233	1055.2-1061.0	0.99212	CONTINENTAL
ST-234	1061.0-1063.0	0.91421	CONTINENTAL
ST-235	1063.0-1064.0	1.00000	CONTINENTAL
ST-236	1064.0-1067.0	1.00000	CONTINENTAL
ST-237	1067.0 1070.5	1.00000	CONTINENTAL
ST-238	1070.5-1072.0	1.00000	CONTINENTAL
ST-239	1072.0-1073.0	0.99999	CONTINENTAL
ST-240	1073.0-1074.0	0.99996	CONTINENTAL
ST-241	1074.0-1075.2	0.99979	CONTINENTAL
ST-242	1075.2-1078.5	0.99564	CONTINENTAL
ST-243	1078.5-1079.0	0.99959	CONTINENTAL
ST-244	1079.0-1080.2	0.99932	CONTINENTAL
ST-245	1080.2-1081.2	1.00000	CONTINENTAL
ST-246	1081.2-1082.5	0.99991	CONTINENTAL
ST-247	1082.5-1083.0	0.94905	CONTINENTAL
ST-248	1083.0-1083.5	0.99996	BRACKISH
ST-249	1083.5 1085.5	0.85698	CONTINENTAL
ST-250	1085.5-1087.5	0.97330	CONTINENTAL
ST-251	1087.5-1093.5	0.97132	BRACKISH
ST-252	1093.5-1096.0	0.99950	CONTINENTAL
ST-253	1096.0-1097.0	0.99754	CONTINENTAL
ST-254	1097.0-1101.0	0.87640	CONTINENTAL
ST-255	1101.0-1104.0	0.98233	CONTINENTAL
ST-256	1104.0-1105.5	0.99954	CONTINENTAL
ST-257	1105.5-1108.0	0.98881	CONTINENTAL
ST-258	1108.0-1109.5	0.87326	BRACKISH
ST-259	1109.5-1112.0	0.63750	CONTINENTAL
ST-260	1112.0-1112.7	0.99963	CONTINENTAL
ST-261	1112.7-1115.0	0.99131	CONTINENTAL
ST-262	1115.0-1117.5	0.99988	CONTINENTAL

ST-263	1117.5-1123.0	0.99999	CONTINENTAL
ST-264	1123.0-1127.0	0.99999	CONTINENTAL
ST-265	1127.0-1130.0	0.69813	CONTINENTAL
ST-266	1130.0-1132.0	0.77234	CONTINENTAL
ST-267	1132.0-1135.0	0.96923	BRACKISH
ST-268	1135.0-1136.0	0.78567	BRACKISH
ST-269	1136.0-1137.5	0.99999	CONTINENTAL
ST-270	1137.5-1140.0	1.00000	CONTINENTAL
ST-271	1140.0-1141.0	0.99879	CONTINENTAL
ST-272	1141.0-1142.0	1.00000	CONTINENTAL
ST-273	1142.0-1143.0	0.88495	BRACKISH
ST-274	1143.0-1150.0	0.99495	CONTINENTAL
ST-275	1150.0-1151.0	0.98204	CONTINENTAL
ST-276	1151.0-1154.5	0.90684	CONTINENTAL
ST-277	1154.5-1156.5	0.99994	BRACKISH
ST-278	1156.5-1157.5	0.99975	CONTINENTAL
ST-279	1157.5-1160.0	1.00000	CONTINENTAL
ST-281	1165.0-1170.0	0.99801	CONTINENTAL
ST-282	1170.0-1175.5	0.99999	CONTINENTAL
ST-283	1175.5-1176.0	1.00000	CONTINENTAL
ST-284	1176.0-1179.0	0.99977	CONTINENTAL
ST-285	1179.0-1180.0	0.99909	CONTINENTAL
ST-286	1180.0 1180.5	0.99942	CONTINENTAL
ST-287	1180.5-1181.0	0.57019	CONTINENTAL
ST-288	1181.0-1182.0	0.81387	CONTINENTAL
ST-289	1182.0-1184.0	0.97067	CONTINENTAL
ST-290	1179.0-1181.5	0.99999	CONTINENTAL
ST-294	1184.0-1188.0	0.99999	CONTINENTAL
ST-295	1188.0-1189.0	1.00000	CONTINENTAL
ST-296	1184.0-1185.5	0.91098	CONTINENTAL
ST-297	1185.5-1189.0	0.94640	CONTINENTAL
ST-298	1189.0-1190.0	1.00000	CONTINENTAL
ST-299	1190.0-1192.0	0.99985	BRACKISH
ST-300	1192.0-1193.0	1.00000	CONTINENTAL
ST-301	1193.0-1198.0	1.00000	CONTINENTAL
ST-304	1200.5-1203.5	1.00000	CONTINENTAL
ST-306	1204.0-1207.5	0.99990	CONTINENTAL
ST-307	1207.5-1208.5	0.97964	CONTINENTAL
ST-308	1208.5-1211.0	1.00000	CONTINENTAL
ST-309	1211.0-1213.0	0.99948	CONTINENTAL
ST-310	1213.0-1214.0	0.91362	CONTINENTAL
ST-312	1217.0-1221.5	0.70894	CONTINENTAL
ST-313	1221.5-1225.0	0.99988	CONTINENTAL
ST-314	1225.0-1226.0	0.99999	CONTINENTAL
ST-315	1226.0 1228.5	1.00000	CONTINENTAL
ST-317	1232.0-1234.5	0.74106	BRACKISH
ST-318	1234.5-1235.5	0.97995	CONTINENTAL
ST-319	1235.5-1238.0	0.86211	CONTINENTAL
ST-320	1238.0-1242.5	0.64175	BRACKISH
ST-321	1242.5-1242.8	0.96582	BRACKISH
ST-322	1242.8-1244.5	0.99031	BRACKISH
ST-323	1244.5-1245.5	0.89912	BRACKISH
ST-324	1245.5-1247.5	0.97734	BRACKISH
ST-325	1247.5-1249.5	0.51450	BRACKISH
ST-326	1249.5-1250.5	0.88340	CONTINENTAL
ST-327	1250.5-1257.0	1.00000	CONTINENTAL
ST-329	1257.5-1258.0	0.68229	BRACKISH
ST-331	1258.5-1261.0	0.92105	BRACKISH
ST-332	1261.0-1264.5	1.00000	CONTINENTAL
ST-333	1264.5-1265.5	1.00000	CONTINENTAL
ST-335	1266.5-1271.5	0.99422	CONTINENTAL
ST-336	1271.5-1276.5	0.98656	CONTINENTAL
ST-337	1276.5-1281.0	0.99988	CONTINENTAL
ST-338	1281.0 1285.5	1.00000	CONTINENTAL
ST-340	1286.0-1286.5	0.96490	CONTINENTAL
ST-342	1286.7 1288.5	0.85570	CONTINENTAL
ST-343	1288.5-1294.0	0.94796	CONTINENTAL
ST-344	1288.5-1294.0	0.90881	CONTINENTAL
ST-345	1294.0-1296.0	0.68839	CONTINENTAL
ST-347	1298.0-1301.5	0.80420	CONTINENTAL
ST-348	1301.5-1305.0	0.99023	BRACKISH
ST-350	1305.5-1305.7	0.97283	BRACKISH
ST-351	1305.7-1306.5	0.92465	BRACKISH
ST-352	1306.5-1306.7	0.97066	BRACKISH
ST-353	1306.7-1307.2	0.94298	BRACKISH
ST-356	1310.5-1313.0	0.99979	CONTINENTAL
ST-357	1313.0-1314.0	0.99663	CONTINENTAL
ST-360	1320.0-1322.5	0.85861	CONTINENTAL
ST-361	1322.5-1324.0	0.63186	BRACKISH
ST-362	1324.0-1326.0	0.97368	CONTINENTAL
ST-363	1326.0-1330.0	0.90114	BRACKISH
ST-364	1330.0 1337.5	0.55850	BRACKISH
ST-365	1337.5-1337.7	0.94303	CONTINENTAL
ST-366	1337.7-1340.0	0.99046	CONTINENTAL
ST-367	1340.0-1341.5	0.99979	CONTINENTAL
ST-368	1341.5-1345.0	0.98970	CONTINENTAL
ST-369	1345.0-1346.0	0.99635	CONTINENTAL
ST-370	1346.0-1348.0	0.59991	CONTINENTAL

ST-371	1348.0-1348.5	1.00000	CONTINENTAL
ST-374	1351.0-1352.5	0.99957	BRACKISH
ST-375	1352.5-1355.0	0.99128	BRACKISH
ST-376	1355.0-1360.0	0.62326	BRACKISH
ST-378	1360.2-1364.0	1.00000	BRACKISH
ST-379	1364.0-1368.0	0.99123	BRACKISH
ST-381	1370.0-1371.7	0.99842	BRACKISH
ST-382	1371.7-1372.7	0.99867	BRACKISH
ST-383	1372.7-1376.0	0.80878	BRACKISH
ST-387	1386.0-1386.5	0.99969	BRACKISH
ST-388	1386.5-1392.5	0.91934	CONTINENTAL
ST-389	1392.5-1393.5	0.72808	BRACKISH
ST-390	1393.5-1398.5	0.95548	CONTINENTAL
ST-391	1398.5-1402.0	0.94436	CONTINENTAL
ST-393	1410.0-1412.0	0.54569	BRACKISH
ST-394	1412.0-1418.0	0.96095	CONTINENTAL
ST-395	1418.0-1425.0	0.90801	CONTINENTAL
ST-396	1425.0-1430.5	0.93523	CONTINENTAL
ST-397	1430.5-1437.0	0.69460	BRACKISH
ST-398	1437.0-1441.5	0.96903	CONTINENTAL
ST-399	1441.5-1442.0	0.99660	CONTINENTAL
ST-400	1442.0-1450.0	0.94884	CONTINENTAL
ST-401	1450.0-1456.5	0.79110	CONTINENTAL
ST-402	1456.5-1461.5	0.82737	BRACKISH
ST-403	1461.5 1466.5	0.87553	BRACKISH
ST-404	1466.5-1471.5	0.83824	CONTINENTAL
ST-405	1471.5-1477.5	0.99990	CONTINENTAL
ST-406	1477.5-1483.0	0.99976	CONTINENTAL
ST-407	1483.0-1483.5	0.99195	CONTINENTAL
ST-408	1483.5-1489.0	0.99986	CONTINENTAL
ST-409	1489.0-1491.5	0.99996	CONTINENTAL
ST-410	1491.5-1492.0	0.99961	CONTINENTAL
ST-411	1492.0-1496.5	0.99896	CONTINENTAL
ST-412	1496.5-1499.0	0.98336	CONTINENTAL
ST-413	1499.0-1505.5	0.99976	CONTINENTAL
ST-414	1505.5-1506.0	0.99846	CONTINENTAL
ST-415	1506.0-1511.0	0.99972	CONTINENTAL
ST-416	1511.0-1514.0	0.99984	CONTINENTAL
ST-417	1514.0-1515.0	0.99169	CONTINENTAL
ST-418	1515.0-1519.0	0.99994	CONTINENTAL
ST-420	1520.0-1529.0	0.99965	CONTINENTAL
ST-421	1529.0-1536.0	0.99779	CONTINENTAL
ST-422	1536.0-1537.5	0.57899	CONTINENTAL
ST-423	1537.5-1539.5	0.99762	CONTINENTAL

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DISCRIMINANT ANALYSIS.....CONTINENTAL VS BRACKISH SIXTEEN VAR

  NUMBER OF GROUPS            2
  NUMBER OF VARIABLES     16
  SAMPLE SIZES..
           GROUP
             1          199
             2          199

DISCRIMINANT FUNCTION CONTINENTAL
      CONSTANT    *    COEFFICIENTS
      -73.7195892334   *
                                0.0001575540     -0.0000379400      0.0002907659      0.0070289001
                                0.0031158940      0.0266610608     -0.2823676467      0.0397032499
                               -0.1977338195      1.9659404755      0.0414306633      0.3290233612
                                0.0001892720     -0.2137164474      0.0296544991      0.0225318260
DISCRIMINANT FUNCTION BRACKISH
      CONSTANT    *    COEFFICIENTS
      -79.5686187744   *
                               -0.0002453530      0.0000704510      0.0007169410      0.0062312856
                                0.0116714947      0.0275342874     -0.0284233727      0.0431203246
                               -0.4009277821      1.7192916870      0.0430336930      0.3511693478
                                0.0001675430     -0.1908112168      0.0412801169     -0.0149626993
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EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-424	1539.5-1540.0	0.99744	CONTINENTAL
ST-425	1540.0-1545.5	0.99841	CONTINENTAL
ST-426	1545.5-1551.0	0.99814	CONTINENTAL
ST-427	1551.0-1553.0	0.98332	CONTINENTAL
ST-428	1553.0-1555.0	0.78944	BRACKISH
ST-429	1555.0-1560.0	0.93423	CONTINENTAL
ST-430	1560.0-1562.5	0.76589	CONTINENTAL
ST-431	1562.5-1563.0	0.86269	CONTINENTAL
ST-433	1564.0-1566.0	0.99933	CONTINENTAL
ST-434	1566.0-1569.0	0.99963	CONTINENTAL
ST-435	1569.0-1570.5	0.99995	CONTINENTAL
ST-436	1570.5-1571.0	0.99669	CONTINENTAL
ST-437	1571.0-1572.5	0.99954	CONTINENTAL
ST-439	1573.5-1577.5	0.99978	CONTINENTAL
ST-440	1577.5-1582.0	0.99808	CONTINENTAL
ST-441	1582.0-1585.5	0.73784	BRACKISH
ST-442	1585.5-1590.5	0.79211	CONTINENTAL
ST-443	1590.5-1595.0	0.95177	CONTINENTAL
ST-444	1595.0-1597.5	0.99800	CONTINENTAL
ST-445	1597.5-1600.5	0.95672	CONTINENTAL
ST-447	1601.0-1601.2	0.98477	CONTINENTAL
ST-448	1601.2-1605.0	0.95087	CONTINENTAL
ST-449	1605.0-1608.5	0.84175	BRACKISH
ST-451	1611.5-1613.0	0.96943	BRACKISH
ST-452	1613.0-1614.0	0.99908	BRACKISH
ST-454	1614.2-1614.5	0.99251	BRACKISH
ST-456	1617.5-1617.6	0.99797	BRACKISH
ST-458	1622.5-1623.0	0.99649	BRACKISH
ST-459	1623.0-1624.0	0.99034	BRACKISH
ST-462	1625.7-1628.0	0.99872	BRACKISH
ST-464	1631.0-1633.5	0.99997	BRACKISH
ST-465	1633.5-1638.5	0.78490	CONTINENTAL
ST-466	1638.5-1640.0	0.96423	BRACKISH
ST-468	1641.0-1647.0	0.99994	CONTINENTAL
ST-469	1642.0-1652.0	0.99932	CONTINENTAL
ST-470	1652.0-1657.0	0.96649	CONTINENTAL
ST-471	1657.0-1662.0	0.98909	CONTINENTAL
ST-472	1662.0-1666.0	0.97608	CONTINENTAL
ST-473	1666.0-1668.0	1.00000	CONTINENTAL
ST-474	1668.0-1672.0	0.98591	CONTINENTAL
ST-475	1672.0-1677.0	0.99999	CONTINENTAL
ST-476	1677.0-1683.0	0.99985	CONTINENTAL
ST-477	1683.0-1684.0	1.00000	CONTINENTAL
ST-478	1684.0-1688.0	1.00000	CONTINENTAL
ST-479	1688.0-1689.0	0.98020	CONTINENTAL
ST-480	1689.0-1693.0	0.99981	CONTINENTAL
ST-481	1693.0-1694.0	0.99997	CONTINENTAL
ST-482	1694.0-1697.0	0.99999	CONTINENTAL
ST-483	1697.0-1698.0	0.99860	CONTINENTAL
ST-484	1698.0-1702.0	0.99997	CONTINENTAL
ST-485	1702.0-1705.0	0.99897	CONTINENTAL
ST-486	1705.0-1707.0	0.96418	CONTINENTAL
ST-487	1707.0-1711.0	0.99182	CONTINENTAL
ST-488	1711.0-1715.5	0.99996	CONTINENTAL
ST-490	1716.0-1721.0	0.99990	CONTINENTAL
ST-491	1721.0-1725.5	0.99996	CONTINENTAL
ST-492	1725.5-1728.0	0.99998	CONTINENTAL
ST-493	1728.0-1730.0	0.99561	CONTINENTAL
ST-494	1730.0-1735.0	0.99796	CONTINENTAL
ST-495	1735.0-1736.0	0.99772	CONTINENTAL
ST-496	1736.0-1736.2	0.90069	BRACKISH
ST-497	1736.2-1739.5	0.99966	CONTINENTAL
ST-498	1739.5-1743.0	0.99544	CONTINENTAL
ST-499	1743.0-1750.5	0.99981	CONTINENTAL
ST-500	1750.5-1751.5	0.97403	CONTINENTAL
ST-503	1753.0-1754.0	0.86695	CONTINENTAL
ST-504	1754.0-1755.5	1.00000	CONTINENTAL
ST-505	1755.5-1757.5	1.00000	CONTINENTAL
ST-506	1757.5-1759.0	0.99401	CONTINENTAL
ST-507	1759.0-1762.0	0.81395	CONTINENTAL
ST-508	1762.0-1765.0	0.99974	CONTINENTAL
ST-509	1765.0-1767.0	1.00000	CONTINENTAL
ST-510	1767.0-1768.0	0.99909	CONTINENTAL

ST-512	1768.3-1769.0	0.98704	BRACKISH
ST-513	1769.0-1770.0	0.99790	CONTINENTAL
ST-515	1771.0-1771.5	0.99566	CONTINENTAL
ST-516	1771.5-1778.0	0.99993	CONTINENTAL
ST-517	1778.0-1779.5	0.57290	BRACKISH
ST-518	1779.5-1781.5	0.99710	BRACKISH
ST-519	1781.5-1782.5	0.92445	CONTINENTAL
ST-520	1782.5-1783.0	0.99598	CONTINENTAL
ST-521	1783.0 1784.0	0.99764	CONTINENTAL
ST-522	1784.0-1785.5	0.99993	CONTINENTAL
ST-523	1785.5-1787.0	0.98278	CONTINENTAL
ST-524	1787.0-1788.5	0.99974	CONTINENTAL
ST-525	1788.5-1789.0	0.98166	CONTINENTAL
ST-526	1789.0-1790.5	0.99985	CONTINENTAL
ST-527	1790.5-1793.0	0.99989	CONTINENTAL
ST-528	1793.0-1797.0	0.99999	CONTINENTAL
ST-529	1797.0-1798.5	0.97635	CONTINENTAL
ST-530	1798.5-1799.0	0.99984	CONTINENTAL
ST-531	1799.0-1800.5	0.99986	CONTINENTAL
ST-532	1800.5-1804.0	0.99991	CONTINENTAL
ST-533	1804.0-1806.0	0.99991	CONTINENTAL
ST-534	1806.0-1808.0	1.00000	CONTINENTAL
ST-535	1808.0-1814.5	1.00000	CONTINENTAL
ST-536	1814.5-1815.5	0.99964	CONTINENTAL
ST-537	1815.5-1818.5	0.99998	CONTINENTAL
ST-538	1818.5-1819.0	1.00000	CONTINENTAL
ST-539	1819.0-1821.0	1.00000	CONTINENTAL
ST-540	1821.0-1823.0	0.53276	BRACKISH
ST-541	1823.0-1825.5	0.99985	CONTINENTAL
ST-542	1825.5-1827.0	0.99036	CONTINENTAL
ST-543	1827.0-1830.0	0.99959	CONTINENTAL
ST-544	1830.0-1831.5	1.00000	CONTINENTAL
ST-545	1831.5-1833.0	0.98340	CONTINENTAL
ST-546	1833.0-1834.0	0.94056	CONTINENTAL
ST-547	1834.0-1835.5	0.98812	CONTINENTAL
ST-548	1835.5-1837.0	0.99946	CONTINENTAL
ST-549	1837.0-1844.0	0.99992	CONTINENTAL
ST-550	1844.0-1844.5	0.99923	BRACKISH
ST-551	1844.5-1845.0	0.60674	CONTINENTAL
ST-552	1845.0-1846.0	0.95625	BRACKISH
ST-553	1846.0-1847.0	0.96516	CONTINENTAL
ST-554	1847.0-1850.0	0.78699	BRACKISH
ST-555	1850.0-1851.0	0.99810	CONTINENTAL
ST-556	1851.0-1853.0	0.99729	CONTINENTAL
ST-557	1853.0-1853.5	0.99525	CONTINENTAL
ST-558	1853.5-1855.5	0.84964	CONTINENTAL
ST-559	1855.5-1857.0	0.88356	CONTINENTAL
ST-560	1857.0-1857.5	0.81905	CONTINENTAL
ST-561	1857.5-1859.0	0.99147	CONTINENTAL
ST-563	1859.5-1861.5	0.99625	CONTINENTAL
ST-564	1861.5-1867.0	0.95822	CONTINENTAL
ST-565	1867.0-1868.0	0.98298	CONTINENTAL
ST-566	1868.0-1868.5	0.55844	CONTINENTAL
ST-567	1868.5-1873.0	0.99984	CONTINENTAL
ST-568	1873.0-1878.0	0.99903	CONTINENTAL
ST-569	1878.0 1883.0	0.99972	CONTINENTAL
ST-570	1883.0-1886.0	0.99992	CONTINENTAL
ST-571	1886.0-1887.5	0.91785	CONTINENTAL
ST-572	1887.5-1892.5	0.98241	CONTINENTAL
ST-573	1892.5-1893.5	0.94784	CONTINENTAL
ST-574	1893.5-1895.0	0.99970	CONTINENTAL
ST-575	1895.0-1896.5	0.99267	CONTINENTAL
ST-576	1896.5-1898.5	0.89177	CONTINENTAL
ST-577	1898.5-1900.0	0.99985	CONTINENTAL
ST-578	1900.0 1906.0	0.99993	CONTINENTAL
ST-579	1906.0-1910.5	0.98204	CONTINENTAL
ST-580	1910.5-1912.5	0.99997	CONTINENTAL
ST-581	1912.5-1914.5	0.99991	CONTINENTAL
ST-582	1914.5-1916.0	1.00000	CONTINENTAL
ST-583	1916.0-1920.0	0.99958	CONTINENTAL
ST-584	1920.0-1921.0	0.99498	CONTINENTAL
ST-585	1921.0-1925.5	1.00000	CONTINENTAL
ST-586	1925.5-1927.5	1.00000	CONTINENTAL
ST-587	1927.5-1929.0	1.00000	CONTINENTAL
ST-588	1929.0-1930.5	1.00000	CONTINENTAL
ST-589	1930.5-1936.5	0.99965	CONTINENTAL
ST-590	1936.5-1936.8	0.99912	CONTINENTAL
ST-591	1935.8-1942.0	0.99780	CONTINENTAL
ST-592	1942.0-1943.5	1.00000	CONTINENTAL
ST-593	1943.5-1944.5	0.99972	CONTINENTAL
ST-594	1944.5-1945.5	0.88582	CONTINENTAL
ST-595	1945.5-1947.0	0.99997	CONTINENTAL
ST-596	1947.0-1948.0	0.99967	CONTINENTAL
ST-597	1948.0-1953.0	0.99992	CONTINENTAL
ST-598	1953.0-1954.0	0.99984	CONTINENTAL
ST-599	1954.0-1955.5	0.99989	CONTINENTAL
ST-600	1955.5-1956.0	0.99994	CONTINENTAL
ST-601	1956.0-1958.0	0.99982	CONTINENTAL

ST-60[illegible]	[illegible]-1960.9	0.67730	CONTINENTAL
ST-606	1960.9-1962.0	0.99997	CONTINENTAL
ST-607	1962.0-1963.3	0.99824	CONTINENTAL
ST-608	1963.3-1964.0	0.58427	BRACKISH
ST-609	1964.0-1966.0	0.99999	CONTINENTAL
ST-610	1966.0-1968.0	0.89940	CONTINENTAL
ST-611	1968.0-1970.5	0.89714	CONTINENTAL
ST-612	1970.5-1974.0	0.91973	BRACKISH
ST-613	1974.0-1983.0	0.91895	BRACKISH
ST-614	1983.0-1983.5	0.96611	BRACKISH
ST-615	1983.5-1989.0	0.99482	CONTINENTAL
ST-616	1989.0-1990.5	0.99796	CONTINENTAL
ST-617	1990.5-1993.5	0.93152	CONTINENTAL
ST-618	1993.5-1999.5	0.99921	CONTINENTAL
ST-619	1999.5-2000.5	0.98795	CONTINENTAL
ST-620	2000.5-2007.0	0.94841	BRACKISH
ST-621	2007.0-2012.0	0.99809	BRACKISH
ST-622	2012.0-2017.0	0.96260	CONTINENTAL
ST-624	2019.5-2021.5	0.82086	CONTINENTAL
ST-625	2021.5-2027.0	0.99972	CONTINENTAL
ST-626	2027.0 2027.5	1.00000	CONTINENTAL
ST-627	2027.5-2032.5	0.99979	CONTINENTAL
ST-628	2032.5-2038.0	0.98832	CONTINENTAL
ST-629	2038.0-2040.0	0.96618	BRACKISH
ST-630	2040.0-2041.0	0.99696	BRACKISH
ST-631	2041.0-2044.0	0.99509	CONTINENTAL
ST-632	2044.0-2045.5	1.00000	CONTINENTAL
ST-633	2045.5-2048.5	0.98872	BRACKISH
ST-634	2048.5-2050.5	0.57167	CONTINENTAL
ST-635	2050.5-2051.0	0.99955	CONTINENTAL
ST-636	2051.0-2054.0	0.99996	CONTINENTAL
ST-637	2054.0-2055.0	1.00000	CONTINENTAL
ST-638	2055.0-2056.0	1.00000	CONTINENTAL
ST-639	2056.0-2057.5	0.99309	CONTINENTAL
ST-640	2057.5-2059.5	0.70462	CONTINENTAL

GROUP BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-641	2059.5-2062.5	0.99852	CONTINENTAL
ST-642	2062.5-2068.5	0.99967	CONTINENTAL
ST-643	2068.5-2074.5	0.97824	CONTINENTAL
ST-644	2074.5-2078.0	0.99542	CONTINENTAL
ST-645	2078.0-2083.0	0.98213	CONTINENTAL
ST-646	2083.0-2085.5	0.98783	CONTINENTAL
ST-647	2085.5-2086.0	0.91051	CONTINENTAL
ST-648	2086.0-2088.0	0.99529	CONTINENTAL
ST-649	2088.0-2089.0	1.00000	CONTINENTAL
ST-650	2089.0-2093.5	0.56760	BRACKISH
ST-651	2093.5-2095.5	0.76139	CONTINENTAL
ST-652	2095.5-2097.0	0.96828	CONTINENTAL
ST-653	2097.0-2099.0	0.99750	CONTINENTAL
ST-654	2099.0-2101.0	0.99382	CONTINENTAL
ST-655	2101.0-2104.0	0.98180	CONTINENTAL
ST-656	2104.0-2108.0	0.59927	BRACKISH
ST-657	2108.0-2114.0	0.70124	BRACKISH
ST-658	2114.0-2119.5	0.95290	BRACKISH
ST-659	2119.5-2125.5	0.99802	CONTINENTAL
ST-660	2125.5-2127.5	1.00000	CONTINENTAL
ST-661	2127.5-2128.5	1.00000	CONTINENTAL
ST-662	2128.5-2133.0	0.98856	CONTINENTAL
ST-663	2133.0-2135.5	0.97585	CONTINENTAL
ST-664	2135.5-2136.5	0.91335	CONTINENTAL
ST-665	2136.5-2138.5	0.90395	CONTINENTAL
ST-666	2138.5-2141.5	0.92715	CONTINENTAL
ST-667	2141.5-2143.5	0.94828	BRACKISH
ST-668	2143.5-2144.0	0.99193	CONTINENTAL
ST-669	2144.0-2145.0	0.79581	CONTINENTAL
ST-670	2145.0-2145.5	0.99194	CONTINENTAL
ST-671	2145.5-2147.0	1.00000	CONTINENTAL
ST-672	2147.0-2149.5	0.87482	BRACKISH
ST-673	2149.5-2150.5	0.93766	CONTINENTAL
ST-674	2150.5-2151.0	0.72123	BRACKISH
ST-675	2151.0-2152.0	0.96648	CONTINENTAL
ST-676	2152.0-2153.0	0.99767	CONTINENTAL
ST-677	2153.0-2154.0	0.88139	CONTINENTAL
ST-678	2154.0-2161.0	0.99979	CONTINENTAL
ST-679	2161.0-2162.0	0.72077	CONTINENTAL
ST-680	2162.0-2163.5	0.99782	CONTINENTAL
ST-683	2166.0-2166.5	0.84711	CONTINENTAL
ST-684	2166.5-2167.5	0.93339	CONTINENTAL
ST-685	2167.5-2169.0	0.98085	CONTINENTAL
ST-686	2169.0-2172.0	0.95888	CONTINENTAL
ST-687	2172.0-2173.5	0.98974	CONTINENTAL
ST-688	2173.5-2176.5	0.83981	CONTINENTAL
ST-689	2176.5-2178.0	0.99959	CONTINENTAL

ST-692	2179.5-2181.5	0.93972	CONTINENTAL
ST-693	2181.5-2183.5	0.99321	CONTINENTAL
ST-694	2183.5-2184.0	0.99952	CONTINENTAL
ST-695	2184.0-2186.0	0.99976	CONTINENTAL
ST-696	2186.0-2187.5	1.00000	CONTINENTAL
ST-698	2188.0-2189.0	0.75412	BRACKISH
ST-699	2189.0-2193.0	0.99825	CONTINENTAL
ST-700	2193.0-2194.0	0.58812	CONTINENTAL
ST-701	2194.0-2196.0	0.99894	CONTINENTAL
ST-702	2196.0-2199.5	0.84996	CONTINENTAL
ST-703	2199.5-2201.5	0.94384	CONTINENTAL
ST-704	2201.5-2203.0	0.98988	CONTINENTAL
ST-705	2203.0-2209.0	0.99741	CONTINENTAL
ST-706	2209.0-2213.0	0.99725	CONTINENTAL
ST-707	2213.0-2214.0	1.00000	CONTINENTAL
ST-708	2214.0-2218.5	0.99889	CONTINENTAL
ST-709	2218.5-2219.5	0.96279	CONTINENTAL
ST-710	2219.5-2226.0	0.99979	CONTINENTAL
ST-711	2226.0-2227.0	0.98222	CONTINENTAL
ST-712	2227.0-2232.5	0.99956	CONTINENTAL
ST-713	2232.5-2235.0	1.00000	CONTINENTAL
ST-714	2235.0-2236.0	0.92485	CONTINENTAL
ST-716	2236.2-2237.0	0.99066	CONTINENTAL
ST-717	2237.0-2242.5	1.00000	CONTINENTAL
ST-718	2242.5-2244.0	0.95183	CONTINENTAL
ST-719	2244.0-2246.0	0.98764	CONTINENTAL
ST-720	2246.0-2247.0	0.96101	CONTINENTAL
ST-721	2247.0-2248.0	0.98444	CONTINENTAL
ST-722	2248.0-2252.5	0.99351	CONTINENTAL
ST-723	2252.5-2255.5	0.99999	CONTINENTAL
ST-724	2255.5-2256.5	0.80883	CONTINENTAL
ST-725	2256.5-2259.5	0.55118	BRACKISH
ST-726	2259.5-2261.0	0.81714	CONTINENTAL
ST-727	2261.0-2265.5	0.98373	CONTINENTAL
ST-728	2265.5-2266.5	0.99787	CONTINENTAL
ST-729	2266.5-2271.0	0.99979	CONTINENTAL
ST-730	2271.0-2275.5	0.99956	CONTINENTAL
ST-731	2275.5-2279.0	0.76877	CONTINENTAL
ST-732	2279.0-2279.5	0.89143	CONTINENTAL
ST-733	2279.5-2281.0	0.95265	CONTINENTAL
ST-734	2281.0-2286.5	1.00000	BRACKISH
ST-735	2286.5-2289.0	0.91436	CONTINENTAL
ST-736	2289.0-2292.0	0.87804	CONTINENTAL
ST-737	2292.0-2297.5	0.53472	BRACKISH
ST-738	2297.5-2298.0	0.99897	CONTINENTAL
ST-739	2298.0-2299.5	0.99978	CONTINENTAL
ST-740	2299.5-2301.0	1.00000	CONTINENTAL
ST-741	2301.0-2302.7	0.99881	CONTINENTAL
ST-742	2302.7-2303.0	0.88576	CONTINENTAL
ST-743	2303.0-2304.0	0.79744	CONTINENTAL
ST-744	2304.0-2310.0	0.99973	CONTINENTAL
ST-745	2310.0-2315.0	0.99914	CONTINENTAL
ST-746	2315.0-2319.0	0.99999	CONTINENTAL
ST-747	2319.0-2324.0	0.99999	CONTINENTAL
ST-748	2324.0-2325.0	0.99644	CONTINENTAL
ST-749	2325.0-2325.5	1.00000	CONTINENTAL
ST-750	2325.5-2326.0	0.99837	CONTINENTAL
ST-751	2326.0-2326.5	1.00000	CONTINENTAL
ST-752	2326.5-2328.0	0.99862	CONTINENTAL
ST-753	2328.0-2333.0	0.99962	CONTINENTAL
ST-754	2333.0-2335.0	0.73463	CONTINENTAL
ST-755	2335.0-2337.0	0.76161	CONTINENTAL
ST-756	2337.0-2339.0	0.97109	CONTINENTAL
ST-757	2339.0-2342.0	1.00000	CONTINENTAL
ST-758	2342.0-2344.0	0.99699	CONTINENTAL
ST-759	2344.0-2345.0	0.98701	CONTINENTAL
ST-760	2345.0-2349.0	0.99952	CONTINENTAL
ST-761	2349.0-2351.5	0.99888	CONTINENTAL
ST-762	2351.5-2352.0	0.95207	CONTINENTAL
ST-763	2352.0-2357.0	1.00000	CONTINENTAL
ST-764	2357.0-2361.5	0.99587	CONTINENTAL
ST-765	2361.5-2362.5	0.97455	CONTINENTAL
ST-766	2362.5-2364.5	0.99925	CONTINENTAL
ST-767	2364.5-2369.0	0.97774	CONTINENTAL
ST-768	2369.0-2370.0	0.75004	CONTINENTAL
ST-769	2370.0-2371.0	0.65228	CONTINENTAL
ST-770	2371.0-2372.5	1.00000	CONTINENTAL
ST-771	2372.5-2374.0	0.99129	CONTINENTAL
ST-772	2374.0-2375.5	0.97923	CONTINENTAL
ST-773	2375.5-2377.0	0.98946	CONTINENTAL
ST-774	2377.0-2377.5	0.99999	CONTINENTAL
ST-775	2377.5-2379.0	0.60409	CONTINENTAL
ST-776	2379.0-2380.0	0.99939	CONTINENTAL
ST-777	2380.0-2383.5	0.99870	CONTINENTAL
ST-778	2383.5-2385.5	0.99592	CONTINENTAL
ST-779	2385.5-2387.0	0.98214	CONTINENTAL
ST-780	2387.0-2389.0	0.98250	CONTINENTAL

ST-781	2389.0-2389.5	0.99869	CONTINENTAL
ST-782	2389.5-2391.0	0.99685	CONTINENTAL
ST-783	2391.0-2391.5	0.57196	BRACKISH
ST-784	2391.5-2392.0	0.92595	BRACKISH
ST-785	2392.0-2393.5	0.98408	CONTINENTAL
ST-786	2393.5-2394.0	0.98182	CONTINENTAL
ST-787	2394.0-2394.5	0.73383	BRACKISH
ST-788	2394.5-2396.5	1.00000	CONTINENTAL
ST-789	2396.5-2399.0	0.99997	CONTINENTAL
ST-790	2399.0-2400.0	0.98979	BRACKISH
ST-791	2400.0-2402.5	0.56056	CONTINENTAL
ST-792	2402.5-2403.5	0.96205	BRACKISH
ST-793	2403.5-2405.0	0.85570	CONTINENTAL
ST-794	2405.0-2406.5	0.99927	CONTINENTAL
ST-795	2406.5-2407.5	0.98662	CONTINENTAL
ST-796	2407.5-2410.0	0.60680	CONTINENTAL
ST-797	2410.0-2416.0	0.82911	CONTINENTAL
ST-798	2416.0-2419.0	0.99687	CONTINENTAL
ST-799	2419.0-2425.0	0.93842	CONTINENTAL
ST-800	2425.0-2427.0	1.00000	CONTINENTAL
ST-801	2427.0-2428.0	0.99987	CONTINENTAL
ST-802	2428.0-2431.0	1.00000	CONTINENTAL
ST-803	2431.0-2431.5	1.00000	CONTINENTAL
ST-804	2431.5-2432.5	0.98840	BRACKISH
ST-805	2432.5-2434.0	0.99993	CONTINENTAL
ST-806	2434.0-2435.5	0.72645	CONTINENTAL
ST-807	2435.5-2438.0	0.80366	BRACKISH
ST-808	2438.0-2439.5	0.92617	CONTINENTAL
ST-809	2439.5-2442.0	0.87636	CONTINENTAL
ST-810	2442.0-2444.0	0.99909	CONTINENTAL
ST-811	2444.0-2447.5	0.66835	CONTINENTAL
ST-812	2447.5-2449.0	0.93255	CONTINENTAL
ST-813	2449.0-2453.0	0.88111	CONTINENTAL
ST-814	2453.0-2455.0	0.99959	CONTINENTAL
ST-815	2455.0-2457.5	0.99998	CONTINENTAL
ST-816	2457.5-2466.0	1.00000	CONTINENTAL
ST-817	2466.0-2470.0	0.98499	CONTINENTAL
ST-818	2470.0-2471.5	0.99986	CONTINENTAL
ST-819	2471.5-2475.0	0.79745	CONTINENTAL
ST-820	2475.0-2478.0	0.57161	BRACKISH
ST-821	2478.0-2479.5	0.99920	CONTINENTAL
ST-822	2479.5-2481.0	0.92767	CONTINENTAL
ST-823	2481.0-2486.0	0.98936	CONTINENTAL
ST-824	2486.0-2486.5	0.98314	CONTINENTAL
ST-825	2486.5-2488.0	0.94614	CONTINENTAL
ST-826	2488.0-2491.0	0.71614	CONTINENTAL
ST-827	2491.0-2493.0	0.74176	CONTINENTAL
ST-828	2493.0-2498.5	0.99718	CONTINENTAL
ST-829	2498.5-2503.5	0.98358	CONTINENTAL
ST-830	2503.5-2508.5	0.99905	CONTINENTAL
ST-831	2508.5-2515.0	1.00000	CONTINENTAL
ST-832	2515.0-2517.0	0.89181	CONTINENTAL
ST-833	2517.0-2520.0	0.99752	CONTINENTAL
ST-834	2520.0-2525.0	0.99853	CONTINENTAL
ST-835	2525.0-2525.5	0.99964	CONTINENTAL
ST-836	2525.5-2531.0	0.99967	CONTINENTAL
ST-837	2531.0-2532.0	0.99086	CONTINENTAL
ST-838	2532.0-2533.5	0.61383	CONTINENTAL
ST-839	2533.5-2535.0	0.88634	BRACKISH
ST-840	2535.0-2537.0	0.99784	CONTINENTAL
ST-841	2537.0-2538.0	0.95160	BRACKISH
ST-842	2538.0-2538.7	0.95580	BRACKISH
ST-844	2539.0-2540.0	0.81791	BRACKISH
ST-845	2540.0-2541.0	0.75788	CONTINENTAL

Appendix 8

Classification for the Unknown Samples in the Groups
Marine vs. Continental-Brackish 24 Variables

DISCRIMINANT ANALYSIS.....CON BRACK VS MARINE TWENTY FOUR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 24
SAMPLE SIZES..

GROUP	
1	189
2	189

DISCRIMINANT FUNCTION CONTINENTAL BRACKISH

CONSTANT * COEFFICIENTS
-672.1210937500 *

0.0023022140	0.0038947670	0.0017466519	-0.0009948500
-0.0034743431	-0.0003552490	-0.0013260569	-0.0097321644
0.0315331593	-0.0017535309	-0.2281978130	-0.6965434551
-2.6554460526	2.2432565689	-0.1974661946	0.5882895589
-0.1545892954	-0.0027592271	0.7053164244	0.0008847020
-0.0168817602	0.0415930673	0.2089881301	-0.0522475988

DISCRIMINANT FUNCTION MARINE

CONSTANT * COEFFICIENTS
-655.8234863281 *

0.0022711051	0.0038666320	0.0017484350	-0.0009121930
0.0034354799	-0.0003468259	0.0011681900	0.0094515420
0.0343351588	-0.0061298162	-0.1170145273	-0.8353856802
-2.7221860886	2.7983722687	-0.4444887638	0.5841623545
-0.1550185084	-0.0033960200	0.6673902869	0.0008191429
-0.0041047707	0.0589203984	0.2134955525	-0.0565382838

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL BRACKISH

SAMPLE NO.	DEPTH		PROBABILITY	SAMPLE CLASSIFICATION
ST -1	599.5	0.0	0.75306	CONTINENTAL BRACKISH
ST -2	600.0	0.0	0.70680	MARINE
ST -3	600.0	-602.0	0.71963	MARINE
ST -4	602.0	-603.2	0.91210	MARINE
ST -5	603.2	-603.4	0.95898	MARINE
ST -6	603.4	-605.7	0.98643	MARINE
ST -7	605.7	-607.2	0.99442	CONTINENTAL BRACKISH
ST -9	607.4	-611.5	0.93462	MARINE
ST -10	611.5	-612.0	0.99612	MARINE
ST -11	612.0	-616.3	0.95324	MARINE
ST -12	616.3	-618.0	0.99948	MARINE
ST -13	618.0	-622.0	0.99423	MARINE
ST -14	622.0	-623.0	0.77120	MARINE
ST -15	623.0	-624.0	0.93354	MARINE
ST -16	624.0	-631.0	0.85839	CONTINENTAL BRACKISH
ST -17	631.0	-632.3	1.00000	MARINE
ST -18	632.3	-633.8	0.99944	MARINE
ST -19	633.8	-635.0	0.84819	CONTINENTAL BRACKISH
ST -20	635.0	-638.0	0.99180	CONTINENTAL BRACKISH
ST -21	638.0	-640.0	0.99755	CONTINENTAL BRACKISH
ST -22	640.0	-644.5	0.99939	CONTINENTAL BRACKISH
ST -23	644.5	-645.0	0.99994	CONTINENTAL BRACKISH
ST -24	645.0	-648.0	0.99990	CONTINENTAL BRACKISH
ST -25	645.0	-650.5	0.99988	CONTINENTAL BRACKISH
ST -26	650.5	-652.0	0.99608	CONTINENTAL BRACKISH
ST -27	652.0	-653.5	0.73574	CONTINENTAL BRACKISH
ST -28	653.5	-657.0	1.00000	CONTINENTAL BRACKISH
ST -29	657.0	-658.0	0.99908	CONTINENTAL BRACKISH
ST -30	658.0	-660.5	0.99954	CONTINENTAL BRACKISH
ST -31	660.5	-661.0	0.99999	CONTINENTAL BRACKISH
ST -32	661.0	-662.0	0.99991	CONTINENTAL BRACKISH
ST -33	662.0	-662.5	0.99982	CONTINENTAL BRACKISH
ST -34	662.5	-663.5	0.67811	CONTINENTAL BRACKISH
ST -35	663.5	-667.5	0.99994	CONTINENTAL BRACKISH
ST -36	667.5	-667.7	0.99775	CONTINENTAL BRACKISH
ST -37	667.7	-667.9	0.92290	MARINE
ST -38	667.9	-668.1	0.99692	CONTINENTAL BRACKISH
ST -39	668.1	-673.0	0.97981	CONTINENTAL BRACKISH
ST -40	673.0	-673.5	0.54740	CONTINENTAL BRACKISH
ST -41	673.5	-674.5	0.94200	CONTINENTAL BRACKISH
ST -42	674.5	-675.5	0.97340	CONTINENTAL BRACKISH
ST -43	675.5	-677.0	0.95844	CONTINENTAL BRACKISH
ST -44	677.0	-679.0	0.83599	CONTINENTAL BRACKISH
ST -45	679.0	-679.5	0.80659	CONTINENTAL BRACKISH
ST -46	679.5	-682.0	0.97272	CONTINENTAL BRACKISH
ST -47	682.0	-685.0	0.73436	MARINE
ST -48	685.0	-685.2	1.00000	MARINE
ST -49	685.2	-693.0	0.97146	CONTINENTAL BRACKISH
ST -50	693.0	-697.0	0.99998	CONTINENTAL BRACKISH

ST -52	699.5 -700.5	0.86247	CONTINENTAL BRACKISH
ST -53	700.5 -702.0	0.99019	CONTINENTAL BRACKISH
ST -54	702.0 -703.0	0.72081	CONTINENTAL BRACKISH
ST -55	703.0 -704.5	0.99822	CONTINENTAL BRACKISH
ST -56	704.5 -705.5	0.64120	MARINE
ST -57	705.5 -709.0	0.95907	CONTINENTAL BRACKISH
ST -58	709.0 -709.5	0.87512	CONTINENTAL BRACKISH
ST -59	709.5 -710.5	0.99430	CONTINENTAL BRACKISH
ST -60	710.5 -711.0	0.99677	CONTINENTAL BRACKISH
ST -61	711.0 -712.0	0.99592	CONTINENTAL BRACKISH
ST -62	712.0 -713.0	0.99312	CONTINENTAL BRACKISH
ST -63	713.0 -713.5	0.99765	CONTINENTAL BRACKISH
ST -64	713.5 -718.0	0.98733	CONTINENTAL BRACKISH
ST -65	718.0 -719.2	0.56194	CONTINENTAL BRACKISH
ST -66	719.2 -719.4	0.94020	CONTINENTAL BRACKISH
ST -69	721.0 -730.0	0.95065	CONTINENTAL BRACKISH
ST -70	730.0 -732.0	0.99899	CONTINENTAL BRACKISH
ST -71	732.0 -732.6	0.99927	CONTINENTAL BRACKISH
ST -72	732.6 -733.2	0.99867	MARINE
ST -73	733.2 -734.5	0.99769	CONTINENTAL BRACKISH
ST -74	734.5 -735.0	0.99947	CONTINENTAL BRACKISH
ST -75	735.0 -737.2	0.99977	CONTINENTAL BRACKISH
ST -76	737.2 -737.5	1.00000	CONTINENTAL BRACKISH
ST -77	737.5 -738.0	0.99904	CONTINENTAL BRACKISH
ST -78	738.0 -739.2	0.88622	CONTINENTAL BRACKISH
ST -79	739.2 -743.0	0.99577	CONTINENTAL BRACKISH
ST -80	743.0 -744.3	0.99959	CONTINENTAL BRACKISH
ST -81	744.3 -746.5	0.99845	CONTINENTAL BRACKISH
ST -82	746.5 -747.4	0.99888	CONTINENTAL BRACKISH
ST -83	747.4 -750.8	0.99269	CONTINENTAL BRACKISH
ST -84	750.8 -752.5	0.99966	CONTINENTAL BRACKISH
ST -85	752.5 -754.0	0.99909	CONTINENTAL BRACKISH
ST -86	754.0 -755.2	0.99973	CONTINENTAL BRACKISH
ST -87	755.2 -757.5	0.99996	CONTINENTAL BRACKISH
ST -88	757.5 -758.5	0.99985	CONTINENTAL BRACKISH
ST -90	759.2 -763.8	0.99997	CONTINENTAL BRACKISH
ST -91	763.8 -765.8	0.99842	CONTINENTAL BRACKISH
ST -92	765.8 -770.1	1.00000	CONTINENTAL BRACKISH
ST -93	770.1 -770.8	0.99958	CONTINENTAL BRACKISH
ST -94	770.8 -775.5	0.99898	CONTINENTAL BRACKISH
ST -95	775.5 -780.0	0.97581	CONTINENTAL BRACKISH
ST -97	782.3 -782.9	0.97287	CONTINENTAL BRACKISH
ST -98	782.9 -784.8	0.94699	CONTINENTAL BRACKISH
ST -99	784.8 -785.3	0.99937	CONTINENTAL BRACKISH
ST-100	785.3 -786.5	0.87480	CONTINENTAL BRACKISH
ST-101	786.5 -787.2	0.94125	CONTINENTAL BRACKISH
ST-102	787.2 -791.2	0.99737	CONTINENTAL BRACKISH
ST-103	791.2 -791.5	0.87068	CONTINENTAL BRACKISH
ST-104	791.5 -792.0	0.76397	CONTINENTAL BRACKISH
ST-105	792.0 -792.5	0.97596	CONTINENTAL BRACKISH
ST-107	794.0 -794.5	0.99005	CONTINENTAL BRACKISH
ST-108	794.5 -795.5	0.95199	CONTINENTAL BRACKISH
ST-109	795.5 -796.0	0.94784	CONTINENTAL BRACKISH
ST-110	796.0 -797.0	0.99334	CONTINENTAL BRACKISH
ST-111	797.0 -798.0	0.71373	CONTINENTAL BRACKISH
ST-112	798.0 -799.0	1.00000	CONTINENTAL BRACKISH
ST-113	799.0 -801.0	0.98495	CONTINENTAL BRACKISH
ST-114	801.0 -801.5	0.99646	CONTINENTAL BRACKISH
ST-115	801.5 -805.5	0.99965	CONTINENTAL BRACKISH
ST-116	805.5 -806.0	0.94020	CONTINENTAL BRACKISH
ST-117	806.0 -807.5	0.99980	CONTINENTAL BRACKISH
ST-118	807.5 -809.0	0.97813	CONTINENTAL BRACKISH
ST-119	809.0 -810.2	0.95878	CONTINENTAL BRACKISH
ST-120	810.2 -810.5	0.94791	CONTINENTAL BRACKISH
ST-122	812.5 -813.0	0.97983	MARINE
ST-124	814.2 -816.7	0.99975	CONTINENTAL BRACKISH
ST-125	816.7 -817.7	0.97905	CONTINENTAL BRACKISH
ST-126	817.7 -820.0	0.99482	CONTINENTAL BRACKISH
ST-127	820.0 -821.5	0.99991	CONTINENTAL BRACKISH
ST-128	821.5 -823.0	0.99955	CONTINENTAL BRACKISH
ST-129	823.0 -825.0	0.99995	CONTINENTAL BRACKISH
ST-130	825.0 -826.0	0.99886	CONTINENTAL BRACKISH
ST-131	826.0 -827.0	0.99563	CONTINENTAL BRACKISH
ST-132	827.0 -829.5	0.99152	CONTINENTAL BRACKISH
ST-133	829.5 -832.0	0.99946	CONTINENTAL BRACKISH
ST-134	832.0 -832.5	0.97788	CONTINENTAL BRACKISH
ST-135	832.5 -833.0	0.99898	CONTINENTAL BRACKISH
ST-136	833.0 -833.2	0.98147	CONTINENTAL BRACKISH
ST-137	833.2 -833.5	0.97874	CONTINENTAL BRACKISH
ST-138	833.5 -834.0	0.99584	CONTINENTAL BRACKISH
ST-139	834.0 -838.0	0.99995	CONTINENTAL BRACKISH
ST-140	838.0 -838.5	0.98492	CONTINENTAL BRACKISH
ST-141	838.5 -840.0	0.99745	CONTINENTAL BRACKISH
ST-142	840.0 -841.0	0.97172	CONTINENTAL BRACKISH
ST-143	841.0 -844.2	0.99583	CONTINENTAL BRACKISH
ST-144	844.2 -845.5	0.99903	CONTINENTAL BRACKISH
ST-145	845.5 -846.8	0.98266	CONTINENTAL BRACKISH

ST-146	846.8 -848.0	0.99754	CONTINENTAL BRACKISH
ST-147	848.0 -849.0	0.99977	CONTINENTAL BRACKISH
ST-148	849.0 -850.5	0.99992	CONTINENTAL BRACKISH
ST-149	850.5 -854.0	0.99993	CONTINENTAL BRACKISH
ST-150	854.0 -857.0	0.99980	CONTINENTAL BRACKISH
ST-151	857.0 -858.5	0.99879	CONTINENTAL BRACKISH
ST-152	858.5 -859.0	0.99998	CONTINENTAL BRACKISH
ST-153	859.0 -859.5	0.98394	CONTINENTAL BRACKISH
ST-154	859.5 -860.5	0.99749	CONTINENTAL BRACKISH
ST-156	860.7 -865.5	0.99946	CONTINENTAL BRACKISH
ST-158	866.0 -866.2	0.99999	MARINE
ST-159	866.2 -870.0	0.97961	CONTINENTAL BRACKISH
ST-160	870.0 -871.0	0.96171	CONTINENTAL BRACKISH
ST-161	871.0 -871.3	0.99400	CONTINENTAL BRACKISH
ST-162	871.3 -872.5	0.97023	CONTINENTAL BRACKISH
ST-163	872.5 -876.5	0.99924	CONTINENTAL BRACKISH
ST-164	876.5 -879.2	0.98577	CONTINENTAL BRACKISH
ST-165	879.2 -880.0	0.98139	CONTINENTAL BRACKISH
ST-166	880.0 -882.8	0.94378	CONTINENTAL BRACKISH
ST-167	882.8 -884.5	0.55043	CONTINENTAL BRACKISH
ST-168	884.5 -885.5	0.99750	CONTINENTAL BRACKISH
ST-169	885.5 -887.0	0.99600	CONTINENTAL BRACKISH
ST-170	887.0 891.4	0.99639	CONTINENTAL BRACKISH
ST-171	891.4 -892.5	0.85807	CONTINENTAL BRACKISH
ST-172	892.5 -899.0	0.94640	CONTINENTAL BRACKISH
ST-173	904.0 -905.2	0.99467	CONTINENTAL BRACKISH
ST-174	905.2 -907.7	0.79546	CONTINENTAL BRACKISH
ST-175	907.7 -909.5	0.76114	CONTINENTAL BRACKISH
ST-176	909.5 -912.5	0.99565	CONTINENTAL BRACKISH
ST-177	912.5 -917.5	0.96475	CONTINENTAL BRACKISH
ST-178	917.5 920.0	0.97369	MARINE
ST-179	920.0 921.5	0.99541	CONTINENTAL BRACKISH
ST-180	921.5 924.8	0.99444	CONTINENTAL BRACKISH
ST-181	924.8 -929.6	0.99876	CONTINENTAL BRACKISH
ST-182	929.6 -933.0	0.99887	CONTINENTAL BRACKISH
ST-183	933.0 -933.5	0.99903	CONTINENTAL BRACKISH
ST-184	933.5 -935.5	0.98599	CONTINENTAL BRACKISH
ST-185	935.5 -936.0	0.96563	CONTINENTAL BRACKISH
ST-186	936.0 -938.5	0.98242	CONTINENTAL BRACKISH
ST-187	938.5 -939.0	0.99027	CONTINENTAL BRACKISH
ST-188	939.0 -944.5	0.97761	CONTINENTAL BRACKISH
ST-189	944.5 -945.7	0.89136	CONTINENTAL BRACKISH
ST-190	945.7 -947.5	0.97240	CONTINENTAL BRACKISH
ST-191	947.5 -954.0	0.97127	CONTINENTAL BRACKISH
ST-192	959.0 -960.2	0.97855	CONTINENTAL BRACKISH
ST-193	960.2 -960.5	0.63290	CONTINENTAL BRACKISH
ST-197	970.0 -971.0	0.99984	CONTINENTAL BRACKISH
ST-198	971.0 -972.8	0.96986	CONTINENTAL BRACKISH
ST-199	972.8 -973.5	0.98522	CONTINENTAL BRACKISH
ST-200	973.5 974.0	0.99122	CONTINENTAL BRACKISH
ST-201	974.0 -975.0	1.00000	MARINE
ST-202	975.0 975.5	1.00000	MARINE

GROUP MARINE

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-203	975.5 -979.2	0.82877	CONTINENTAL BRACKISH
ST-204	979.2 -980.7	0.99841	CONTINENTAL BRACKISH
ST-205	980.7 -982.0	0.99748	CONTINENTAL BRACKISH
ST-206	982.0 -985.2	0.99251	CONTINENTAL BRACKISH
ST-207	985.2 -988.0	0.99624	CONTINENTAL BRACKISH
ST-209	987.0 -989.3	0.81055	CONTINENTAL BRACKISH
ST-211	989.5 -995.5	0.99810	CONTINENTAL BRACKISH
ST-212	995.5-1001.5	0.99978	CONTINENTAL BRACKISH
ST-213	1001.5-1004.0	0.99730	CONTINENTAL BRACKISH
ST-214	1004.0-1005.0	0.99993	CONTINENTAL BRACKISH
ST-216	1007.5-1013.0	0.88374	CONTINENTAL BRACKISH
ST-217	1013.0-1015.0	0.61092	CONTINENTAL BRACKISH
ST-218	1015.0 1017.5	0.99781	CONTINENTAL BRACKISH
ST-219	1017.5-1023.0	0.80856	MARINE
ST-220	1023.0-1024.0	0.60352	CONTINENTAL BRACKISH
ST-221	1024.0-1030.0	0.99886	CONTINENTAL BRACKISH
ST-222	1030.0-1035.2	0.97443	CONTINENTAL BRACKISH
ST-223	1035.2-1036.0	0.84743	MARINE
ST-224	1036.0-1040.5	0.93586	CONTINENTAL BRACKISH
ST-225	1040.5-1040.6	0.86582	CONTINENTAL BRACKISH
ST-226	1040.6-1041.4	0.98073	MARINE
ST-227	1041.4-1041.5	0.93889	CONTINENTAL BRACKISH
ST-228	1041.5-1042.0	0.74163	MARINE
ST-229	1042.0-1043.0	0.50647	CONTINENTAL BRACKISH
ST-230	1043.0-1049.0	0.98936	MARINE
ST-231	1049.0-1054.2	0.99957	CONTINENTAL BRACKISH
ST-232	1054.2-1055.2	0.75147	CONTINENTAL BRACKISH
ST-233	1055.2-1061.0	0.93907	CONTINENTAL BRACKISH
ST-234	1061.0-1063.0	0.96987	CONTINENTAL BRACKISH
ST-235	1063.0-1064.0	0.94790	CONTINENTAL BRACKISH
ST-236	1064.0-1067.0	0.99979	CONTINENTAL BRACKISH
ST-237	1067.0 1070.5	0.99964	CONTINENTAL BRACKISH
ST-238	1070.5-1072.0	0.99449	CONTINENTAL BRACKISH

ST-239	1072.0-1073.0	0.99975	CONTINENTAL BRACKISH
ST-240	1073.0-1074.0	0.99633	CONTINENTAL BRACKISH
ST-241	1074.0-1075.2	0.83032	CONTINENTAL BRACKISH
ST-242	1075.2-1078.5	0.99835	CONTINENTAL BRACKISH
ST-243	1078.5-1079.0	0.99900	CONTINENTAL BRACKISH
ST-244	1079.0-1080.2	0.99967	CONTINENTAL BRACKISH
ST-245	1080.2-1081.2	0.58522	CONTINENTAL BRACKISH
ST-246	1081.2-1082.5	0.99719	CONTINENTAL BRACKISH
ST-247	1082.5-1083.0	0.94734	CONTINENTAL BRACKISH
ST-248	1083.0-1083.5	0.99927	CONTINENTAL BRACKISH
ST-249	1083.5-1085.5	0.83622	CONTINENTAL BRACKISH
ST-250	1085.5-1087.5	0.97117	CONTINENTAL BRACKISH
ST-251	1087.5-1093.5	0.99966	CONTINENTAL BRACKISH
ST-252	1093.5-1096.0	0.75824	CONTINENTAL BRACKISH
ST-253	1096.0-1097.0	0.92660	CONTINENTAL BRACKISH
ST-254	1097.0-1101.0	0.97842	CONTINENTAL BRACKISH
ST-255	1101.0-1104.0	0.99795	CONTINENTAL BRACKISH
ST-256	1104.0-1105.5	0.99613	CONTINENTAL BRACKISH
ST-257	1105.5-1108.0	0.99481	CONTINENTAL BRACKISH
ST-258	1108.0-1109.5	0.94102	CONTINENTAL BRACKISH
ST-259	1109.5-1112.0	0.99418	CONTINENTAL BRACKISH
ST-260	1112.0-1112.7	0.99802	CONTINENTAL BRACKISH
ST-261	1112.7-1115.0	0.99965	CONTINENTAL BRACKISH
ST-262	1115.0-1117.5	0.98939	CONTINENTAL BRACKISH
ST-263	1117.5-1123.0	0.99997	CONTINENTAL BRACKISH
ST-264	1123.0 1127.0	0.99978	CONTINENTAL BRACKISH
ST-265	1127.0-1130.0	0.99490	CONTINENTAL BRACKISH
ST-266	1130.0-1132.0	0.97638	CONTINENTAL BRACKISH
ST-267	1132.0-1135.0	0.94269	CONTINENTAL BRACKISH
ST-268	1135.0-1136.0	0.99860	CONTINENTAL BRACKISH
ST-269	1136.0-1137.5	0.99830	CONTINENTAL BRACKISH
ST-270	1137.5-1140.0	0.99989	CONTINENTAL BRACKISH
ST-271	1140.0-1141.0	0.99815	CONTINENTAL BRACKISH
ST-272	1141.0-1142.0	0.99958	CONTINENTAL BRACKISH
ST-273	1142.0-1143.0	0.99985	CONTINENTAL BRACKISH
ST-274	1143.0-1150.0	0.99867	CONTINENTAL BRACKISH
ST-275	1150.0-1151.0	0.99851	CONTINENTAL BRACKISH
ST-276	1151.0-1154.5	1.00000	CONTINENTAL BRACKISH
ST-277	1154.5-1156.5	0.99995	CONTINENTAL BRACKISH
ST-278	1156.5-1157.5	0.99989	CONTINENTAL BRACKISH
ST-279	1157.5-1160.0	0.96969	CONTINENTAL BRACKISH
ST-281	1165.0-1170.0	0.99815	CONTINENTAL BRACKISH
ST-282	1170.0-1175.5	0.99845	CONTINENTAL BRACKISH
ST-283	1175.5-1176.0	0.99566	CONTINENTAL BRACKISH
ST-284	1176.0-1179.0	0.99644	CONTINENTAL BRACKISH
ST-285	1179.0-1180.0	0.92036	CONTINENTAL BRACKISH
ST-286	1180.0 1180.5	0.99160	CONTINENTAL BRACKISH
ST-287	1180.5-1181.0	0.94566	MARINE
ST-288	1181.0-1182.0	0.92380	CONTINENTAL BRACKISH
ST-289	1182.0-1184.0	0.80689	CONTINENTAL BRACKISH
ST-290	1179.0-1181.5	0.97112	CONTINENTAL BRACKISH
ST-294	1184.0-1188.0	0.72115	MARINE
ST-295	1188.0-1189.0	0.73616	CONTINENTAL BRACKISH
ST-296	1184.0-1185.5	0.87359	MARINE
ST-297	1185.5-1189.0	0.67806	MARINE
ST-298	1187.0-1190.0	0.89044	MARINE
ST-299	1190.0-1192.0	0.69874	MARINE
ST-300	1192.0-1193.0	0.94052	CONTINENTAL BRACKISH
ST-301	1193.0-1198.0	0.69689	CONTINENTAL BRACKISH
ST-304	1200.5-1203.5	0.98602	CONTINENTAL BRACKISH
ST-306	1204.0-1207.5	0.96960	CONTINENTAL BRACKISH
ST-307	1207.5-1208.5	0.76410	MARINE
ST-308	1208.5-1211.0	0.99364	CONTINENTAL BRACKISH
ST-309	1211.0-1213.0	0.83662	CONTINENTAL BRACKISH
ST-310	1213.0-1214.0	0.59555	MARINE
ST-312	1217.0-1221.5	0.79450	CONTINENTAL BRACKISH
ST-313	1221.5-1225.0	0.95478	CONTINENTAL BRACKISH
ST-314	1225.0-1226.0	0.85090	CONTINENTAL BRACKISH
ST-315	1226.0 1228.5	0.59808	CONTINENTAL BRACKISH
ST-317	1232.0-1234.5	0.68411	MARINE
ST-318	1234.5-1235.5	0.87142	MARINE
ST-319	1235.5-1238.0	0.93163	MARINE
ST-320	1238.0-1242.5	0.96801	MARINE
ST-321	1242.5-1242.8	0.60218	MARINE
ST-322	1242.8-1244.5	0.99280	CONTINENTAL BRACKISH
ST-323	1244.5-1245.5	0.71458	CONTINENTAL BRACKISH
ST-324	1245.5-1247.5	0.51751	CONTINENTAL BRACKISH
ST-325	1247.5-1249.5	0.88426	CONTINENTAL BRACKISH
ST-326	1249.5-1250.5	0.88755	MARINE
ST-327	1252.5-1257.0	0.99937	MARINE
ST-329	1257.5-1258.0	0.96193	CONTINENTAL BRACKISH
ST-331	1258.5-1261.0	0.96271	CONTINENTAL BRACKISH
ST-332	1261.0-1264.5	0.99679	MARINE
ST-333	1264.5-1265.5	0.98632	CONTINENTAL BRACKISH
ST-335	1266.5-1271.5	0.96805	CONTINENTAL BRACKISH
ST-336	1271.5-1276.5	0.97169	CONTINENTAL BRACKISH
ST-337	1276.5-1281.0	0.98215	CONTINENTAL BRACKISH
ST-338	1281.0 1285.5	0.99911	CONTINENTAL BRACKISH

ST-340	1286.0-1286.5	0.72351	MARINE
ST-342	1286.7 1288.5	0.70289	CONTINENTAL BRACKISH
ST-343	1288.5-1294.0	0.55157	CONTINENTAL BRACKISH
ST-344	1288.5-1294.0	0.65063	CONTINENTAL BRACKISH
ST-345	1294.0-1296.0	0.82230	CONTINENTAL BRACKISH
ST-347	1298.0-1301.5	0.71228	CONTINENTAL BRACKISH
ST-348	1301.5-1305.0	0.83022	CONTINENTAL BRACKISH
ST-350	1305.5-1305.7	0.72681	CONTINENTAL BRACKISH
ST-351	1305.7-1306.5	0.52926	CONTINENTAL BRACKISH
ST-352	1306.5-1306.7	0.65280	MARINE
ST-353	1306.7-1307.2	0.90334	CONTINENTAL BRACKISH
ST-356	1310.5-1313.0	0.73923	MARINE
ST-357	1313.0-1314.0	0.63335	CONTINENTAL BRACKISH
ST-360	1320.0-1322.5	0.76546	CONTINENTAL BRACKISH
ST-361	1322.5-1324.0	0.81100	MARINE
ST-362	1324.0-1326.0	0.89022	CONTINENTAL BRACKISH
ST-363	1326.0-1330.0	0.78045	CONTINENTAL BRACKISH
ST-364	1330.0 1337.5	0.98851	CONTINENTAL BRACKISH
ST-365	1337.5-1337.7	0.89477	CONTINENTAL BRACKISH
ST-366	1337.7-1340.0	0.99632	CONTINENTAL BRACKISH
ST-367	1340.0-1341.5	0.99914	CONTINENTAL BRACKISH
ST-368	1341.5-1345.0	0.99350	CONTINENTAL BRACKISH
ST-369	1345.0-1346.0	0.98600	CONTINENTAL BRACKISH
ST-370	1346.0-1348.0	0.99962	CONTINENTAL BRACKISH
ST-371	1348.0-1348.5	1.00000	MARINE
ST-374	1351.0-1352.5	0.95721	CONTINENTAL BRACKISH
ST-375	1352.5-1355.0	0.97368	CONTINENTAL BRACKISH
ST-376	1355.0-1360.0	0.99740	CONTINENTAL BRACKISH
ST-378	1360.2-1364.0	0.99995	CONTINENTAL BRACKISH
ST-379	1364.0-1368.0	0.99471	CONTINENTAL BRACKISH
ST-381	1370.0-1371.7	0.97745	CONTINENTAL BRACKISH
ST-382	1371.7-1372.7	0.94429	CONTINENTAL BRACKISH
ST-383	1372.7-1376.0	0.99923	CONTINENTAL BRACKISH
ST-387	1386.0-1386.5	0.92669	CONTINENTAL BRACKISH
ST-388	1386.5-1392.5	0.97537	CONTINENTAL BRACKISH
ST-389	1392.5-1393.5	0.98225	CONTINENTAL BRACKISH
ST-390	1393.5-1398.5	0.99353	CONTINENTAL BRACKISH
ST-391	1398.5-1402.0	0.99822	CONTINENTAL BRACKISH
ST-393	1410.0-1412.0	0.97056	CONTINENTAL BRACKISH
ST-394	1412.0-1418.0	0.99305	CONTINENTAL BRACKISH
ST-395	1418.0-1425.0	0.99717	CONTINENTAL BRACKISH
ST-396	1425.0-1430.5	0.99284	CONTINENTAL BRACKISH
ST-397	1430.5-1437.0	0.99592	CONTINENTAL BRACKISH
ST-398	1437.0-1441.5	0.99393	CONTINENTAL BRACKISH
ST-399	1441.5-1442.0	0.99894	CONTINENTAL BRACKISH
ST-400	1442.0-1450.0	0.98328	CONTINENTAL BRACKISH
ST-401	1450.0-1456.5	0.97474	CONTINENTAL BRACKISH
ST-402	1456.5-1461.5	0.92516	CONTINENTAL BRACKISH
ST-403	1461.5 1466.5	0.90979	MARINE
ST-404	1466.5-1471.5	0.96673	MARINE
ST-405	1471.5-1477.5	0.54226	CONTINENTAL BRACKISH
ST-406	1477.5-1483.0	0.99780	CONTINENTAL BRACKISH
ST-407	1483.0-1483.5	0.57738	MARINE
ST-408	1483.5-1489.0	0.99987	CONTINENTAL BRACKISH
ST-409	1489.0-1491.5	0.99969	CONTINENTAL BRACKISH
ST-410	1491.5-1492.0	0.99555	CONTINENTAL BRACKISH
ST-411	1492.0-1496.5	0.99955	CONTINENTAL BRACKISH
ST-412	1496.5-1499.0	0.99813	CONTINENTAL BRACKISH
ST-413	1499.0-1505.5	0.97003	CONTINENTAL BRACKISH
ST-414	1505.5-1506.0	0.99670	CONTINENTAL BRACKISH
ST-415	1506.0-1511.0	0.96434	CONTINENTAL BRACKISH
ST-416	1511.0-1514.0	0.86454	CONTINENTAL BRACKISH
ST-417	1514.0-1515.0	0.95890	CONTINENTAL BRACKISH
ST-418	1515.0-1519.0	0.78498	CONTINENTAL BRACKISH
ST-420	1520.0-1529.0	0.73321	CONTINENTAL BRACKISH
ST-421	1529.0-1536.0	0.51410	CONTINENTAL BRACKISH
ST-422	1536.0-1537.5	0.87779	CONTINENTAL BRACKISH
ST-423	1537.5-1539.5	0.72609	MARINE

DISCRIMINANT ANALYSIS.....CON BRACK VS MARINE TWENTY FOUR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 24
SAMPLE SIZES..

GROUP	
1	199
2	199

DISCRIMINANT FUNCTION CONTINENTAL BRACKISH

CONSTANT * COEFFICIENTS
-672.1210937500 *

0.0023022140	0.0038947670	0.0017466519	-0.0009948500
-0.0034743431	-0.0003552490	0.0013260569	0.0097321644
0.0315331593	-0.0017535309	-0.2281978130	-0.6965434551
-2.6554460526	2.2432565689	-0.1974661946	0.5882895589
-0.1545892954	-0.0027592271	0.7053164244	0.0008847020
-0.0168817602	0.0415930673	0.2089881301	-0.0522475988

DISCRIMINANT FUNCTION MARINE

CONSTANT * COEFFICIENTS
-655.8234863281 *

0.0022711051	0.0038666320	0.0017484350	-0.0009121930
0.0034354799	-0.0003468259	0.0011681900	0.0094515420
0.0343351588	-0.0061298162	-0.1170145273	-0.8353856802
-2.7221860886	2.7983722687	-0.4444887638	0.5841623545
-0.1550185084	-0.0033960200	0.6673902869	0.0008191429
-0.0041047707	0.0589203984	0.2134955525	-0.0565382838

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-424	1539.5-1540.0	0.94248	CONTINENTAL BRACKISH
ST-425	1540.0-1545.5	0.93088	MARINE
ST-426	1545.5-1551.0	0.94870	CONTINENTAL BRACKISH
ST-427	1551.0-1553.0	0.58362	MARINE
ST-428	1553.0-1555.0	0.98161	CONTINENTAL BRACKISH
ST-429	1555.0 1560.0	0.94559	CONTINENTAL BRACKISH
ST-430	1560.0-1562.5	0.96996	CONTINENTAL BRACKISH
ST-431	1562.5-1563.0	0.99890	CONTINENTAL BRACKISH
ST-433	1564.0-1566.0	0.99905	CONTINENTAL BRACKISH
ST-434	1566.0-1569.0	0.99889	CONTINENTAL BRACKISH
ST-435	1569.0 1570.5	0.99920	CONTINENTAL BRACKISH
ST-436	1570.5-1571.0	0.99383	CONTINENTAL BRACKISH
ST-437	1571.0-1572.5	0.97583	CONTINENTAL BRACKISH
ST-439	1573.5-1577.5	0.99239	CONTINENTAL BRACKISH
ST-440	1577.5-1582.0	0.64947	MARINE
ST-441	1582.0-1585.5	0.79307	MARINE
ST-442	1585.5-1590.5	0.57416	CONTINENTAL BRACKISH
ST-443	1590.5-1595.0	0.71909	MARINE
ST-444	1595.0-1597.5	0.90844	MARINE
ST-445	1597.5-1600.5	0.98241	CONTINENTAL BRACKISH
ST-447	1601.0-1601.2	0.99600	CONTINENTAL BRACKISH
ST-448	1601.2-1605.0	0.86148	MARINE
ST-449	1605.0-1608.5	0.57242	CONTINENTAL BRACKISH
ST-451	1611.5-1613.0	0.57565	CONTINENTAL BRACKISH
ST-452	1613.0-1614.0	0.91102	CONTINENTAL BRACKISH
ST-454	1614.2-1614.5	0.96567	CONTINENTAL BRACKISH
ST-456	1617.5-1617.6	0.99592	CONTINENTAL BRACKISH
ST-458	1622.5-1623.0	0.91335	CONTINENTAL BRACKISH
ST-459	1623.0-1624.0	0.98703	CONTINENTAL BRACKISH
ST-462	1625.7-1628.0	0.98059	CONTINENTAL BRACKISH
ST-464	1631.0-1633.5	0.99808	CONTINENTAL BRACKISH
ST-465	1633.5-1638.5	0.98767	CONTINENTAL BRACKISH
ST-466	1638.5-1640.0	0.99854	CONTINENTAL BRACKISH
ST-468	1641.0-1647.0	0.98940	MARINE
ST-469	1642.0-1652.0	0.98803	MARINE
ST-470	1652.0-1657.0	0.96858	MARINE
ST-471	1657.0-1662.0	0.98356	MARINE
ST-472	1662.0-1666.0	0.89548	MARINE
ST-473	1666.0-1668.0	1.00000	MARINE
ST-474	1668.0-1672.0	0.94743	MARINE
ST-475	1672.0-1677.0	0.99959	MARINE
ST-476	1677.0-1683.0	0.99215	MARINE
ST-477	1683.0-1684.0	0.99544	MARINE
ST-478	1684.0-1688.0	0.99977	MARINE
ST-479	1688.0-1689.0	0.99966	MARINE
ST-480	1689.0-1693.0	0.99874	MARINE
ST-481	1693.0-1694.0	0.99983	MARINE
ST-482	1694.0-1697.0	0.99989	MARINE
ST-483	1697.0-1698.0	0.99500	MARINE

ST-485	1702.5-1705.0	0.99616	CONTINENTAL BRACKISH
ST-486	1705.0-1707.0	0.92657	CONTINENTAL BRACKISH
ST-487	1707.0-1711.0	0.99975	CONTINENTAL BRACKISH
ST-488	1711.0-1715.5	0.97248	CONTINENTAL BRACKISH
ST-490	1716.0-1721.0	0.97846	CONTINENTAL BRACKISH
ST-491	1721.0-1725.5	0.65423	CONTINENTAL BRACKISH
ST-492	1725.5-1728.0	0.84610	MARINE
ST-493	1728.0-1730.0	0.81457	CONTINENTAL BRACKISH
ST-494	1730.0-1735.0	0.82464	CONTINENTAL BRACKISH
ST-495	1735.0-1736.0	0.80256	CONTINENTAL BRACKISH
ST-496	1736.0-1736.2	0.99786	CONTINENTAL BRACKISH
ST-497	1736.2-1739.5	0.99773	CONTINENTAL BRACKISH
ST-498	1739.5-1743.0	0.95003	CONTINENTAL BRACKISH
ST-499	1743.0-1750.5	0.99957	CONTINENTAL BRACKISH
ST-500	1750.5-1751.5	0.67774	MARINE
ST-503	1753.0-1754.0	0.96252	CONTINENTAL BRACKISH
ST-504	1754.0-1755.5	0.84283	MARINE
ST-505	1755.5-1757.5	0.98404	CONTINENTAL BRACKISH
ST-506	1757.5-1759.0	0.67603	CONTINENTAL BRACKISH
ST-507	1759.0-1762.0	0.91817	CONTINENTAL BRACKISH
ST-508	1762.0-1765.0	0.97105	CONTINENTAL BRACKISH
ST-509	1765.0-1767.0	0.86282	MARINE
ST-510	1767.0 1768.0	0.93579	MARINE
ST-512	1768.3-1769.0	0.94326	CONTINENTAL BRACKISH
ST-513	1769.0-1770.0	0.90929	CONTINENTAL BRACKISH
ST-515	1771.0-1771.5	0.98583	CONTINENTAL BRACKISH
ST-516	1771.5-1778.0	0.99899	CONTINENTAL BRACKISH
ST-517	1778.0-1779.5	0.99230	CONTINENTAL BRACKISH
ST-518	1779.5-1781.5	0.99995	CONTINENTAL BRACKISH
ST-519	1781.5-1782.5	0.99714	CONTINENTAL BRACKISH
ST-520	1782.5-1783.0	0.99293	CONTINENTAL BRACKISH
ST-521	1783.0 1784.0	0.99982	CONTINENTAL BRACKISH
ST-522	1784.0-1785.5	0.99798	CONTINENTAL BRACKISH
ST-523	1785.5-1787.0	0.98669	CONTINENTAL BRACKISH
ST-524	1787.0-1788.5	0.99978	CONTINENTAL BRACKISH
ST-525	1788.5-1789.0	0.97315	CONTINENTAL BRACKISH
ST-526	1789.0-1790.5	0.99125	CONTINENTAL BRACKISH
ST-527	1790.5-1793.0	0.99335	CONTINENTAL BRACKISH
ST-528	1793.0-1797.0	0.99339	CONTINENTAL BRACKISH
ST-529	1797.0-1798.5	0.99139	CONTINENTAL BRACKISH
ST-530	1798.5-1799.0	0.94886	CONTINENTAL BRACKISH
ST-531	1799.0-1800.5	0.99989	CONTINENTAL BRACKISH
ST-532	1800.5-1804.0	0.99952	CONTINENTAL BRACKISH
ST-533	1804.0-1806.0	0.99739	CONTINENTAL BRACKISH
ST-534	1806.0-1808.0	0.83090	CONTINENTAL BRACKISH
ST-535	1808.0-1814.5	0.70952	CONTINENTAL BRACKISH
ST-536	1814.5-1815.5	0.99929	CONTINENTAL BRACKISH
ST-537	1815.5-1818.5	0.99822	CONTINENTAL BRACKISH
ST-538	1818.5-1819.0	0.97097	CONTINENTAL BRACKISH
ST-539	1819.0-1821.0	0.88760	CONTINENTAL BRACKISH
ST-540	1821.0-1823.0	0.99062	CONTINENTAL BRACKISH
ST-541	1823.0-1825.5	0.99524	CONTINENTAL BRACKISH
ST-542	1825.5-1827.0	0.99743	CONTINENTAL BRACKISH
ST-543	1827.0-1830.0	0.99711	CONTINENTAL BRACKISH
ST-544	1830.0-1831.5	0.72735	CONTINENTAL BRACKISH
ST-545	1831.5-1833.0	0.90364	CONTINENTAL BRACKISH
ST-546	1833.0-1834.0	0.99909	CONTINENTAL BRACKISH
ST-547	1834.0-1835.5	0.99454	CONTINENTAL BRACKISH
ST-548	1835.5-1837.0	0.95388	CONTINENTAL BRACKISH
ST-549	1837.0-1844.0	0.99924	CONTINENTAL BRACKISH
ST-550	1844.0-1844.5	0.99862	CONTINENTAL BRACKISH
ST-551	1844.5-1845.0	0.99529	CONTINENTAL BRACKISH
ST-552	1845.0-1846.0	0.98930	CONTINENTAL BRACKISH
ST-553	1846.0-1847.0	0.99984	CONTINENTAL BRACKISH
ST-554	1847.0-1850.0	0.99768	CONTINENTAL BRACKISH
ST-555	1850.0-1851.0	0.97544	CONTINENTAL BRACKISH
ST-556	1851.0-1853.0	0.73825	CONTINENTAL BRACKISH
ST-557	1853.0-1853.5	0.98640	CONTINENTAL BRACKISH
ST-558	1853.5-1855.5	0.99742	CONTINENTAL BRACKISH
ST-559	1855.5-1857.0	0.99761	CONTINENTAL BRACKISH
ST-560	1857.0-1857.5	0.95383	CONTINENTAL BRACKISH
ST-561	1857.5-1859.0	0.98903	CONTINENTAL BRACKISH
ST-563	1860.5-1861.5	0.99799	CONTINENTAL BRACKISH
ST-564	1861.5-1867.0	0.99973	CONTINENTAL BRACKISH
ST-565	1867.0-1868.0	0.99913	CONTINENTAL BRACKISH
ST-566	1868.0-1868.5	0.99989	CONTINENTAL BRACKISH
ST-567	1868.5-1873.0	0.93554	CONTINENTAL BRACKISH
ST-568	1873.0-1878.0	0.63182	CONTINENTAL BRACKISH
ST-569	1878.0 1883.0	0.78283	CONTINENTAL BRACKISH
ST-570	1883.0-1886.0	0.89745	MARINE
ST-571	1886.0-1887.5	0.63884	CONTINENTAL BRACKISH
ST-572	1887.5-1892.5	0.59390	MARINE
ST-573	1892.5-1893.5	0.57642	MARINE
ST-574	1893.5-1895.0	0.65660	MARINE
ST-575	1895.0-1896.5	0.56578	MARINE
ST-576	1896.5-1898.5	0.99242	CONTINENTAL BRACKISH
ST-577	1898.5-1900.0	0.91538	CONTINENTAL BRACKISH

ST-580	1910.5-1912.5	0.75442	CONTINENTAL BRACKISH
ST-581	1912.5-1914.5	0.87429	CONTINENTAL BRACKISH
ST-582	1914.5-1916.0	0.82534	CONTINENTAL BRACKISH
ST-583	1916.0-1920.0	0.99519	CONTINENTAL BRACKISH
ST-584	1920.0-1921.0	0.99912	CONTINENTAL BRACKISH
ST-585	1921.0-1925.5	0.99967	CONTINENTAL BRACKISH
ST-586	1925.5-1927.5	0.75708	MARINE
ST-587	1927.5-1929.0	0.84303	MARINE
ST-588	1929.0-1930.5	0.99999	MARINE
ST-589	1930.5-1936.5	0.99358	CONTINENTAL BRACKISH
ST-590	1936.5-1936.8	0.92387	CONTINENTAL BRACKISH
ST-591	1936.8-1942.0	0.94891	CONTINENTAL BRACKISH
ST-592	1942.0-1943.5	0.55519	CONTINENTAL BRACKISH
ST-593	1943.5-1944.5	0.77844	MARINE
ST-594	1944.5-1945.5	0.94825	CONTINENTAL BRACKISH
ST-595	1945.5-1947.0	0.94870	MARINE
ST-596	1947.0-1948.0	0.82230	CONTINENTAL BRACKISH
ST-597	1948.0-1953.0	0.61769	MARINE
ST-598	1953.0-1954.0	0.93140	MARINE
ST-599	1954.0-1955.5	0.57278	MARINE
ST-600	1955.5-1956.0	0.63313	CONTINENTAL BRACKISH
ST-601	1956.0-1958.0	0.98104	MARINE
ST-602	1958.0-1959.0	1.00000	MARINE
ST-603	1959.0-1959.7	0.99518	MARINE
ST-604	1959.7-1960.7	0.92868	CONTINENTAL BRACKISH
ST-605	1960.7-1960.9	0.84098	MARINE
ST-606	1960.9-1962.0	0.57260	MARINE
ST-607	1962.0-1963.3	0.98434	MARINE
ST-608	1963.3-1964.0	0.99754	CONTINENTAL BRACKISH
ST-609	1964.0-1966.0	0.95235	CONTINENTAL BRACKISH
ST-610	1966.0-1968.0	0.99965	CONTINENTAL BRACKISH
ST-611	1968.0-1970.5	0.84978	CONTINENTAL BRACKISH
ST-612	1970.5-1974.0	0.87115	CONTINENTAL BRACKISH
ST-613	1974.0-1983.0	0.99166	MARINE
ST-614	1983.0-1983.5	0.96283	MARINE
ST-615	1983.5-1989.0	0.79025	CONTINENTAL BRACKISH
ST-616	1989.0-1990.5	0.99881	MARINE
ST-617	1990.5-1993.5	0.93621	CONTINENTAL BRACKISH
ST-618	1993.5-1999.5	0.99977	MARINE
ST-619	1999.5-2000.5	0.99913	MARINE
ST-620	2000.5-2007.0	0.90414	MARINE
ST-621	2007.0-2012.0	0.99999	MARINE
ST-622	2012.0-2017.0	0.99917	MARINE
ST-624	2019.5-2021.5	0.86422	MARINE
ST-625	2021.5-2027.0	0.99913	MARINE
ST-626	2027.0-2027.5	0.99995	MARINE
ST-627	2027.5-2032.5	0.68595	MARINE
ST-628	2032.5-2038.0	0.88526	MARINE
ST-629	2038.0-2040.0	0.53819	CONTINENTAL BRACKISH
ST-630	2040.0-2041.0	0.65638	CONTINENTAL BRACKISH
ST-631	2041.0-2044.0	0.98233	CONTINENTAL BRACKISH
ST-632	2044.0-2045.5	0.90856	MARINE
ST-633	2045.5-2048.5	0.60066	MARINE
ST-634	2048.5-2050.5	0.51861	MARINE
ST-635	2050.5-2051.0	0.99246	MARINE
ST-636	2051.0-2054.0	0.95016	MARINE
ST-637	2054.0-2055.0	0.69689	CONTINENTAL BRACKISH
ST-638	2055.0-2056.0	0.65594	MARINE
ST-639	2056.0-2057.5	0.99975	MARINE
ST-640	2057.5-2059.5	0.99996	MARINE

GROUP MARINE

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-641	2059.5-2062.5	0.99721	MARINE
ST-642	2062.5-2068.5	0.99985	MARINE
ST-643	2068.5-2074.5	0.99924	MARINE
ST-644	2074.5-2078.0	0.99967	MARINE
ST-645	2078.0-2083.0	0.99958	MARINE
ST-646	2083.0-2085.5	0.99995	MARINE
ST-647	2085.5-2086.0	1.00000	MARINE
ST-648	2086.0-2088.0	0.99997	MARINE
ST-649	2088.0-2089.0	1.00000	MARINE
ST-650	2089.0-2093.5	0.97240	MARINE
ST-651	2093.5-2095.5	0.73106	MARINE
ST-652	2095.5-2097.0	0.99937	MARINE
ST-653	2097.0-2099.0	0.99980	MARINE
ST-654	2099.0-2101.0	0.99996	MARINE
ST-655	2101.0-2104.0	1.00000	MARINE
ST-656	2104.0-2108.0	0.99999	MARINE
ST-657	2108.0-2114.0	0.99976	MARINE
ST-658	2114.0-2119.5	0.99936	MARINE
ST-659	2119.5-2125.5	0.99994	MARINE
ST-660	2125.5-2127.5	1.00000	MARINE
ST-661	2127.5-2128.5	0.99990	MARINE
ST-662	2128.5-2133.0	0.95754	MARINE
ST-663	2133.0-2135.5	0.99996	MARINE

ST-665	2136.5-2138.5	0.99919	MARINE
ST-666	2138.5-2141.5	0.99972	MARINE
ST-667	2141.5-2143.5	0.97548	MARINE
ST-668	2143.5-2144.0	1.00000	MARINE
ST-669	2144.0-2145.0	1.00000	MARINE
ST-670	2145.0-2145.5	0.99540	MARINE
ST-671	2145.5-2147.0	1.00000	MARINE
ST-672	2147.0-2149.5	0.99947	MARINE
ST-673	2149.5-2150.5	1.00000	MARINE
ST-674	2150.5-2151.0	1.00000	MARINE
ST-675	2151.0-2152.0	0.99996	MARINE
ST-676	2152.0-2153.0	0.99998	MARINE
ST-677	2153.0-2154.0	0.99999	MARINE
ST-678	2154.0-2161.0	0.99993	MARINE
ST-679	2161.0-2162.0	0.99999	MARINE
ST-680	2162.0-2163.5	0.99993	MARINE
ST-683	2166.0-2166.5	0.91819	MARINE
ST-684	2166.5-2167.5	0.56500	MARINE
ST-685	2167.5-2169.0	0.99974	MARINE
ST-686	2169.0-2172.0	0.99993	MARINE
ST-687	2172.0-2173.5	0.99999	MARINE
ST-688	2173.5-2176.5	0.99924	MARINE
ST-689	2176.5-2178.0	0.99999	MARINE
ST-690	2178.0-2178.5	0.99988	MARINE
ST-692	2179.0-2181.5	0.78911	MARINE
ST-693	2181.5-2183.5	1.00000	MARINE
ST-694	2183.5-2184.0	0.99625	MARINE
ST-695	2184.0-2186.0	0.99974	MARINE
ST-696	2186.0-2187.5	0.99998	MARINE
ST-698	2188.0-2189.0	0.97906	MARINE
ST-699	2189.0-2193.0	0.94367	MARINE
ST-700	2193.0-2194.0	0.88996	MARINE
ST-701	2194.0-2196.0	0.99642	MARINE
ST-702	2196.0-2199.5	0.99837	MARINE
ST-703	2199.5-2201.5	0.83789	MARINE
ST-704	2201.5-2203.0	0.69347	MARINE
ST-705	2203.0-2209.0	0.99897	MARINE
ST-706	2209.0-2213.0	0.98858	MARINE
ST-707	2213.0-2214.0	0.95394	MARINE
ST-708	2214.0-2218.5	0.99970	MARINE
ST-709	2218.5-2219.5	1.00000	MARINE
ST-710	2219.5-2226.0	0.99907	MARINE
ST-711	2226.0-2227.0	0.99971	MARINE
ST-712	2227.0-2232.5	0.99947	MARINE
ST-713	2232.5-2235.0	0.99489	MARINE
ST-714	2235.0-2236.0	0.99965	MARINE
ST-716	2236.2-2237.0	0.84639	CONTINENTAL BRACKISH
ST-717	2237.0-2242.5	0.84393	MARINE
ST-718	2242.5-2244.0	0.86579	CONTINENTAL BRACKISH
ST-719	2244.0-2246.0	0.99940	MARINE
ST-720	2246.0-2247.0	0.80073	MARINE
ST-721	2247.0-2248.0	0.89405	MARINE
ST-722	2248.0-2252.5	0.99969	MARINE
ST-723	2252.5-2255.5	0.99772	MARINE
ST-724	2255.5-2256.5	0.96341	MARINE
ST-725	2256.5-2259.5	0.99973	MARINE
ST-726	2259.5-2261.0	0.98965	CONTINENTAL BRACKISH
ST-727	2261.0-2265.5	0.94902	MARINE
ST-728	2265.5-2266.5	0.95826	MARINE
ST-729	2266.5-2271.0	0.98579	MARINE
ST-730	2271.0-2275.5	0.95531	MARINE
ST-731	2275.5-2279.0	0.97209	MARINE
ST-732	2279.0-2279.5	0.90457	MARINE
ST-733	2279.5-2281.0	0.99795	MARINE
ST-734	2281.0-2286.5	0.92844	MARINE
ST-735	2286.5-2289.0	0.99999	MARINE
ST-736	2289.0-2292.0	0.99939	MARINE
ST-737	2292.0-2297.5	0.99999	MARINE
ST-738	2297.5-2298.0	0.99998	MARINE
ST-739	2298.0-2299.5	0.99986	MARINE
ST-740	2298.5-2301.0	1.00000	MARINE
ST-741	2301.0-2302.7	0.99997	MARINE
ST-742	2302.7-2303.0	0.99999	MARINE
ST-743	2303.0-2304.0	0.97583	MARINE
ST-744	2304.0-2310.0	0.99695	MARINE
ST-745	2310.0-2315.0	1.00000	MARINE
ST-746	2315.0-2319.0	0.99987	MARINE
ST-747	2319.0-2324.0	0.98031	MARINE
ST-748	2324.0-2325.0	0.83672	MARINE
ST-749	2325.0-2325.5	1.00000	MARINE
ST-750	2325.5-2326.0	0.83599	MARINE
ST-751	2326.0-2326.5	0.99997	MARINE
ST-752	2326.5-2328.0	0.98948	MARINE
ST-753	2328.0-2333.0	0.99997	MARINE
ST-754	2333.0-2335.0	0.59978	MARINE
ST-755	2335.0-2337.0	0.96924	MARINE
ST-756	2337.0-2339.0	0.67459	MARINE

ST-759	2344.0-2345.0	0.90850	MARINE
ST-760	2345.0-2349.0	0.65886	MARINE
ST-761	2349.0-2351.5	0.97794	MARINE
ST-762	2351.5-2352.0	0.99648	MARINE
ST-763	2352.0-2357.0	0.96717	MARINE
ST-764	2357.0-2361.5	0.99939	MARINE
ST-765	2361.5-2362.5	0.93712	MARINE
ST-766	2362.5-2364.5	0.81692	MARINE
ST-767	2364.5-2369.0	0.99799	MARINE
ST-768	2369.0-2370.0	0.66449	MARINE
ST-769	2370.0-2371.0	0.97211	CONTINENTAL BRACKISH
ST-770	2371.0-2372.5	0.99985	MARINE
ST-771	2372.5-2374.0	0.76029	MARINE
ST-772	2374.0-2375.5	0.99956	MARINE
ST-773	2375.5-2377.0	1.00000	MARINE
ST-774	2377.0-2377.5	0.99385	MARINE
ST-775	2377.5-2379.0	0.98167	MARINE
ST-776	2379.0-2380.0	0.99999	MARINE
ST-777	2380.0-2383.5	0.99543	MARINE
ST-778	2383.5-2385.5	0.99995	MARINE
ST-779	2385.5-2387.0	0.99987	MARINE
ST-780	2387.0-2389.0	0.84267	MARINE
ST-781	2389.0-2389.5	0.95304	CONTINENTAL BRACKISH
ST-782	2389.5-2391.0	0.99999	MARINE
ST-783	2391.0-2391.5	0.99723	MARINE
ST-784	2391.5-2392.0	0.87637	MARINE
ST-785	2392.0-2393.5	0.98432	MARINE
ST-786	2393.5-2394.0	0.89440	MARINE
ST-787	2394.0-2394.5	0.50110	MARINE
ST-788	2394.5-2396.5	0.99795	MARINE
ST-789	2396.5-2399.0	0.85750	MARINE
ST-790	2399.0-2400.0	0.99787	MARINE
ST-791	2400.0-2402.5	0.99209	MARINE
ST-792	2402.5-2403.5	0.97133	MARINE
ST-793	2403.5-2405.0	0.64713	MARINE
ST-794	2405.0-2406.5	0.99110	MARINE
ST-795	2406.5-2407.5	0.98279	MARINE
ST-796	2407.5-2410.0	0.96151	MARINE
ST-797	2410.0-2416.0	0.99980	MARINE
ST-798	2416.0-2419.0	0.99523	MARINE
ST-799	2419.0-2425.0	0.99509	MARINE
ST-800	2425.0-2427.0	0.93157	MARINE
ST-801	2427.0-2428.0	0.85815	CONTINENTAL BRACKISH
ST-802	2428.0-2431.0	0.97277	MARINE
ST-803	2431.0-2431.5	1.00000	CONTINENTAL BRACKISH
ST-804	2431.5-2432.5	0.84196	MARINE
ST-805	2432.5-2434.0	0.98720	MARINE
ST-806	2434.0-2435.5	0.75188	CONTINENTAL BRACKISH
ST-807	2435.5-2438.0	0.85501	MARINE
ST-808	2438.0-2439.5	0.97307	MARINE
ST-809	2439.5-2442.0	0.85492	CONTINENTAL BRACKISH
ST-810	2442.0-2444.0	0.55381	CONTINENTAL BRACKISH
ST-811	2444.0-2447.5	0.99384	MARINE
ST-812	2447.5-2449.0	0.99870	MARINE
ST-813	2449.0-2453.0	0.99025	MARINE
ST-814	2453.0-2455.0	0.98182	MARINE
ST-815	2455.0-2457.5	0.99231	MARINE
ST-816	2457.5-2466.0	0.93557	MARINE
ST-817	2466.0-2470.0	0.95203	MARINE
ST-818	2470.0-2471.5	0.97123	MARINE
ST-819	2471.5-2475.0	0.88735	MARINE
ST-820	2475.0-2478.0	0.94842	MARINE
ST-821	2478.0-2479.5	0.99904	MARINE
ST-822	2479.5-2481.0	0.97332	CONTINENTAL BRACKISH
ST-823	2481.0-2486.0	0.96492	MARINE
ST-824	2486.0-2486.5	0.98660	CONTINENTAL BRACKISH
ST-825	2486.5-2488.0	0.89718	MARINE
ST-826	2488.0-2491.0	0.69997	MARINE
ST-827	2491.0-2493.0	0.77840	CONTINENTAL BRACKISH
ST-828	2493.0-2498.5	0.54867	CONTINENTAL BRACKISH
ST-829	2498.5-2503.5	0.58409	MARINE
ST-830	2503.5-2508.5	0.70786	MARINE
ST-831	2508.5-2515.0	0.93774	MARINE
ST-832	2515.0-2517.0	0.97706	CONTINENTAL BRACKISH
ST-833	2517.0-2520.0	0.91043	CONTINENTAL BRACKISH
ST-834	2520.0-2525.0	0.70741	CONTINENTAL BRACKISH
ST-835	2525.0-2525.5	0.78481	CONTINENTAL BRACKISH
ST-836	2525.5-2531.0	0.52232	CONTINENTAL BRACKISH
ST-837	2531.0-2532.0	0.92938	MARINE
ST-838	2532.0-2533.5	0.90068	CONTINENTAL BRACKISH
ST-839	2533.5-2535.0	0.59620	MARINE
ST-840	2535.0-2537.0	0.63940	CONTINENTAL BRACKISH
ST-841	2537.0-2538.0	0.99950	CONTINENTAL BRACKISH
ST-842	2538.0-2538.7	0.80112	CONTINENTAL BRACKISH
ST-844	2539.0-2540.0	0.56788	CONTINENTAL BRACKISH
ST-845	2540.0-2541.0	0.99279	MARINE

Appendix 9

Classification for the Unknown Samples in the Groups Continental vs. Brackish 24 Variables

DISCRIMINANT ANALYSIS.....CONTINENTAL VS BRACKISH TWENTY FOUR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 24
SAMPLE SIZES..

GROUP	
1	189
2	189

DISCRIMINANT FUNCTION CONTINENTAL
CONSTANT * COEFFICIENTS
-663.8369140625 *

0.0019659661	0.0050696507	0.0006231421	-0.0000616750
0.0034450591	-0.0007798420	-0.0005365841	-0.0110258907
0.0655317307	0.0233819932	-1.4350414276	-0.7451632619
-2.4571886063	4.8100519180	-0.2483499050	0.5155697465
-0.1032204628	-0.0046755746	0.5587678552	0.0008383561
0.0311754867	0.1078732610	0.2280504107	-0.0095824599

DISCRIMINANT FUNCTION BRACKISH
CONSTANT * COEFFICIENTS
-642.0764160156 *

0.0019000189	0.0049727596	0.0007596740	-0.0005858261
0.0034354839	-0.0005764819	0.0000255920	0.0106478557
0.0655161142	0.0244941637	-1.1779479980	-0.7116690278
-2.5129718781	4.5443363190	0.3072032928	0.4894944429
-0.1079488397	-0.0030409261	0.5783316493	0.0007662550
0.0068739504	0.1114441156	0.1816170812	0.0122581124

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL

SAMPLE NO.	DEPTH		PROBABILITY	SAMPLE CLASSIFICATION
ST -1	599.5	0.0	0.97837	CONTINENTAL
ST -2	600.0	0.0	0.98535	CONTINENTAL
ST -3	600.0	-602.0	0.99998	CONTINENTAL
ST -4	602.0	-603.2	1.00000	CONTINENTAL
ST -5	603.2	-603.4	0.99984	CONTINENTAL
ST -6	603.4	-605.7	0.99992	CONTINENTAL
ST -7	605.7	-607.2	0.99997	CONTINENTAL
ST -9	607.4	-611.5	0.99997	CONTINENTAL
ST -10	611.5	-612.0	1.00000	CONTINENTAL
ST -11	612.0	-616.3	0.99998	CONTINENTAL
ST -12	616.3	-618.0	0.99941	CONTINENTAL
ST -13	618.0	-622.0	0.99998	CONTINENTAL
ST -14	622.0	-623.0	0.99985	CONTINENTAL
ST -15	623.0	-624.0	0.99997	CONTINENTAL
ST -16	624.0	-631.0	0.99916	CONTINENTAL
ST -17	631.0	-632.3	0.99994	CONTINENTAL
ST -18	632.3	-633.8	0.99950	CONTINENTAL
ST -19	633.8	-635.0	0.99943	CONTINENTAL
ST -20	635.0	-638.0	0.99845	CONTINENTAL
ST -21	638.0	-640.0	0.99188	CONTINENTAL
ST -22	640.0	-644.5	0.99996	CONTINENTAL
ST -23	644.5	-645.0	0.99999	CONTINENTAL
ST -24	645.0	-648.0	0.99998	CONTINENTAL
ST -25	645.0	-650.5	1.00000	CONTINENTAL
ST -26	650.5	-652.0	1.00000	CONTINENTAL
ST -27	652.0	-653.5	1.00000	CONTINENTAL
ST -28	653.5	-657.0	1.00000	CONTINENTAL
ST -29	657.0	-658.0	1.00000	CONTINENTAL
ST -30	658.0	-660.5	1.00000	CONTINENTAL
ST -31	660.5	-661.0	0.99996	CONTINENTAL
ST -32	661.0	-662.0	0.96893	CONTINENTAL
ST -33	662.0	-662.5	0.99968	CONTINENTAL
ST -34	662.5	-663.5	0.62567	CONTINENTAL
ST -35	663.5	-667.5	0.99999	CONTINENTAL
ST -36	667.5	-667.7	0.99434	CONTINENTAL
ST -37	667.7	-667.9	1.00000	CONTINENTAL
ST -38	667.9	-668.1	0.99969	CONTINENTAL
ST -39	668.1	-673.0	0.99994	CONTINENTAL
ST -40	673.0	-673.5	0.99984	CONTINENTAL
ST -41	673.5	-674.5	0.91236	CONTINENTAL
ST -42	674.5	-675.5	0.96785	CONTINENTAL
ST -43	675.5	-677.0	0.99990	CONTINENTAL
ST -44	677.0	-679.0	0.99961	CONTINENTAL
ST -45	679.0	-679.5	0.99318	CONTINENTAL
ST -46	679.5	-682.0	0.99306	CONTINENTAL
ST -47	682.0	-685.0	0.99635	CONTINENTAL
ST -48	685.0	-685.2	0.96184	CONTINENTAL
ST -49	685.2	-693.0	0.99997	CONTINENTAL
ST -50	693.0	-697.0	0.99999	CONTINENTAL

ST -51	697.0 -699.0	0.99959	BRACKISH
ST -52	699.0 -700.5	1.00000	CONTINENTAL
ST -53	700.5 -702.0	1.00000	CONTINENTAL
ST -54	702.0 -703.0	0.99997	CONTINENTAL
ST -55	703.0 -704.5	0.99984	CONTINENTAL
ST -56	704.5 -705.5	1.00000	CONTINENTAL
ST -57	705.5 -709.0	1.00000	CONTINENTAL
ST -58	709.0 -709.5	1.00000	CONTINENTAL
ST -59	709.5 -710.5	1.00000	CONTINENTAL
ST -60	710.5 -711.0	0.99999	CONTINENTAL
ST -61	711.0 -712.0	1.00000	CONTINENTAL
ST -62	712.0 -713.0	0.99740	CONTINENTAL
ST -63	713.0 -713.5	0.99986	CONTINENTAL
ST -64	713.5 -718.0	0.99938	CONTINENTAL
ST -65	718.0 -719.2	0.97214	CONTINENTAL
ST -66	719.2 -719.4	1.00000	CONTINENTAL
ST -69	721.0 -730.0	1.00000	CONTINENTAL
ST -70	730.0 -732.0	1.00000	CONTINENTAL
ST -71	732.0 -732.6	0.99996	CONTINENTAL
ST -72	732.6 -733.2	1.00000	CONTINENTAL
ST -73	733.2 -734.5	0.99993	CONTINENTAL
ST -74	734.5 -735.0	0.99995	CONTINENTAL
ST -75	735.0 -737.2	0.99959	CONTINENTAL
ST -76	737.2 -737.5	0.99953	BRACKISH
ST -77	737.5 -738.0	0.99966	CONTINENTAL
ST -78	738.0 -739.2	0.81145	CONTINENTAL
ST -79	739.2 -743.0	0.99994	CONTINENTAL
ST -80	743.0 -744.3	0.99972	CONTINENTAL
ST -81	744.3 -746.5	0.99887	CONTINENTAL
ST -82	746.5 -747.4	0.99719	CONTINENTAL
ST -83	747.4 -750.8	0.99766	CONTINENTAL
ST -84	750.8 -752.5	0.99795	CONTINENTAL
ST -85	752.5 -754.0	0.99481	CONTINENTAL
ST -86	754.0 -755.2	0.99553	CONTINENTAL
ST -87	755.2 -757.5	0.99727	CONTINENTAL
ST -88	757.5 -758.5	0.99971	CONTINENTAL
ST -90	759.2 -763.8	0.99987	CONTINENTAL
ST -91	763.8 -765.8	0.99791	CONTINENTAL
ST -92	765.8 -770.1	1.00000	CONTINENTAL
ST -93	770.1 -770.8	0.99967	CONTINENTAL
ST -94	770.8 -775.5	0.99990	CONTINENTAL
ST -95	775.5 -780.0	1.00000	CONTINENTAL
ST -97	782.3 -782.9	0.99999	BRACKISH
ST -98	782.9 -784.8	0.74729	CONTINENTAL
ST -99	784.8 -785.3	0.99568	BRACKISH
ST-100	785.3 -786.5	0.99980	CONTINENTAL
ST-101	786.5 -787.2	0.89518	CONTINENTAL
ST-102	787.2 -791.2	0.99123	BRACKISH
ST-103	791.2 -791.5	0.93811	BRACKISH
ST-104	791.5 -792.0	0.72788	BRACKISH
ST-105	792.0 -792.5	0.50006	CONTINENTAL
ST-107	794.0 -794.5	0.88610	CONTINENTAL
ST-108	794.5 -795.5	0.75949	BRACKISH
ST-109	795.5 -796.0	0.57087	BRACKISH
ST-110	796.0 -797.0	0.77077	CONTINENTAL
ST-111	797.0 -798.0	0.99873	CONTINENTAL
ST-112	798.0 -799.0	0.95354	CONTINENTAL
ST-113	799.0 -801.0	0.96166	CONTINENTAL
ST-114	801.0 -801.5	0.62938	CONTINENTAL
ST-115	801.5 -805.5	0.66769	BRACKISH
ST-116	805.5 -806.0	0.99179	BRACKISH
ST-117	806.0 -807.5	0.76673	BRACKISH
ST-118	807.5 -809.0	0.99835	BRACKISH
ST-119	809.0 -810.2	0.99930	BRACKISH
ST-120	810.2 -810.5	0.97054	BRACKISH
ST-122	812.5 -813.0	0.97131	BRACKISH
ST-124	814.2 -816.7	0.65434	BRACKISH
ST-125	816.7 -817.7	1.00000	CONTINENTAL
ST-126	817.7 -820.0	0.99983	CONTINENTAL
ST-127	820.0 -821.5	1.00000	CONTINENTAL
ST-128	821.5 -823.0	1.00000	CONTINENTAL
ST-129	823.0 -825.0	0.98075	CONTINENTAL
ST-130	825.0 -826.0	0.99998	CONTINENTAL
ST-131	826.0 -827.0	0.99999	CONTINENTAL
ST-132	827.0 -829.5	1.00000	CONTINENTAL
ST-133	829.5 -832.0	0.99995	CONTINENTAL
ST-134	832.0 -832.5	0.92414	CONTINENTAL
ST-135	832.5 -833.0	0.98571	CONTINENTAL
ST-136	833.0 -833.2	0.94817	CONTINENTAL
ST-137	833.2 -833.5	0.82783	CONTINENTAL
ST-138	833.5 -834.0	0.96672	CONTINENTAL
ST-139	834.0 -838.0	1.00000	CONTINENTAL
ST-140	838.0 -838.5	0.57607	BRACKISH
ST-141	838.5 -840.0	0.57952	CONTINENTAL
ST-142	840.0 -841.0	0.70967	CONTINENTAL
ST-143	841.0 -844.2	0.99993	CONTINENTAL
ST-144	844.2 -845.5	0.95226	CONTINENTAL
ST-145	845.5 -846.8	0.91439	CONTINENTAL

ST-148	849.0 -850.5	0.98703	CONTINENTAL
ST-149	850.5 -854.0	0.93552	CONTINENTAL
ST-150	854.0 -857.0	0.99642	CONTINENTAL
ST-151	857.0 -858.5	0.99508	CONTINENTAL
ST-152	858.5 -859.0	0.99977	CONTINENTAL
ST-153	859.0 -859.5	0.82932	CONTINENTAL
ST-154	859.5 -860.5	0.99994	CONTINENTAL
ST-156	860.7 -865.5	0.99556	CONTINENTAL
ST-158	866.0 -866.2	0.99856	CONTINENTAL
ST-159	866.2 -870.0	0.64735	CONTINENTAL
ST-160	870.0 -871.0	0.91199	BRACKISH
ST-161	871.0 -871.3	0.99858	BRACKISH
ST-162	871.3 -872.5	0.87112	BRACKISH
ST-163	872.5 -876.5	0.99992	CONTINENTAL
ST-164	876.5 -879.2	0.99997	CONTINENTAL
ST-165	879.2 -880.0	0.99351	CONTINENTAL
ST-166	880.0 -882.8	0.92440	BRACKISH
ST-167	882.8 -884.5	0.91588	BRACKISH
ST-168	884.5 -885.5	0.86316	CONTINENTAL
ST-169	885.5 -887.0	0.53249	CONTINENTAL
ST-170	887.0 891.4	0.99961	CONTINENTAL
ST-171	891.4 -892.5	0.64030	BRACKISH
ST-172	892.5 -899.0	1.00000	CONTINENTAL
ST-173	904.0 -905.2	0.99600	CONTINENTAL
ST-174	905.2 -907.7	0.99986	CONTINENTAL
ST-175	907.7 -909.5	0.99157	CONTINENTAL
ST-176	909.5 -912.5	0.99857	CONTINENTAL
ST-177	912.5 -917.5	0.99724	CONTINENTAL
ST-178	917.5 920.0	1.00000	CONTINENTAL
ST-179	920.0 921.5	0.99995	CONTINENTAL
ST-180	921.5 924.8	0.99518	CONTINENTAL
ST-181	924.8 -929.6	0.96101	CONTINENTAL
ST-182	929.6 -933.0	0.96370	CONTINENTAL
ST-183	933.0 -933.5	0.99585	CONTINENTAL
ST-184	933.5 -935.5	0.53759	BRACKISH
ST-185	935.5 -936.0	0.88233	BRACKISH
ST-186	936.0 -938.5	0.68279	BRACKISH
ST-187	938.5 -939.0	0.85485	CONTINENTAL
ST-188	939.0 -944.5	0.98599	CONTINENTAL
ST-189	944.5 -945.7	0.64769	BRACKISH
ST-190	945.7 -947.5	0.66557	CONTINENTAL
ST-191	947.5 -954.0	0.99937	CONTINENTAL
ST-192	959.0 -960.2	0.88521	CONTINENTAL
ST-193	960.2 -960.5	0.99929	CONTINENTAL
ST-197	970.0 -971.0	1.00000	CONTINENTAL
ST-198	971.0 -972.8	0.99999	CONTINENTAL
ST-199	972.8 -973.5	0.94414	CONTINENTAL
ST-200	973.5 974.0	0.99974	CONTINENTAL
ST-201	974.0 -975.0	1.00000	BRACKISH
ST-202	975.0 975.5	1.00000	BRACKISH

GROUP BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-203	975.5 -979.2	0.98808	BRACKISH
ST-204	979.2 -980.7	0.64702	BRACKISH
ST-205	980.7 -982.0	0.73488	BRACKISH
ST-206	982.0 -985.2	0.97364	BRACKISH
ST-207	985.2 -988.0	0.88635	BRACKISH
ST-209	989.0 -989.3	0.99927	BRACKISH
ST-211	989.5 -995.5	0.99757	BRACKISH
ST-212	995.5-1001.5	1.00000	CONTINENTAL
ST-213	1001.5-1004.0	0.99999	CONTINENTAL
ST-214	1004.0-1005.0	1.00000	CONTINENTAL
ST-216	1007.5-1013.0	0.78597	BRACKISH
ST-217	1013.0-1015.0	0.99911	BRACKISH
ST-218	1015.0 1017.5	0.99993	CONTINENTAL
ST-219	1017.5-1023.0	0.99960	BRACKISH
ST-220	1023.0-1024.0	0.99745	BRACKISH
ST-221	1024.0-1030.0	0.77038	CONTINENTAL
ST-222	1030.0-1035.2	0.76590	CONTINENTAL
ST-223	1035.2-1036.0	0.99881	CONTINENTAL
ST-224	1036.0-1040.5	0.84997	CONTINENTAL
ST-225	1040.5-1040.6	0.97676	CONTINENTAL
ST-226	1040.6-1041.4	0.56620	CONTINENTAL
ST-227	1041.4-1041.5	0.96486	BRACKISH
ST-228	1041.5-1042.0	0.99985	BRACKISH
ST-229	1042.0-1043.0	0.99997	CONTINENTAL
ST-230	1043.0-1049.0	0.91624	BRACKISH
ST-231	1049.0-1054.2	1.00000	CONTINENTAL
ST-232	1054.2-1055.2	0.99686	CONTINENTAL
ST-233	1055.2-1061.0	0.99500	CONTINENTAL
ST-234	1061.0-1063.0	0.98214	CONTINENTAL
ST-235	1063.0-1064.0	1.00000	CONTINENTAL
ST-236	1064.0-1067.0	1.00000	CONTINENTAL
ST-237	1067.0 1070.5	1.00000	CONTINENTAL
ST-238	1070.5-1072.0	1.00000	CONTINENTAL

ST-239	1072.0-1073.0	1.00000	CONTINENTAL
ST-240	1073.0-1074.0	1.00000	CONTINENTAL
ST-241	1074.0-1075.2	0.99995	CONTINENTAL
ST-242	1075.2-1078.5	0.99933	CONTINENTAL
ST-243	1078.5-1079.0	0.99980	CONTINENTAL
ST-244	1079.0-1080.2	0.99952	CONTINENTAL
ST-245	1080.2-1081.2	1.00000	CONTINENTAL
ST-246	1081.2-1082.5	0.99985	CONTINENTAL
ST-247	1082.5-1083.0	0.78711	CONTINENTAL
ST-248	1083.0-1083.5	0.60259	BRACKISH
ST-249	1083.5-1085.5	0.93896	CONTINENTAL
ST-250	1085.5-1087.5	0.99004	CONTINENTAL
ST-251	1087.5-1093.5	0.99940	CONTINENTAL
ST-252	1093.5-1096.0	0.99991	CONTINENTAL
ST-253	1096.0-1097.0	0.96463	CONTINENTAL
ST-254	1097.0-1101.0	0.96307	CONTINENTAL
ST-255	1101.0-1104.0	0.99752	CONTINENTAL
ST-256	1104.0-1105.5	1.00000	CONTINENTAL
ST-257	1105.5-1108.0	0.99464	CONTINENTAL
ST-258	1108.0-1109.5	0.50525	CONTINENTAL
ST-259	1109.5-1112.0	0.88202	CONTINENTAL
ST-260	1112.0-1112.7	0.99941	CONTINENTAL
ST-261	1112.7-1115.0	0.99208	CONTINENTAL
ST-262	1115.0-1117.5	0.99992	CONTINENTAL
ST-263	1117.5-1123.0	1.00000	CONTINENTAL
ST-264	1123.0 1127.0	1.00000	CONTINENTAL
ST-265	1127.0-1130.0	0.81025	CONTINENTAL
ST-266	1130.0-1132.0	0.52482	CONTINENTAL
ST-267	1132.0-1135.0	0.98456	BRACKISH
ST-268	1135.0-1136.0	0.91885	BRACKISH
ST-269	1136.0-1137.5	1.00000	CONTINENTAL
ST-270	1137.5-1140.0	1.00000	CONTINENTAL
ST-271	1140.0-1141.0	0.99999	CONTINENTAL
ST-272	1141.0-1142.0	1.00000	CONTINENTAL
ST-273	1142.0-1143.0	0.88588	BRACKISH
ST-274	1143.0-1150.0	0.99716	CONTINENTAL
ST-275	1150.0-1151.0	0.99466	CONTINENTAL
ST-276	1151.0-1154.5	1.00000	CONTINENTAL
ST-277	1154.5-1156.5	0.96796	CONTINENTAL
ST-278	1156.5-1157.5	0.99999	CONTINENTAL
ST-279	1157.5-1160.0	0.99998	CONTINENTAL
ST-281	1165.0-1170.0	0.97092	CONTINENTAL
ST-282	1170.0-1175.5	0.99999	CONTINENTAL
ST-283	1175.5-1176.0	0.99923	CONTINENTAL
ST-284	1176.0-1179.0	0.99943	CONTINENTAL
ST-285	1179.0-1180.0	0.97691	CONTINENTAL
ST-286	1180.0 1180.5	0.99944	CONTINENTAL
ST-287	1180.5-1181.0	0.88041	BRACKISH
ST-288	1181.0-1182.0	0.51373	BRACKISH
ST-289	1182.0-1184.0	0.96617	CONTINENTAL
ST-290	1179.0-1181.5	0.99992	CONTINENTAL
ST-294	1184.0-1188.0	0.99993	CONTINENTAL
ST-295	1188.0-1189.0	0.99990	CONTINENTAL
ST-296	1184.0-1185.5	0.84569	BRACKISH
ST-297	1185.5-1189.0	0.96939	CONTINENTAL
ST-298	1189.0-1190.0	0.99895	CONTINENTAL
ST-299	1190.0-1192.0	1.00000	BRACKISH
ST-300	1192.0-1193.0	1.00000	CONTINENTAL
ST-301	1193.0-1198.0	1.00000	CONTINENTAL
ST-304	1200.5-1203.5	0.99999	CONTINENTAL
ST-306	1204.0-1207.5	0.99925	CONTINENTAL
ST-307	1207.5-1208.5	0.59496	CONTINENTAL
ST-308	1208.5-1211.0	0.99958	CONTINENTAL
ST-309	1211.0-1213.0	0.99814	CONTINENTAL
ST-310	1213.0-1214.0	0.98160	CONTINENTAL
ST-312	1217.0-1221.5	0.99105	CONTINENTAL
ST-313	1221.5-1225.0	0.99999	CONTINENTAL
ST-314	1225.0-1226.0	0.99998	CONTINENTAL
ST-315	1226.0 1228.5	1.00000	CONTINENTAL
ST-317	1232.0-1234.5	0.55863	BRACKISH
ST-318	1234.5-1235.5	0.70741	CONTINENTAL
ST-319	1235.5-1238.0	0.60894	CONTINENTAL
ST-320	1238.0-1242.5	0.94531	BRACKISH
ST-321	1242.5-1242.8	0.99971	BRACKISH
ST-322	1242.8-1244.5	0.99990	BRACKISH
ST-323	1244.5-1245.5	0.66209	BRACKISH
ST-324	1245.5-1247.5	0.99323	BRACKISH
ST-325	1247.5-1249.5	0.60025	CONTINENTAL
ST-326	1249.5-1250.5	0.94190	CONTINENTAL
ST-327	1250.5-1257.0	1.00000	CONTINENTAL
ST-329	1257.5-1258.0	0.95453	BRACKISH
ST-331	1258.5-1261.0	0.88627	BRACKISH
ST-332	1261.0-1264.5	1.00000	CONTINENTAL
ST-333	1264.5-1265.5	1.00000	CONTINENTAL
ST-335	1266.5-1271.5	0.99999	CONTINENTAL
ST-336	1271.5-1276.5	0.99895	CONTINENTAL
ST-337	1276.5-1281.0	0.99993	CONTINENTAL
ST-338	1281.0 1285.5	1.00000	CONTINENTAL

ST-340	1286.0-1286.5	0.99391	CONTINENTAL
ST-342	1286.7 1288.5	0.66121	CONTINENTAL
ST-343	1288.5-1294.0	0.98656	CONTINENTAL
ST-344	1288.5-1294.0	0.98536	CONTINENTAL
ST-345	1294.0-1296.0	0.97991	CONTINENTAL
ST-347	1298.0-1301.5	0.79979	CONTINENTAL
ST-348	1301.5-1305.0	0.99951	BRACKISH
ST-350	1305.5-1305.7	0.95430	BRACKISH
ST-351	1305.7-1306.5	0.88329	BRACKISH
ST-352	1306.5-1306.7	0.99923	BRACKISH
ST-353	1306.7-1307.2	0.99910	BRACKISH
ST-356	1310.5-1313.0	0.99984	CONTINENTAL
ST-357	1313.0-1314.0	0.97854	CONTINENTAL
ST-360	1320.0-1322.5	0.69186	CONTINENTAL
ST-361	1322.5-1324.0	0.91953	BRACKISH
ST-362	1324.0-1326.0	0.92804	CONTINENTAL
ST-363	1326.0-1330.0	0.92982	BRACKISH
ST-364	1330.0 1337.5	0.64713	BRACKISH
ST-365	1337.5-1337.7	0.94684	CONTINENTAL
ST-366	1337.7-1340.0	0.99287	CONTINENTAL
ST-367	1340.0-1341.5	1.00000	CONTINENTAL
ST-368	1341.5-1345.0	0.99906	CONTINENTAL
ST-369	1345.0-1346.0	0.99860	CONTINENTAL
ST-370	1346.0-1348.0	0.89336	BRACKISH
ST-371	1348.0-1348.5	1.00000	BRACKISH
ST-374	1351.0-1352.5	0.99997	BRACKISH
ST-375	1352.5-1355.0	0.98845	BRACKISH
ST-376	1355.0-1360.0	0.96387	BRACKISH
ST-378	1360.2-1364.0	1.00000	BRACKISH
ST-379	1364.0-1368.0	0.99781	BRACKISH
ST-381	1370.0-1371.7	0.99994	BRACKISH
ST-382	1371.7-1372.7	0.99811	BRACKISH
ST-383	1372.7-1376.0	0.90011	BRACKISH
ST-387	1386.0-1386.5	0.99988	BRACKISH
ST-388	1386.5-1392.5	0.98431	CONTINENTAL
ST-389	1392.5-1393.5	0.93208	BRACKISH
ST-390	1393.5-1398.5	0.98852	CONTINENTAL
ST-391	1398.5-1402.0	0.98787	CONTINENTAL
ST-393	1410.0-1412.0	0.72453	CONTINENTAL
ST-394	1412.0-1418.0	0.99789	CONTINENTAL
ST-395	1418.0-1425.0	0.99972	CONTINENTAL
ST-396	1425.0-1430.5	0.92537	CONTINENTAL
ST-397	1430.5-1437.0	0.75165	CONTINENTAL
ST-398	1437.0-1441.5	0.99664	CONTINENTAL
ST-399	1441.5-1442.0	0.99988	CONTINENTAL
ST-400	1442.0-1450.0	0.98916	CONTINENTAL
ST-401	1450.0-1456.5	0.95941	CONTINENTAL
ST-402	1456.5-1461.5	0.83087	CONTINENTAL
ST-403	1461.5 1466.5	0.59196	BRACKISH
ST-404	1466.5-1471.5	0.93836	CONTINENTAL
ST-405	1471.5-1477.5	1.00000	CONTINENTAL
ST-406	1477.5-1483.0	0.99945	CONTINENTAL
ST-407	1483.0-1483.5	0.99996	CONTINENTAL
ST-408	1483.5-1489.0	0.99999	CONTINENTAL
ST-409	1489.0-1491.5	0.99997	CONTINENTAL
ST-410	1491.5-1492.0	0.99995	CONTINENTAL
ST-411	1492.0-1496.5	0.99998	CONTINENTAL
ST-412	1496.5-1499.0	0.99797	CONTINENTAL
ST-413	1499.0-1505.5	0.99999	CONTINENTAL
ST-414	1505.5-1506.0	1.00000	CONTINENTAL
ST-415	1506.0-1511.0	0.99999	CONTINENTAL
ST-416	1511.0-1514.0	0.99998	CONTINENTAL
ST-417	1514.0-1515.0	0.99998	CONTINENTAL
ST-418	1515.0-1519.0	1.00000	CONTINENTAL
ST-420	1520.0-1529.0	0.99971	CONTINENTAL
ST-421	1529.0-1536.0	0.99849	CONTINENTAL
ST-422	1536.0-1537.5	0.99761	CONTINENTAL
ST-423	1537.5-1539.5	0.99990	CONTINENTAL

DISCRIMINANT ANALYSIS.....CONTINENTAL VS BRACKISH TWENTY FOUR

NUMBER OF GROUPS 2
NUMBER OF VARIABLES 24
SAMPLE SIZES..

GROUP	
1	199
2	199

DISCRIMINANT FUNCTION CONTINENTAL

CONSTANT *	COEFFICIENTS			
-663.8369140625 *	0.0019659661	0.0050696507	0.0006231421	-0.0000616750
	0.0034450591	-0.0007798420	-0.0005365841	0.0110258907
	0.0655317307	0.0233819932	-1.4350414276	-0.7451632619
	-2.4571886063	4.8100519180	-0.2483499050	0.5155697465
	-0.1032204628	-0.0046755746	0.5587678552	0.0008383561
	0.0311754867	0.1078732610	0.2280504107	-0.0095824599

DISCRIMINANT FUNCTION BRACKISH

CONSTANT *	COEFFICIENTS			
-642.0764160156 *	0.0019000189	0.0049727596	0.0007596740	-0.0005858261
	0.0034354839	-0.0005764819	0.0000255920	0.0106478557
	0.0655161142	0.0244941637	-1.1779479980	-0.7116690278
	-2.5129718781	4.5443363190	0.3072032928	0.4894944429
	-0.1079488397	-0.0030409261	0.5783316493	0.0007662550
	0.0068739504	0.1114441156	0.1816170812	0.0122581124

EVALUATION OF CLASSIFICATION FUNCTIONS FOR EACH OBSERVATION
GROUP CONTINENTAL

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-424	1539.5-1540.0	0.99986	CONTINENTAL
ST-425	1540.0-1545.5	0.99957	CONTINENTAL
ST-426	1545.5-1551.0	0.99110	CONTINENTAL
ST-427	1551.0-1553.0	0.96419	CONTINENTAL
ST-428	1553.0-1555.0	0.51519	CONTINENTAL
ST-429	1555.0 1560.0	0.82911	CONTINENTAL
ST-430	1560.0-1562.5	0.90265	CONTINENTAL
ST-431	1562.5-1563.0	0.99642	CONTINENTAL
ST-433	1564.0-1566.0	0.99945	CONTINENTAL
ST-434	1566.0-1569.0	0.99987	CONTINENTAL
ST-435	1569.0 1570.5	0.99998	CONTINENTAL
ST-436	1570.5-1571.0	0.99917	CONTINENTAL
ST-437	1571.0-1572.5	0.99955	CONTINENTAL
ST-439	1573.5-1577.5	1.00000	CONTINENTAL
ST-440	1577.5-1582.0	0.99988	CONTINENTAL
ST-441	1582.0-1585.5	0.91800	BRACKISH
ST-442	1585.5-1590.5	0.50513	BRACKISH
ST-443	1590.5-1595.0	0.85714	CONTINENTAL
ST-444	1595.0-1597.5	0.99989	CONTINENTAL
ST-445	1597.5-1600.5	0.99898	CONTINENTAL
ST-447	1601.0-1601.2	0.99998	CONTINENTAL
ST-448	1601.2-1605.0	0.70370	BRACKISH
ST-449	1605.0-1608.5	0.99781	BRACKISH
ST-451	1611.5-1613.0	0.99788	BRACKISH
ST-452	1613.0-1614.0	0.99999	BRACKISH
ST-454	1614.2-1614.5	0.99978	BRACKISH
ST-456	1617.5-1617.6	0.99948	BRACKISH
ST-458	1622.5-1623.0	0.99929	BRACKISH

ST-464	1631.0-1633.5	1.00000	BRACKISH
ST-465	1633.5-1638.5	0.61642	BRACKISH
ST-466	1638.5-1640.0	0.99948	BRACKISH
ST-468	1641.0-1647.0	0.98599	CONTINENTAL
ST-469	1642.0-1652.0	0.74785	CONTINENTAL
ST-470	1652.0-1657.0	0.50305	BRACKISH
ST-471	1657.0-1662.0	0.99865	CONTINENTAL
ST-472	1662.0-1666.0	0.98949	CONTINENTAL
ST-473	1666.0-1668.0	1.00000	CONTINENTAL
ST-474	1668.0-1672.0	0.99766	CONTINENTAL
ST-475	1672.0-1677.0	0.99941	CONTINENTAL
ST-476	1677.0-1683.0	0.98569	CONTINENTAL
ST-477	1683.0-1684.0	1.00000	CONTINENTAL
ST-478	1634.0-1688.0	1.00000	CONTINENTAL
ST-479	1688.0-1689.0	1.00000	CONTINENTAL
ST-480	1689.0-1693.0	1.00000	CONTINENTAL
ST-481	1693.0-1694.0	1.00000	CONTINENTAL
ST-482	1694.0-1697.0	1.00000	CONTINENTAL
ST-483	1697.0-1698.0	1.00000	CONTINENTAL
ST-484	1698.0-1702.0	1.00000	CONTINENTAL
ST-485	1702.0-1705.0	0.99880	CONTINENTAL
ST-486	1705.0-1707.0	0.99933	CONTINENTAL
ST-487	1707.0-1711.0	0.99638	CONTINENTAL
ST-488	1711.0-1715.5	0.99999	CONTINENTAL
ST-490	1716.0-1721.0	1.00000	CONTINENTAL
ST-491	1721.0-1725.5	0.99997	CONTINENTAL
ST-492	1725.5-1728.0	1.00000	CONTINENTAL
ST-493	1728.0-1730.0	0.99996	CONTINENTAL
ST-494	1730.0-1735.0	0.99999	CONTINENTAL
ST-495	1735.0-1736.0	0.99986	CONTINENTAL
ST-496	1736.0-1736.2	0.91467	CONTINENTAL
ST-497	1736.2-1739.5	0.99996	CONTINENTAL
ST-498	1739.5-1743.0	0.99994	CONTINENTAL
ST-499	1743.0-1750.5	1.00000	CONTINENTAL
ST-500	1750.5-1751.5	0.99994	CONTINENTAL
ST-503	1753.0-1754.0	0.95797	CONTINENTAL
ST-504	1754.0-1755.5	1.00000	CONTINENTAL
ST-505	1755.5-1757.5	1.00000	CONTINENTAL
ST-506	1757.5-1759.0	0.99290	CONTINENTAL
ST-507	1759.0-1762.0	0.51684	BRACKISH
ST-508	1762.0-1765.0	0.99999	CONTINENTAL
ST-509	1765.0-1767.0	1.00000	CONTINENTAL
ST-510	1767.0 1768.0	0.99305	CONTINENTAL
ST-512	1768.3-1769.0	0.99982	BRACKISH
ST-513	1769.0-1770.0	0.99964	CONTINENTAL
ST-515	1771.0-1771.5	0.99877	CONTINENTAL
ST-516	1771.5-1778.0	0.99989	CONTINENTAL
ST-517	1778.0-1779.5	0.86371	CONTINENTAL
ST-518	1779.5-1781.5	0.99841	CONTINENTAL
ST-519	1781.5-1782.5	0.99554	CONTINENTAL
ST-520	1782.5-1783.0	0.99999	CONTINENTAL
ST-521	1783.0 1784.0	0.99983	CONTINENTAL
ST-522	1784.0-1785.5	0.99999	CONTINENTAL
ST-523	1785.5-1787.0	0.98260	CONTINENTAL
ST-524	1787.0-1788.5	0.99953	CONTINENTAL
ST-525	1788.5-1789.0	0.99776	CONTINENTAL
ST-526	1789.0-1790.5	0.99990	CONTINENTAL
ST-527	1790.5-1793.0	0.99995	CONTINENTAL
ST-528	1793.0-1797.0	1.00000	CONTINENTAL
ST-529	1797.0-1798.5	0.99894	CONTINENTAL
ST-530	1798.5-1799.0	0.99991	CONTINENTAL
ST-531	1799.0-1800.5	1.00000	CONTINENTAL
ST-532	1800.5-1804.0	0.99994	CONTINENTAL
ST-533	1804.0-1806.0	1.00000	CONTINENTAL

ST-534	1806.0-1808.0	1.00000	CONTINENTAL
ST-535	1808.0-1814.5	1.00000	CONTINENTAL
ST-536	1814.5-1815.5	1.00000	CONTINENTAL
ST-537	1815.5-1818.5	1.00000	CONTINENTAL
ST-538	1818.5-1819.0	1.00000	CONTINENTAL
ST-539	1819.0-1821.0	1.00000	CONTINENTAL
ST-540	1821.0-1823.0	0.98071	CONTINENTAL
ST-541	1823.0-1825.5	1.00000	CONTINENTAL
ST-542	1825.5-1827.0	0.99290	CONTINENTAL
ST-543	1827.0-1830.0	0.99984	CONTINENTAL
ST-544	1830.0-1831.5	0.99998	CONTINENTAL
ST-545	1831.5-1833.0	0.99946	CONTINENTAL
ST-546	1833.0-1834.0	0.98777	CONTINENTAL
ST-547	1834.0-1835.5	0.98921	CONTINENTAL
ST-548	1835.5-1837.0	0.99978	CONTINENTAL
ST-549	1837.0-1844.0	0.99996	CONTINENTAL
ST-550	1844.0-1844.5	0.99876	BRACKISH
ST-551	1844.5-1845.0	0.81534	BRACKISH
ST-552	1845.0-1846.0	0.99452	BRACKISH
ST-553	1846.0-1847.0	0.96102	CONTINENTAL
ST-554	1847.0-1850.0	0.80746	BRACKISH
ST-555	1850.0-1851.0	0.99893	CONTINENTAL
ST-556	1851.0-1853.0	0.61844	CONTINENTAL
ST-557	1853.0-1853.5	0.99886	CONTINENTAL
ST-558	1853.5-1855.5	0.92123	CONTINENTAL
ST-559	1855.5-1857.0	0.92484	CONTINENTAL
ST-560	1857.0-1857.5	0.99781	CONTINENTAL
ST-561	1857.5-1859.0	0.99715	CONTINENTAL
ST-563	1860.5-1861.5	0.99946	CONTINENTAL
ST-564	1861.5-1867.0	0.99455	CONTINENTAL
ST-565	1867.0-1868.0	0.99766	CONTINENTAL
ST-566	1868.0-1868.5	0.88955	BRACKISH
ST-567	1868.5-1873.0	0.99994	CONTINENTAL
ST-568	1873.0-1878.0	0.99999	CONTINENTAL
ST-569	1878.0 1883.0	0.99987	CONTINENTAL
ST-570	1883.0-1886.0	1.00000	CONTINENTAL
ST-571	1886.0-1887.5	0.98878	CONTINENTAL
ST-572	1887.5-1892.5	0.99918	CONTINENTAL
ST-573	1892.5-1893.5	0.96498	CONTINENTAL
ST-574	1893.5-1895.0	0.99996	CONTINENTAL
ST-575	1895.0-1896.5	0.99974	CONTINENTAL
ST-576	1896.5-1898.5	0.98799	CONTINENTAL
ST-577	1898.5-1900.0	1.00000	CONTINENTAL
ST-578	1900.0 1906.0	0.99994	CONTINENTAL
ST-579	1906.0-1910.5	0.99406	CONTINENTAL
ST-580	1910.5-1912.5	0.99999	CONTINENTAL
ST-581	1912.5-1914.5	0.99976	CONTINENTAL
ST-582	1914.5-1916.0	0.99999	CONTINENTAL
ST-583	1916.0-1920.0	0.99984	CONTINENTAL
ST-584	1920.0-1921.0	0.99996	CONTINENTAL
ST-585	1921.0-1925.5	1.00000	CONTINENTAL
ST-586	1925.5-1927.5	1.00000	CONTINENTAL
ST-587	1927.5-1929.0	1.00000	CONTINENTAL
ST-588	1929.0-1930.5	1.00000	CONTINENTAL
ST-589	1930.5-1936.5	1.00000	CONTINENTAL
ST-590	1936.5-1936.8	0.99989	CONTINENTAL
ST-591	1936.8-1942.0	0.99984	CONTINENTAL
ST-592	1942.0-1943.5	1.00000	CONTINENTAL
ST-593	1943.5-1944.5	1.00000	CONTINENTAL
ST-594	1944.5-1945.5	0.53862	BRACKISH
ST-595	1945.5-1947.0	1.00000	CONTINENTAL
ST-596	1947.0-1948.0	0.99998	CONTINENTAL
ST-597	1948.0-1953.0	0.99998	CONTINENTAL
ST-598	1953.0-1954.0	0.99988	CONTINENTAL
ST-599	1954.0-1955.5	1.00000	CONTINENTAL
ST-600	1955.5-1956.0	1.00000	CONTINENTAL

ST-601	1956.0-1958.0	0.99983	CONTINENTAL
ST-602	1958.0-1959.0	1.00000	CONTINENTAL
ST-603	1959.0-1959.7	0.99994	CONTINENTAL
ST-604	1959.7-1960.7	0.99998	CONTINENTAL
ST-605	1960.7-1960.9	0.99063	CONTINENTAL
ST-606	1960.9-1962.0	0.99835	CONTINENTAL
ST-607	1962.0-1963.3	0.99597	CONTINENTAL
ST-608	1963.3-1964.0	0.99915	CONTINENTAL
ST-609	1964.0-1966.0	1.00000	CONTINENTAL
ST-610	1966.0-1968.0	0.99974	CONTINENTAL
ST-611	1968.0-1970.5	0.99968	CONTINENTAL
ST-612	1970.5-1974.0	0.74651	BRACKISH
ST-613	1974.0-1983.0	0.69854	CONTINENTAL
ST-614	1983.0-1983.5	0.96751	BRACKISH
ST-615	1983.5-1989.0	0.99513	CONTINENTAL
ST-616	1989.0-1990.5	0.99756	CONTINENTAL
ST-617	1990.5-1993.5	0.99843	CONTINENTAL
ST-618	1993.5-1999.5	0.99991	CONTINENTAL
ST-619	1999.5-2000.5	0.99823	CONTINENTAL
ST-620	2000.5-2007.0	0.99964	BRACKISH
ST-621	2007.0-2012.0	0.99998	BRACKISH
ST-622	2012.0-2017.0	0.99958	BRACKISH
ST-624	2019.5-2021.5	0.56140	CONTINENTAL
ST-625	2021.5-2027.0	0.97466	CONTINENTAL
ST-626	2027.0 2027.5	0.92007	CONTINENTAL
ST-627	2027.5-2032.5	0.99918	CONTINENTAL
ST-628	2032.5-2038.0	0.82661	CONTINENTAL
ST-629	2038.0-2040.0	0.79150	BRACKISH
ST-630	2040.0-2041.0	0.99895	BRACKISH
ST-631	2041.0-2044.0	0.99997	CONTINENTAL
ST-632	2044.0-2045.5	1.00000	CONTINENTAL
ST-633	2045.5-2048.5	0.90890	BRACKISH
ST-634	2048.5-2050.5	0.96636	CONTINENTAL
ST-635	2050.5-2051.0	0.99967	CONTINENTAL
ST-636	2051.0-2054.0	1.00000	CONTINENTAL
ST-637	2054.0-2055.0	1.00000	CONTINENTAL
ST-638	2055.0-2056.0	0.99994	CONTINENTAL
ST-639	2056.0-2057.5	0.99218	CONTINENTAL
ST-640	2057.5-2059.5	0.61057	CONTINENTAL

GROUP BRACKISH

SAMPLE NO.	DEPTH	PROBABILITY	SAMPLE CLASSIFICATION
ST-641	2059.5-2062.5	0.99821	CONTINENTAL
ST-642	2062.5-2068.5	0.99701	CONTINENTAL
ST-643	2068.5-2074.5	0.98844	CONTINENTAL
ST-644	2074.5-2078.0	0.99630	CONTINENTAL
ST-645	2078.0-2083.0	0.99863	CONTINENTAL
ST-646	2083.0-2085.5	0.94293	CONTINENTAL
ST-647	2085.5-2086.0	0.99882	CONTINENTAL
ST-648	2086.0-2088.0	0.99418	CONTINENTAL
ST-649	2088.0-2089.0	0.99546	CONTINENTAL
ST-650	2089.0-2093.5	0.96352	CONTINENTAL
ST-651	2093.5-2095.5	0.95801	CONTINENTAL
ST-652	2095.5-2097.0	0.99983	CONTINENTAL
ST-653	2097.0-2099.0	0.99991	CONTINENTAL
ST-654	2099.0-2101.0	0.99857	CONTINENTAL
ST-655	2101.0-2104.0	0.89812	CONTINENTAL
ST-656	2104.0-2108.0	0.60048	BRACKISH
ST-657	2108.0-2114.0	0.96080	BRACKISH
ST-658	2114.0-2119.5	0.99953	BRACKISH
ST-659	2119.5-2125.5	0.78096	CONTINENTAL
ST-660	2125.5-2127.5	1.00000	CONTINENTAL
ST-661	2127.5-2128.5	0.99995	CONTINENTAL
ST-662	2128.5-2133.0	0.99949	CONTINENTAL
ST-663	2133.0-2135.5	0.98152	CONTINENTAL
ST-664	2135.5-2136.5	0.99186	CONTINENTAL

ST-666	2138.5-2141.5	0.99391	CONTINENTAL
ST-667	2141.5-2143.5	0.96952	BRACKISH
ST-668	2143.5-2144.0	0.99150	CONTINENTAL
ST-669	2144.0-2145.0	0.84601	CONTINENTAL
ST-670	2145.0-2145.5	0.99886	CONTINENTAL
ST-671	2145.5-2147.0	1.00000	CONTINENTAL
ST-672	2147.0-2149.5	0.97062	CONTINENTAL
ST-673	2149.5-2150.5	0.99189	CONTINENTAL
ST-674	2150.5-2151.0	0.57529	BRACKISH
ST-675	2151.0-2152.0	0.98295	CONTINENTAL
ST-676	2152.0-2153.0	0.99995	CONTINENTAL
ST-677	2153.0-2154.0	0.98535	CONTINENTAL
ST-678	2154.0-2161.0	0.99996	CONTINENTAL
ST-679	2161.0-2162.0	0.95240	CONTINENTAL
ST-680	2162.0-2163.5	0.99989	CONTINENTAL
ST-683	2166.0-2166.5	0.98728	CONTINENTAL
ST-684	2166.5-2167.5	0.99580	CONTINENTAL
ST-685	2167.5-2169.0	0.99951	CONTINENTAL
ST-686	2169.0-2172.0	0.97700	CONTINENTAL
ST-687	2172.0-2173.5	0.99962	CONTINENTAL
ST-688	2173.5-2176.5	0.98359	CONTINENTAL
ST-689	2176.5-2178.0	0.99997	CONTINENTAL
ST-690	2178.0-2178.5	0.64518	CONTINENTAL
ST-692	2179.0-2181.5	0.98331	CONTINENTAL
ST-693	2181.5-2183.5	1.00000	CONTINENTAL
ST-694	2183.5-2184.0	0.99955	CONTINENTAL
ST-695	2184.0-2186.0	0.99994	CONTINENTAL
ST-696	2186.0-2187.5	0.99753	CONTINENTAL
ST-698	2188.0-2189.0	0.99166	CONTINENTAL
ST-699	2189.0-2193.0	0.99990	CONTINENTAL
ST-700	2193.0-2194.0	0.59960	CONTINENTAL
ST-701	2194.0-2196.0	0.99994	CONTINENTAL
ST-702	2196.0-2199.5	0.89675	BRACKISH
ST-703	2199.5-2201.5	0.95311	CONTINENTAL
ST-704	2201.5-2203.0	0.98997	CONTINENTAL
ST-705	2203.0-2209.0	0.99993	CONTINENTAL
ST-706	2209.0-2213.0	0.99995	CONTINENTAL
ST-707	2213.0-2214.0	0.99999	CONTINENTAL
ST-708	2214.0-2218.5	0.99520	CONTINENTAL
ST-709	2218.5-2219.5	0.99591	BRACKISH
ST-710	2219.5-2226.0	1.00000	CONTINENTAL
ST-711	2226.0-2227.0	0.98398	CONTINENTAL
ST-712	2227.0-2232.5	0.99896	CONTINENTAL
ST-713	2232.5-2235.0	0.99999	CONTINENTAL
ST-714	2235.0-2236.0	0.99735	CONTINENTAL
ST-716	2236.2-2237.0	0.85684	CONTINENTAL
ST-717	2237.0-2242.5	1.00000	CONTINENTAL
ST-718	2242.5-2244.0	0.99845	CONTINENTAL
ST-719	2244.0-2246.0	0.99999	CONTINENTAL
ST-720	2246.0-2247.0	0.98904	CONTINENTAL
ST-721	2247.0-2248.0	0.98722	CONTINENTAL
ST-722	2248.0-2252.5	0.99994	CONTINENTAL
ST-723	2252.5-2255.5	1.00000	CONTINENTAL
ST-724	2255.5-2256.5	0.99996	CONTINENTAL
ST-725	2256.5-2259.5	0.61034	CONTINENTAL
ST-726	2259.5-2261.0	0.95603	CONTINENTAL
ST-727	2261.0-2265.5	0.99875	CONTINENTAL
ST-728	2265.5-2266.5	0.99992	CONTINENTAL
ST-729	2266.5-2271.0	0.99967	CONTINENTAL
ST-730	2271.0-2275.5	0.99998	CONTINENTAL
ST-731	2275.5-2279.0	0.99865	CONTINENTAL
ST-732	2279.0-2279.5	0.99764	CONTINENTAL
ST-733	2279.5-2281.0	0.96139	CONTINENTAL
ST-734	2281.0-2286.5	0.68653	BRACKISH
ST-735	2286.5-2289.0	0.91605	CONTINENTAL

ST-737	2292.0-2297.5	0.93019	CONTINENTAL
ST-738	2297.5-2298.0	0.99993	CONTINENTAL
ST-739	2298.0-2299.5	0.99990	CONTINENTAL
ST-740	2298.5-2301.0	1.00000	CONTINENTAL
ST-741	2301.0-2302.7	0.99941	CONTINENTAL
ST-742	2302.7-2303.0	1.00000	CONTINENTAL
ST-743	2303.0-2304.0	0.88789	CONTINENTAL
ST-744	2304.0-2310.0	0.99994	CONTINENTAL
ST-745	2310.0-2315.0	1.00000	CONTINENTAL
ST-746	2315.0-2319.0	0.99963	CONTINENTAL
ST-747	2319.0-2324.0	1.00000	CONTINENTAL
ST-748	2324.0-2325.0	0.99726	CONTINENTAL
ST-749	2325.0-2325.5	1.00000	CONTINENTAL
ST-750	2325.5-2326.0	0.99898	CONTINENTAL
ST-751	2326.0-2326.5	0.99979	CONTINENTAL
ST-752	2326.5-2328.0	0.99742	CONTINENTAL
ST-753	2328.0-2333.0	0.99999	CONTINENTAL
ST-754	2333.0-2335.0	0.93569	CONTINENTAL
ST-755	2335.0-2337.0	0.91140	CONTINENTAL
ST-756	2337.0-2339.0	0.99857	CONTINENTAL
ST-757	2339.0-2342.0	1.00000	CONTINENTAL
ST-758	2342.0-2344.0	0.99463	CONTINENTAL
ST-759	2344.0-2345.0	0.99918	CONTINENTAL
ST-760	2345.0-2349.0	0.99992	CONTINENTAL
ST-761	2349.0-2351.5	0.99999	CONTINENTAL
ST-762	2351.5-2352.0	0.99869	CONTINENTAL
ST-763	2352.0-2357.0	1.00000	CONTINENTAL
ST-764	2357.0-2361.5	0.99993	CONTINENTAL
ST-765	2361.5-2362.5	0.98269	CONTINENTAL
ST-766	2362.5-2364.5	0.99884	CONTINENTAL
ST-767	2364.5-2369.0	0.97818	CONTINENTAL
ST-768	2369.0-2370.0	0.77873	CONTINENTAL
ST-769	2370.0-2371.0	0.94955	CONTINENTAL
ST-770	2371.0-2372.5	1.00000	CONTINENTAL
ST-771	2372.5-2374.0	0.98879	CONTINENTAL
ST-772	2374.0-2375.5	0.99988	CONTINENTAL
ST-773	2375.5-2377.0	0.99335	CONTINENTAL
ST-774	2377.0-2377.5	0.99451	CONTINENTAL
ST-775	2377.5-2379.0	0.91756	CONTINENTAL
ST-776	2379.0-2380.0	0.98663	CONTINENTAL
ST-777	2380.0-2383.5	0.99942	CONTINENTAL
ST-778	2383.5-2385.5	0.99997	CONTINENTAL
ST-779	2385.5-2387.0	0.99933	CONTINENTAL
ST-780	2387.0-2389.0	0.99608	CONTINENTAL
ST-781	2389.0-2389.5	1.00000	CONTINENTAL
ST-782	2389.5-2391.0	0.99953	CONTINENTAL
ST-783	2391.0-2391.5	0.94315	CONTINENTAL
ST-784	2391.5-2392.0	0.82418	CONTINENTAL
ST-785	2392.0-2393.5	0.99690	CONTINENTAL
ST-786	2393.5-2394.0	0.99918	CONTINENTAL
ST-787	2394.0-2394.5	0.72545	CONTINENTAL
ST-788	2394.5-2396.5	1.00000	CONTINENTAL
ST-789	2396.5-2399.0	1.00000	CONTINENTAL
ST-790	2399.0-2400.0	0.78349	CONTINENTAL
ST-791	2400.0-2402.5	0.99975	CONTINENTAL
ST-792	2402.5-2403.5	0.97000	CONTINENTAL
ST-793	2403.5-2405.0	0.99844	CONTINENTAL
ST-794	2405.0-2406.5	0.99624	CONTINENTAL
ST-795	2406.5-2407.5	0.99987	CONTINENTAL
ST-796	2407.5-2410.0	0.97696	CONTINENTAL
ST-797	2410.0-2416.0	0.99849	CONTINENTAL
ST-798	2416.0-2419.0	0.99258	CONTINENTAL
ST-799	2419.0-2425.0	0.99978	CONTINENTAL
ST-800	2425.0-2427.0	1.00000	CONTINENTAL
ST-801	2427.0-2428.0	1.00000	CONTINENTAL

ST-802	2428.0-2431.0	1.00000	CONTINENTAL
ST-803	2431.0-2431.5	1.00000	CONTINENTAL
ST-804	2431.5-2432.5	0.89421	CONTINENTAL
ST-805	2432.5-2434.0	1.00000	CONTINENTAL
ST-806	2434.0-2435.5	0.99747	CONTINENTAL
ST-807	2435.5-2438.0	0.97213	CONTINENTAL
ST-808	2438.0-2439.5	0.99887	CONTINENTAL
ST-809	2439.5-2442.0	0.98856	CONTINENTAL
ST-810	2442.0-2444.0	0.99999	CONTINENTAL
ST-811	2444.0-2447.5	0.97692	CONTINENTAL
ST-812	2447.5-2449.0	0.99961	CONTINENTAL
ST-813	2449.0-2453.0	0.99538	CONTINENTAL
ST-814	2453.0-2455.0	0.99996	CONTINENTAL
ST-815	2455.0-2457.5	0.98435	CONTINENTAL
ST-816	2457.5-2466.0	0.99996	CONTINENTAL
ST-817	2466.0-2470.0	0.99912	CONTINENTAL
ST-818	2470.0-2471.5	1.00000	CONTINENTAL
ST-819	2471.5-2475.0	0.99741	CONTINENTAL
ST-820	2475.0-2478.0	0.70862	CONTINENTAL
ST-821	2478.0-2479.5	0.99987	CONTINENTAL
ST-822	2479.5-2481.0	0.96419	CONTINENTAL
ST-823	2481.0-2486.0	0.99961	CONTINENTAL
ST-824	2486.0-2486.5	0.99668	CONTINENTAL
ST-825	2486.5-2488.0	0.99982	CONTINENTAL
ST-826	2488.0-2491.0	0.99015	CONTINENTAL
ST-827	2491.0-2493.0	0.97713	CONTINENTAL
ST-828	2493.0-2498.5	0.99997	CONTINENTAL
ST-829	2498.5-2503.5	0.99942	CONTINENTAL
ST-830	2503.5-2508.5	1.00000	CONTINENTAL
ST-831	2508.5-2515.0	1.00000	CONTINENTAL
ST-832	2515.0-2517.0	0.99867	CONTINENTAL
ST-833	2517.0-2520.0	0.99993	CONTINENTAL
ST-834	2520.0-2525.0	0.99999	CONTINENTAL
ST-835	2525.0-2525.5	1.00000	CONTINENTAL
ST-836	2525.5-2531.0	0.99999	CONTINENTAL
ST-837	2531.0-2532.0	0.99903	CONTINENTAL
ST-838	2532.0-2533.5	0.93447	CONTINENTAL
ST-839	2533.5-2535.0	0.56284	BRACKISH
ST-840	2535.0-2537.0	0.99216	CONTINENTAL
ST-841	2537.0-2538.0	0.93637	BRACKISH
ST-842	2538.0-2538.7	0.87112	BRACKISH
ST-844	2539.0-2540.0	0.50262	CONTINENTAL
ST-845	2540.0-2541.0	1.00000	CONTINENTAL

This dissertation is accepted on behalf of the faculty of the Institute by the following committee:

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July 25, 1974
Date