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Depositional history at a site in the northwestern Gulf of Mexico revealed by tephrochronology and oxygen isotope stratigraphy

> Brown, Cynthia Louise, M.S. San Jose State University, 1990



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DEPOSITIONAL HISTORY AT A SITE IN THE NORTHWESTERN GULF OF MEXICO REVEALED BY TEPHROCHRONOLOGY AND OXYGEN ISOTOPE STRATIGRAPHY

A Thesis

Presented to

The Faculty of the Department of Geology

San Jose State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

By
Cynthia Louise Brown
December, 1990

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ACKNOWLEDGEMENTS

This thesis would not have been completed without the time and encouragement provided by Jeff Brown and Mary Ellen and Allen Benson. Joe Wooden at the U. S. Geological Survey provided the laboratory space needed for some of the sample preparation. Dick Tosdal at the U. S. Geological Survey provided the computer for the editing and printing of this thesis. Ken Bork, Jeff Muller, Carol Ostergren, and Bob Fehr assisted in some of the sample preparation. Sample analysis on the electron-microprobe was done by Charles Meyer at the U. S. Geological Survey. Michael Ledbetter, David Andersen and Jenny Metz provided critical comments and valuable suggestions in reviewing this manuscript. Drafting of most of the figures was done by Lynn McMasters at Moss Landing Marine Laboratories. I thank you all.

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ABSTRACT

Microprobe analyses of tephra have been used in conjunction with oxygen isotope (∂¹⁸O) and seismic reflection data in a sedimentary study of the 1000 foot-long deep-sea core E67-113 from the northwestern Gulf of Mexico (longitude 95°54′W, latitude 27°28′N). The core is composed mainly of clay with few silt and sand laminae and sections rich in foraminifera. No megascopic tephra layers are found in this core, but electron-microprobe analysis of glass shards (38-63 μm) from five intervals of dispersed rhyolitic tephra indicate that the tephra are both heterogeneous and altered. Extensive hydration and mobility of iron and other ions into carbonate material hinder accurate geochemical fingerprinting. The coincidence of intervals of dispersed tephra with sections of the core composed mainly of terrigenous material suggests that the tephra were reworked from land deposits and redeposited via fluvial systems in the Gulf.

Volcanic tephra widespread in the region are absent from core E67-113. The oxygen isotope stratigraphy in the core indicates two hiatuses, one from 0 - 0.093 million years and the other from 0.12 - 1.2 million years. A discrete tephra layer found in another core (E67-126A) in the same region is geochemically and biostratigraphically correlated with the Lava Creek rhyolitic eruption from Yellowstone (0.6 ± 0.02 million years). This tephra layer, as well as many other region-wide tephra, fall into the missing time spans in E67-113. Therefore, the absence of discrete tephra layers in core E67-113 was due to deep-sea erosional processes that removed sediment at the core site. The seismic reflection data show that core E67-113 was drilled in a channel adjacent to a large salt diapir. This channel cuts into onlapping sediments. As the diapir ascended through the overlying sediments, bottom currents in the Gulf were diverted around the diapir, eroding significant amounts of sediment while creating a channel or moat.

INTRODUCTION

Marine tephra layers are useful time stratigraphic markers because of their widespread distribution and geologically "instantaneous" deposition (Kennett, 1981). There are numerous ways to date marine tephra in deep sea sediments. In earlier studies, the biostratigraphy and oxygen isotope stratigraphy were determined first, and used to give a relative age for distinctive ash layers in sedimentary cores (Kennett and Huddlestun, 1972; Thunell, 1976). Chemical correlations of marine tephra layers with terrestrial sources allow tephrochronology to be used as a primary stratigraphy (Ledbetter, 1984). This method can be quicker and more accurate than biostratigraphy and oxygen isotope stratigraphy, and can be applied to dispersed ash zones as well as layers in a core.

A number of widespread, megascopic and dispersed tephra layers have been found throughout the western Gulf of Mexico, and have been studied by several authors (Kennett and Huddlestun, 1972; Thunell, 1976; Rabek and others, 1985; Ledbetter, 1985). The most common megascopic layers, W1, Y8 and Y6, were named and correlated by Kennett and Huddlestun and Thunell based on the biostratigraphic subzone in which they occur. The definition of these subzones is based on the distinct planktonic foraminifera zones within the Pleistocene zonation of Ericson and Wollin (1968), and the zones are correlated with oxygen isotope stratigraphy. Rabek and others (1985) have determined the chemical composition of these layers (and dispersed tephra horizons X2, W2, and Y5) in the Gulf and correlated them with the layers of Kennett and Huddlestun and Thunell based on the tephra stratigraphy. Chemical analysis can also be used to correlate marine tephra with terrestrial sources and thus an absolute, rather than relative, age may be determined in many cases. In other instances, correlation of the terrestrial ash with a marine tephra layer in a well-dated core may be used to date the terrestrial ash. For example, the Y8 layer is correlated with the Los Chocoyos eruption in Guatemala (Drexler and others, 1980), which

is correlated with another marine tephra layer, the Worzel-D layer, found in the Pacific Ocean (Bowles and others, 1973), and an age of 84 ka was determined.

The Los Chocoyos Ash is the most widely distributed tephra in the Gulf of Mexico (Drexler and others, 1980) (fig. 1). It is the result of just one of many eruptions producing large volumes of silicic ash during the Pleistocene in western North America, Mexico and Central America. Table 1 lists other large eruptions that could be expected to extend to the northwestern Gulf. The volumes of these eruptions, their proximity to the Gulf (fig. 1), and the general prevailing wind patterns, indicate the Gulf of Mexico as a possible location for deposition of the tephra in table 1. One of those, the Lava Creek B tephra, is found as a discrete tephra layer in a core (E67-126A) from the same region as the core used in this study (C. L. Ostergren, 1989, personal communication).

The purpose of the study is to apply tephrostratigraphic techniques to determine the stratigraphy of deep sea core E67-113 from the northwest Gulf of Mexico. Location and identification of tephra in the core were difficult due to sedimentological processes in the area. Salt diapirism in the area creates an increased saline environment, affecting the chemistry of the immediately surrounding sediments and causing alteration of the volcanic ash. Salt diapirs also disrupt the depositional environment by enhancing erosion, slumping, and sliding. Oxygen isotope stratigraphy for a portion of the core (upper 40%) and seismic-reflection profiles of the core and the surrounding region provide the necessary information to identify these sedimentological processes at the core site.

Geologic History of the Gulf of Mexico

The Gulf of Mexico began to form during the Late Paleozoic. Oceanic crust beneath the abyssal gulf developed by rifting and sea floor spreading. This formed an epicontinental sea in the Jurassic where thick layers of salt were deposited. The oceanic

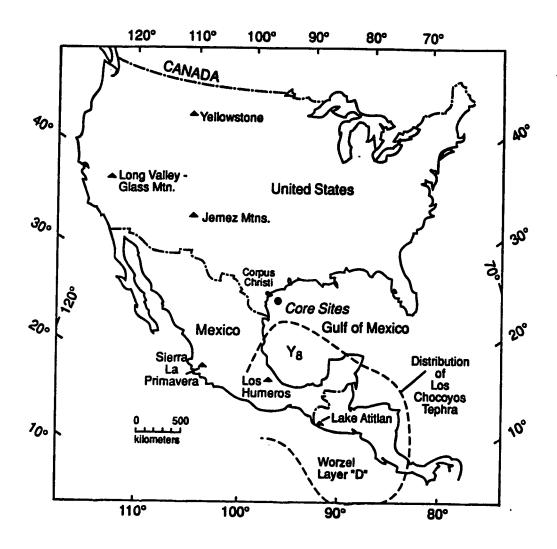


Figure 1. Index map showing the locations of the Late Pliocene and Pleistocene eruptions listed in table 1, the locations of cores E67-113 and E67-126A (Core Sites), and the distribution of the Los Chocoyos tephra from Lake Atitlan. This tephra has been correlated to the Y8 tephra that is present in the western Gulf of Mexico and the Worzel Layer "D" that is present in the eastern Pacific Ocean.

LARGE VOLUME LATE PLIOCENE AND PLEISTOCENE VOLCANIC ERUPTIONS OF NORTH AMERICA, MEXICO, AND CENTRAL AMERICA TABLE 1.

Reference	Izett, 1981	Izett, 1981	Izett, 1981	Izett, 1981	Izett, 1981	Rose and others, 1981 Drexler and others, 1980	Ferriz and Mahood, 1984	Mahood, 1980
Volume km ³	2000	1000	200	300	300	200	40	20
Source Location	Yellowstone, Wyoming	Yellowstone, Wyoming	Long Valley Caldera, California	Jemez Mountains, New Mexico	Jemez Mountains, New Mexico	Lake Atitlan, Guatemala	Los Humeros, Puebla, Mexico	Sierra La Primavera, Jalisco, Mexico
Date	2.01 Ma	0.61 Ma	0.74 Ma	1.15 Ma	1.47 Ma	84 ka	0.24 Ma	90 ka
Eruption Unit or Ash Bed	Huckleberry Ridge	Lava Creek B	Bishop Tuff	Tsankawi Upper Bandelier	Guaje Lower Bandelier	Los Chocoyos	Faby Tuff	Tala Tuff

crust continued to cool and subside until the late Cretaceous. By this time the Gulf had subsided by several kilometers. The Gulf became isolated by continuous growth of surrounding carbonate platforms, the Florida and Yucatan peninsulas (fig. 2), that formed in the Jurassic and Cretaceous. These are made of authigenic, shallow water carbonates and anhydrite (Wilhelm and Ewing, 1972). Low rates of sediment accumulation within the Gulf, together with the continued growth of these carbonate platforms around the Gulf, caused a deepening of the Gulf. Figure 2 shows the major geomorphic provinces and current patterns in the Gulf.

The primary current in the Gulf is the Florida Current. It forms from the Caribbean Current which enters the Gulf by the Yucatan Channel and exits by the Straights of Florida, and therefore is called the Loop Current. The Loop Current extends from the surface to the sea floor along the continental margins. The change in intensity of this current is recorded in sediments by the amount of winnowing observed. At approximately 3.1 Ma, there was a significant increase in the winnowing of the sediments, which continued in numerous cycles into the Pleistocene. This created an increasing number of hiatuses in the sediment record. This increase correlated with the closing of the Central American Passage at approximately 3.1 Ma, diverting most of the Caribbean Current into the Gulf, and later with the glacial-interglacial cycles, which began approximately 2.5 Ma (Late Pliocene), due to the major growth of the ice sheets on the northern continent (Brunner, 1984; Hodell and others, 1985).

The glacial-interglacial cycles that began in the late Pliocene continued into the Pleistocene with increased frequency and decreased duration. Productivity during the Pleistocene increased globally, especially during the glacials. This increase in productivity was due to an increase in current circulation both horizontally and vertically, creating

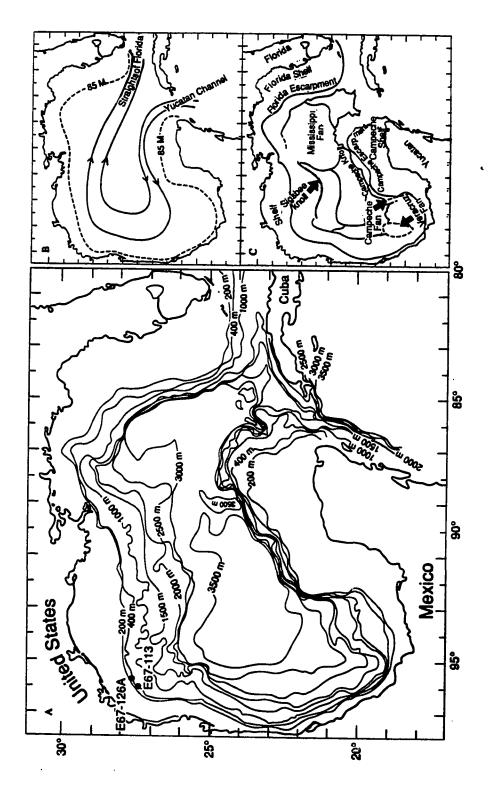


Figure 2. A. Bathymetric map of the Gulf of Mexico showing core locations; B. Major current pattern in the Gulf (after Brunner and Cooley, 1976); C. Major geomorphic provinces in the Gulf (after Wilhelm and Ewing, 1972).

greater upwelling. Terrigenous sediment accumulation rates also increased due to lowered sea level during glacial periods (Brunner, 1984; Hodell and others, 1985).

Salt diapirs dominate the continental slope of the western Gulf of Mexico. The salt diapirs rise due to the density contrast between the less dense salt below and the denser overlying sediments. Diapiric activity increased during the Pleistocene due to the increased sediment accumulation. The salt diapirs form structural highs covered by sediments (Wilhelm and Ewing, 1972). The Sigsbee and Campeche Knolls are results of the extensive diapiric activity (fig. 2).

Today the Gulf is covered by a thin accumulation (approximately 20-50 cm) of foraminiferal ooze on the continental shelves, slopes, rises and abyssal plains as well as on the Mississippi Fan (Davies, 1972). The terrigenous sediments that enter the Gulf are deposited primarily in the western Gulf. This supply of terrigenous sediments also slightly increases productivity by bringing more nutrients into the western part of the Gulf (Jendrzcejewski and Hart, 1978). The present current pattern varies seasonally from spring to winter. In spring, the Caribbean Current impinges on the Gulf, creating the "spring intrusion." This current increases with time, and by the fall, begins to spread into the rest of the Gulf and is termed the "fall spreading." As the current begins to wane during the winter months, eddies are left in the western and northern Gulf (Leipper, 1970).

Geologic Setting of the Study Area

The continental slope in the northern Gulf of Mexico is dominated by salt ridges, domes, and spines, the emplacement and movement of which greatly affect the deposition of the sediments on the slope (fig. 3a). Those sediments are deposited by turbidity currents and hemipelagic sedimentation. Movement of the salt structures causes disruption of these sediments, such as slumping, sliding, faulting and erosion. Salt structures can also

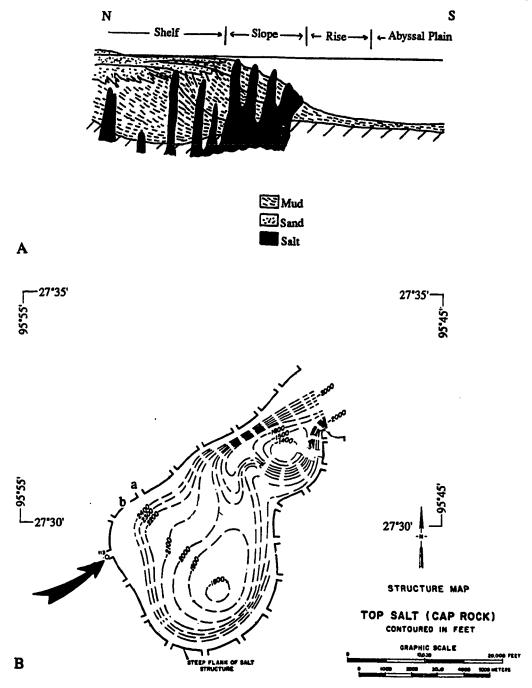


Figure 3. A. Schematic profile of offlapping Pliocene-Pleistocene sediment wedges, showing sand-mud transitions and emplacement of salt structures (after Stuart and Caughey, 1977). B. Structural contour map of the diapir adjacent to core E67-113. Contour intervals are 100 feet. (after Lehner, 1969) Point a is the location of figure 11 and point b is the location of figure 12.

facilitate chemical alteration of adjacent sediments that differs from "normal" alteration of deep sea sediments. The core used for this study, core E67-113 (drilled by the Shell Oil Company in 1967), was drilled at longitude 95°54'W and latitude 27°28'N adjacent to a large salt structure (fig. 3b) in the northwestern Gulf on the upper continental slope (fig. 2). The structure has steep flanks and a flat top covered with caprock, which is typical of an extrusive salt plug, and forms a low-relief promontory (Lehner, 1969).

METHODS

Core E67-113 was chosen for this study because of its continuity (88% recovered) compared to other cores available. The coring data and a brief paleontologic report supplied by Shell are in Appendix A. The core is stored in the U. S. Geological Survey Warehouse in Corpus Christi, Texas. Samples were collected as one inch slices at one foot intervals. This was done by personnel at the storage warehouse. The samples were then sent to Moss Landing Marine Laboratories, California. They arrived as chunks of dried clay in individual plastic bags. Sample preparation consisted of weighing each dry sample, dispersing it in a Calgon solution to disaggregate the clay, then wet-sieving each sample with a 38 μ m screen. The >38 μ m (coarse) fraction was dried and weighed. A final sieving of the dry coarse fraction with a 63 μ m sieve was done to separate the 38 - 63 μ m fraction for analysis.

Identification of the tephra involved preparing smear slides from the 38 - 63 μm fraction. Using a petrographic microscope, the amount of tephra in each slide was estimated and recorded in one of five categories. These categories are none, trace (<1%), rare (1-4%), common (4-10%), and abundant (>10%). Additional information recorded for each slide included the estimated amount of terrigenous material relative to biogenic material (minus the opaque material) and the amount of opaque material relative to the total sample on the slide (% opaques). The samples that contain >1% ash were put into a 10% HCl solution to dissolve the biogenic material (CaCO₃). The end product of this procedure was then put into a mixture of methylene iodide and acetone in a density-gradient column to get a clean ash separate.

Chemical "fingerprinting" of volcanic glass was used as the method of correlating the marine tephra with its terrestrial source. The ash was mounted and analyzed on the electron-microprobe for 9 major elements (Si, Al, Fe, Mg, Mn, Ca, Ti, Na, and K).

Natural glasses and silicate minerals that were analyzed by conventional wet-chemical methods were used as standards. Up to 20 shards were analyzed for each sample. The data were recalculated to 100%, then added to the tephra database at the U. S. Geological Survey in Menlo Park, California. This database contains electron-microprobe data of major element chemistry for tephra from most North American and many Central and Latin American volcanic eruptions. Similarity coefficients were calculated for every sample analyzed with every sample in the tephra database. The similarity coefficient is an average of ratios of element concentrations in two glass samples. The ratios of individual elements are calculated by dividing the concentration in one sample by the concentration in another. The lower concentration is always divided by the higher so the ratio is always less than or equal to one. The coefficients are averaged for all elements in the comparison. The ideal value of this coefficient equals one for an identical pair. Similarity coefficients with values of 0.35 - 0.94 are for different units. Values of 0.94 - 0.96 are intervals of uncertain correlation. Values of 0.96 and higher are considered to be from a single source (Sarna-Wojcicki and others, 1984).

Four different combinations of elements were used for the correlations. These combinations are:

Na₂O, Al₂O₃, SiO₂, CaO, K₂O, Fe₂O₃ Na₂O, Al₂O₃, SiO₂, CaO, K₂O, MgO Na₂O, Al₂O₃, SiO₂, CaO, K₂O Na₂O, Al₂O₃, SiO₂, CaO.

An element is useful in the correlation if it is homogeneously distributed within the glass of a single layer, if it differs in concentration in layers of different ages, and if a full range of concentrations can be accurately measured (Sarna-Wojcicki and others, 1984). A list of the best 50 matches was determined for each combination of elements for each sample.

The homogeneity index is calculated for each sample also. This is done by dividing the standard deviation of the counts accepted for each element in each sample by the square root of the mean. A homogeneity index of 0-2 indicates a very homogeneous sample and suggests that shards are from a single source. Homogeneity indices of 3 or greater indicate increasing heterogeneity (C. E. Meyer, 1990, personal communication).

RESULTS

The opaque material consists of small round beads of pyrite. They appear to be formed by pyritization of organic structures (C. E. Meyer, 1987, personal communication). Appendix B contains the data collected for each sample. Twelve samples contained more than 1% tephra, but no megascopic or discrete tephra layers were found. There was a background level of a few tephra shards in almost every sample. The samples with > 1% tephra came from zones of enriched organic material and > 50% terrigenous material (fig. 4). Samples 1563, 1617, 1629, 1630, 1644, 1653, and 1659 (sample numbers correspond to depth, in feet, below sea level) were not analyzed due to extensive alteration. Samples 1543, 1564, 1640, 1856, and 2178 were less visibly altered and were analyzed. Sample 1640 had the most tephra and is the least altered, so it was analyzed twice, using 15 - 20 grains in each analysis. Two of the samples (1543 and 1564) contained only 3 - 10 acceptable grains.

The chemical data for the five tephra samples analyzed are listed Appendix C and summarized in table 2. The tephra are rhyolitic (75 - 77% SiO₂). The total weight percent of the oxides for all of the samples is low (87 - 91%). This indicates that the tephra have been hydrated. Some of the hydration occurs during the diagenesis of the volcanic glass (Summa and Verosub, 1987).

The best 50 matches (correlations) and chemistry for the samples are in Appendix D. The iron and magnesium of the core samples are significantly different from any other analyses in the database. The iron is very depleted and the magnesium is very enriched. Figure 5 is a comparison of the core sample chemistry with some of the tephra found in the western Gulf. The Faby is represented because of its proximity to the Gulf and possible occurrence within the Gulf (it has not yet been found in the Gulf), and the fact that it appears in some of the correlations for this study. Sample 2040 is from core E67-126A.

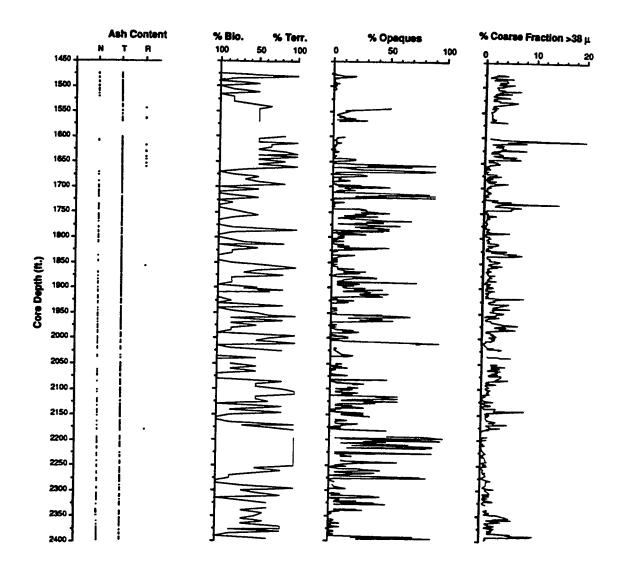


Figure 4. Graph of the data for core E67-113. Ash Content categories: N=0%, T=<1%, and R=1-4%. % Bio - % Terr = amount of biogenic material vs amount of terrigenous material (of total non-opaque material). % Opaques = amount of pyritized organic structures (pyrite beads) compared to the total sample. % Coarse fraction = Weight of >38 μ fraction divided by the the total sample.

TABLE 2. CHEMICAL DATA OF TEPHRA AT CORE SITE E67-113.

			Samp	le No.		
<u>Oxide</u>	1543	1564	1640	1640-2	1856	2178
SiO ₂	64.655	66.267	67.225	70.011	69.779	68.775
Al ₂ O ₃	14.915	14.715	14.502	14.474	14.134	14.594
Fe ₂ O ₃ *	0.083	0.186	0.207	0.270	0.210	0.405
MgO	0.073	0.626	0.611	0.535	0.445	0.517
MnO	0.008	0.008	0.015	0.006	0.000	0.011
CaO	0.243	0.414	0.407	0.439	0.462	0.384
TiO ₂	0.026	0.000	0.000	0.007	0.000	0.000
Na ₂ O	2.133	1.795	2.464	2.200	2.249	3.245
K ₂ O	4.028	<u>4.107</u>	3.180	3.204	3.100	2.834
Total	86.825	88.118	88.612	91.146	90.380	90.766
			Recalculated	d to 100%		
SiO ₂	74.47	75.20	75.86	76.81	77.21	75.77
Al ₂ O ₃	17.18	16.70	16.37	15.88	15.64	16.08
Fe ₂ O ₃ *	0.10	0.21	0.23	0.30	0.23	0.45
MgO	0.08	0.71	0.69	0.59	0.49	0.57
MnO	0.01	0.01	0.02	0.01	0.00	0.01
CaO	0.28	0.47	0.46	0.48	0.51	0.42
TiO ₂	0.03	0.00	0.00	0.01	0.00	0.00
Na ₂ O	2.46	2.04	2.78	2.41	2.49	3.58
K ₂ O	<u>4.64</u>	<u>4.66</u>	<u>3.59</u>	3.52	<u>3.43</u>	3.12
Total	99.25	100.00	100.00	100.01	100.00	100.00

Results are in weight % *Total iron is recalculated as Fe₂O₃.

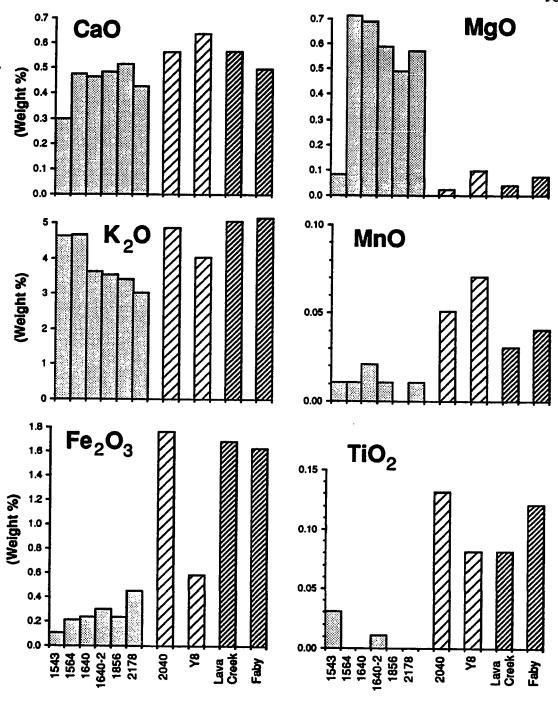


Figure 5. Comparison of chemistry of the samples from core E67-113 with two marine ashes found in the western Gulf of Mexico (2040 and Y8) and two terrestrial ashes (Lava Creek B and Faby).

Y8 and 2040 are marine tephra from the Gulf. The Faby and Los Chocoyos are terrestrial tephra shown here to compare chemical differences between marine and terrestrial tephra. The tephra analyzed throughout core E67-113 are similar to each other, but are very different from the other tephra related to the Gulf (and anywhere else).

Each of the five samples consists of shards that are very heterogeneous. This is indicated by the homogeneity index (Appendix C). Table 3 lists the homogeneity indices for the samples from the core and also samples known to be from single sources for comparison. The majority of indices of the elements from the samples in the core are greater than 3. This provides good evidence that shards in a single sample are differentially altered and possibly from different sources.

The similarity coefficients and lists of 50 best matches for the individual core samples to tephra in the database are in Appendix D. The tephra from the database that appear in the lists of correlations typically represent older, altered tephra that could not stratigraphically occur in the core due to their age (Early Pliocene and older). When Fe₂O₃ or MgO is used in the correlation, the core samples correlate mainly with each other. This is due to the distinct differences between these oxides in the core samples and the tephra in the database. However, a few samples do appear in the correlations that represent Pleistocene tephra found in the western Gulf of Mexico, or that could occur due to the proximity of the source to the western Gulf (fig. 1). These are the Los Chocoyos (Y8 - marine layer) and the Faby Tuff, respectively. Their similarity coefficients are low, typically 70 - 85 %, but appear in the lists in Appendix D as high as the third best match for samples 1564 and 1640.

TABLE 3. COMPARISON OF HOMOGENEITY INDICES OF THE ELEMENTS IN TEPHRA FROM CORE SITE E67-113 TO SOME SINGLE SOURCE SAMPLES

Samples from Core E67-113

<u>Oxide</u>	1543	1564	1640	1640-2	1856	2178
SiO ₂	10.539	13.584	16.801	7.377	6.708	8.594
Al ₂ O ₃	4.644	3.489	4.622	3.941	3.506	4.338
FeO	1.158	2.901	6.084	9.853	4.751	10.586
MgO	9.918	6.523	8.754	9.951	6.252	9.001
MnO	1.331	1.479	0.872	1.451	0.665	1.116
CaO	3.908	5.408	7.226	9.463	5.612	7.096
TiO ₂	1.364	1.047	1.221	2.136	0.819	0.878
Na ₂ O	3.476	2.558	7.664	8.506	2.443	3.641
K ₂ O	9.745	8.308	9.799	13.506	10.017	10.380

	Single	Source	Samples
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<u>Oxide</u>	2040	Faby	Y8_	La Primavera
SiO ₂	1.348	1.341	1.578	0.979
Al ₂ O ₃	1.930	1.322	1.652	1.145
FeO	2.838	0.804	1.095	1.249
MgO	0.938	0.939	1.053	1.147
MnO	1.083	0.673	0.767	1.100
CaO	2.155	1.450	1.828	1.175
TiO ₂	1.853	1.136	1.163	1.166
Na ₂ O	1.654	2.552	1.920	1.903
K ₂ O	4.130	0.948	4.069	1.103

Sample 2040 is a marine tephra layer from Core E67-126A from the Gulf of Mexico. Sample Y8 is a marine tephra from the Gulf of Mexico. The Faby and La Primavera samples are terrestrial tephra layers from Mexico.

DISCUSSION

Alteration

The tephra in core E67-113 have been highly altered as indicated by the low total weight % of the oxides, enrichment of magnesium, and depletion of the iron, titanium and manganese in each sample. Volcanic glass readily alters due to its thermodynamic instability and poorly ordered internal structure. Low temperature alteration of silica glass typically occurs in two stages. The initial stage consists of hydration and alkali ion exchange. In the second stage, destruction of the glass matrix begins and there is precipitation of secondary phases in the newly created pore spaces (Fisher and Schmincke, 1984).

Subaerial alteration depends on changes in the glass/water system. Leaching of elements from the glass rapidly occurs in a well-flushed fluvial system due to the oxygenated fresh water, which is undersaturated in the elements with respect to the glass. The released ions are then carried downstream. Clay minerals (commonly montmorillonite) are the typical alteration product in these conditions (Fisher and Schmincke, 1984).

Low-temperature marine alteration depends on the same glass/water system as in subaerial conditions. However, the tephra pick up ions (Mg²⁺, Na⁺) as well as release them (Ca²⁺)(Brownlow, 1979). The tephra alter to clays (commonly smectites) and zeolites (Summa and others, 1984). Volcanic tephra in the sediment column act as a chemical source and sink. The ions that are released influence the pore water chemistry in the surrounding marine sediments (Fisher and Schmincke, 1984).

The tephra in core E67-113 appear to have been reworked from subaerial deposits and redeposited via fluvial and coastal systems in the Gulf. The homogeneity indices provide some evidence for this. High indices can indicate a number of possible influences

on the tephra. One is that some grains are altered more than others within the sample. Another possibility is that individual grains are heterogeneous initially. They may contain bubbles or lithic intrusions. The third possibility, and typically the most common, is post-depositional reworking. There may be glass incorporated from other eruptions (C. E. Meyer, 1990, personal communication). The tephra in the core occur in zones of increased terrigenous material. This suggests that the tephra were subaerially deposited, then reworked by fluvial and coastal systems to be finally deposited in the Gulf.

Marine alteration has also influenced the tephra in the core as indicated by the enrichment of magnesium and the depletion of iron. The altered tephra probably has picked up extra magnesium from the sea-water. The depletion of iron may be due to the adjacent salt diapir (fig. 3b). The dissolution of near-surface salt increases the salinity of pore fluids and creates anoxic conditions, which preserve marine organic matter and produce a reducing environment (Lehner, 1969; Williams and Lerche, 1987). The tephra samples come from zones enriched in organic material. Pyritization readily occurs in a reducing environment and is seen throughout the core as opaque, pyritized organic structures. Sulfur is associated with the caprock of a salt dome (Krauskopf, 1967); in this case, the caprock is mainly comprised of anhydrite (Lehner, 1969). The reducing environment may have helped the iron to be mobilized from the tephra. This iron, combined with the sulfur, may have contributed to the pyritization. Sample 2178 (the lowermost sample that contains ash in the core) is enriched in magnesium as are the other samples, but it is not significantly depleted in iron. This may be due to the depth at which the sample is located. Compaction at depth, due to overburden of the overlying sediments prior to the ascent of the diapir, could have reduced the pore space. The increase in salinity of the water due to the ascended diapir may not have affected the sediment at this depth because of the inability of the water to enter the pore spaces. The magnesium would be enriched, as in the other

samples in the core, if the tephra has picked up the magnesium from the sea-water in which the sediment was deposited.

Tephrochronology

No correlations can be made with any source of tephra or other marine tephra due to the extensive alteration. It is interesting to note, though, that the Faby, Los Chocoyos, and Y8 ashes do appear in some of the correlations (Appendix D). However, the oxygen isotope stratigraphy (∂^{18} O) for the core indicates that these ashes would not occur in the core (fig. 6). Two major hiatuses occur (D. F. Williams, 1988, written communication), one at 0 - 0.093 Ma (1474 ft below sea level) and one at 0.12 - 1.2 Ma (1728 ft below sea level). The paleontologic report from Shell (Appendix A) indicates a datum line at 1728 ft as a change from Lower Pleistocene to Upper Pleistocene. This datum line correlates with the depth of the lower hiatus that Williams noted in the oxygen isotope stratigraphy. Both of these hiatuses encompass the times that many of the widespread ashes found in the Gulf would occur.

In another core (E67-126A), from the same region as E67-113, where water depth is 1064 ft, a discrete ash layer is found at 2040 ft below sea level. Core E67-126A was drilled on the shelf-slope break (fig. 2). There is less alteration of this ash, and the average homogeneity index is 1-2 (indicating a single source). Electron-microprobe analyses of the ash indicate a correlation with either the Huckleberry Ridge or the Lava Creek B ash (Table 1). Further analysis with X-ray fluorescence, in conjunction with biostratigraphy and oxygen isotope stratigraphy, indicate that the ash layer correlates with the Lava Creek ash (C. L. Ostergren, 1989, personal communication). This ash is not found in core E67-113 because it falls within the 0.12 - 1.2 Ma hiatus.

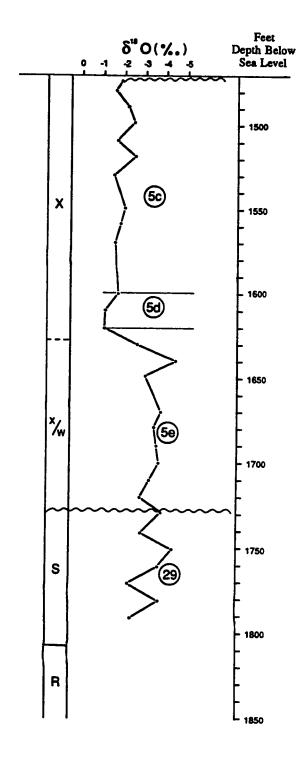


Figure 6. Oxygen isotope stratigraphy for the upper 40% of core E67-113 (From D. F. Williams, 1988, written communication). X, W, S, and R correspond to foraminifera zones and 5c-5e and 29 correspond to oxygen isotopic stages within the foraminifera zones.

Sedimentary History

The proximity of core E67-113 to a large salt diapir is the cause of the major hiatuses indicated by the oxygen isotope stratigraphy. The seismic-reflection profile shows the effect of the adjacent salt diapir on the sediment of the core (fig. 7). Three sections of sediment (A, B, and C) record the history of the rising diapir. Section A shows undisturbed, parallel reflectors, indicating little diapiric activity or activity that had little influence on the sedimentation of the strong reflectors (sedimentation in balance with the ascending diapir). Section B indicates important diapiric activity during deposition. The reflectors pinch out (converge) against the diapir. They show onlap of sediments on a topographic high, or variable compaction due to the rising diapir. Section C consists of parallel reflectors filling a channel. The reflectors at the top of section B are truncated by the channel fill reflectors in section C.

As this diapir ascended, the bottom currents were diverted around this new topographic feature, creating an erosional channel or moat around the diapir in which the core was drilled. As the activity of the diapir slowed, erosion decreased, and eventually deposition increased and the channel that was created was draped with sediment. The upper hiatus of 0 - 93 ka may be due to reactivity of the salt diapir, which may have increased the diverted current activity within the channel and eroded the top 93,000 years of sediment. Figures 8a and 8b are seismic-reflection profiles from the U. S. Geological Survey of the area surrounding the core location. They show a similar channel on the northwestern flank of the diapir, approximately 3,000 meters from the location of the core (points a and b in fig. 3b). This channel is inferred to have been eroded by the same diverted currents.

High rates of sedimentation after the 0.12 - 1.2 Ma hiatus may have caused the renewed activity in the diapir to create the 0 - 93 ka hiatus. Sedimentation rates vary greatly

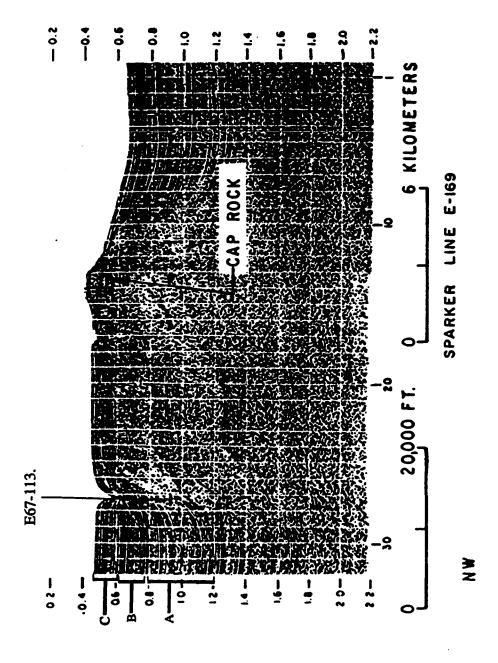


Figure 7. Seismic-reflection profile showing location of core E67-113. (after Lehner, 1969) A = undisturbed parallel reflectors; B = converging reflectors against the diapir; C = parallel channel fill reflectors.

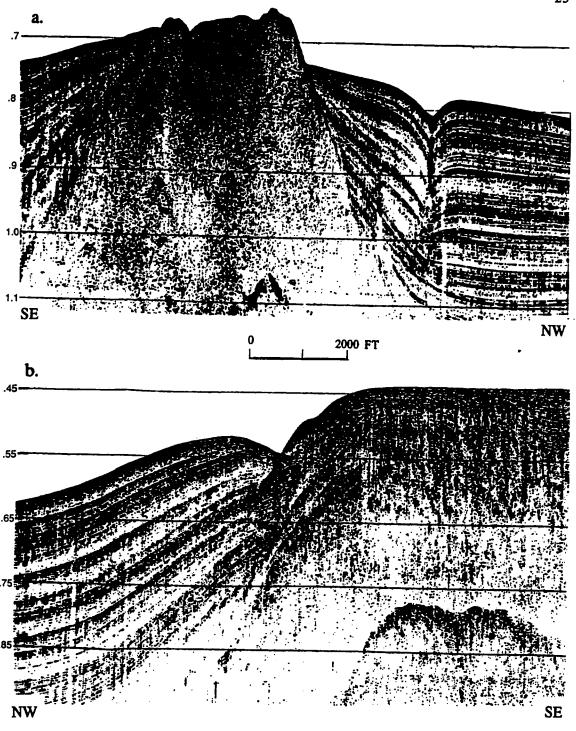


Figure 8. Seismic reflection profiles of the northwestern side of the diapir showing erosional channels similar to the one in which the core was drilled. The top profile (a) corresponds to point a in figure 3 and the bottom profile (b) corresponds to point b in figure 3.

in the Gulf. Thunell (1976) reported rates of 2 - 8 cm/ka, and Kennett and Huddlestun (1972) reported 10 - 30 cm/ka rates and noted that those rates are commonly highly variable within and between cores. The sedimentation rates for core E67-113, based on the oxygen isotope stratigraphy, range from 2.4 cm/ka prior to the hiatus at 0.12 - 1.2 Ma, to 340 cm/ka after the same hiatus, with a section of only 42.2 cm/ka at the 5d isotopic stage (Fig 6). After the erosion stopped, sedimentation rates greatly increased, and large amounts of sediment were deposited prior to renewed activity of the diapir (seen by the second hiatus at 0 - 93 ka). This renewed activity may be due to the rapid accumulation of overburden, causing the less dense salt below to flow upward again.

The depth of the unconformity between sections B and C in the seismic-reflection profile (fig. 7) correlates with the 0.12 - 1.2 Ma hiatus determined by the oxygen isotope stratigraphy (at approximately 1728 ft, fig. 6), and the datum determined by the paleontologic report (at 1728 ft, Appendix A). Seismic velocities recorded for sediments in the Gulf of Mexico range from 1.7 - 1.92 km/sec for the upper kilometer (3281 ft) of sediment on the continental slope (Locker and Chatterjee, 1984). When 1.7 km/sec is used with 0.62 sec for the two-way travel time at the location of the unconformity on the seismic profile, the approximate depth of the unconformity is 527 m (1729 ft).

CONCLUSIONS

The high degree of alteration and hydration of the tephra in core E67-113 (located in the Gulf of Mexico, longitude 95°54'W, latitude 27°28'N) indicate that the tephra have been reworked from land deposits. High homogeneity indices of the electron-microprobe data support the theory of reworked tephra. The tephra occur in zones of comparatively high terrigenous material, indicating that the tephra were redeposited with terrigenous sediment via fluvial and coastal systems. Post-depositional alteration in the marine environment also is indicated by the significant enrichment of magnesium and the depletion of iron in the tephra. Magnesium enrichment may be due to the uptake of magnesium from the sea-water. Iron depletion may be due to the proximity of a salt diapir to the core. The high salinity in the pore fluids in the sediment created an anoxic environment, preserving organic matter and thus forming a reducing environment, ideal for the formation of pyrite, which contains iron from the tephra.

No correlation with any source is possible due to the great amount of alteration. However, poor correlations with a few widespread tephra found in the Gulf are noted. These include the Faby Tuff $(0.24 \pm 0.03 \text{ Ma})$ and the Los Chocoyos (Y-8) tephra (84 ka). A discrete tephra layer occurs in another core (E67-126A) from the same region and is correlated with the Lava Creek Tuff $(0.6 \pm 0.02 \text{ Ma})$. Oxygen isotope stratigraphy $(\partial^{18}O)$ indicates two major hiatuses occuring at 0 - 0.093 Ma and 0.12 - 1.2 Ma. These time spans include the eruption of the Faby, Los Chocoyos, and Lava Creek tephra. If these tephra are present in the core (indicated by the poor correlations for the Faby and Los Chocoyos), then their stratigraphic position would not be of the time of eruption but of the time the tephra entered the Gulf of Mexico via fluvial and coastal systems.

Seismic reflection profiles show that the core was drilled in a small channel adjacent to a large salt diapir. The reflectors in the profile indicate changes in the sedimentation due

to changes in the activity of the rising diapir. The unconformities may be related to times of increased activity of the diapir. As the diapir rose, currents were diverted around the new topographic high and eroded sediments to form a channel. An unconformity is indicated in the reflection data and approximately correlates with the timing of the large hiatus from 0.12 - 1.2 Ma. High sedimentation rates based on the oxygen isotope stratigraphy after the 0.12 - 1.2 Ma hiatus may have caused the renewed activity of the diapir to create the 0 - 0.093 Ma hiatus at the top of the core.

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APPENDIX A Paleontologic report and coring data for core E67-113 provided by Shell Oil Co.

PALEONTOLOGIC REPORT

E67-113 (USGS-113)

WATER DEPTH - 1472'

First sample - 1472'

Recent-Upper Pleistocene mixed

Sample - 1728'

Lower Pleistocene

Last sample - 2391'

In Lower Pleistocene

TD - 2400'

Lower Pleistocene

Sheet 1 of 5

Hole No. <u>E 67-113</u>	Date 7/17-18/67
Drillers Water Depth1472	Coordinates 27°28' 95°54'
Drillers Total Depth 2400	Raydist Loc
On Location 1530 7/17/67 Going in hole 1545 - APE trouble	Total Footage Cored 928'
Completed Hole <u>0250 7/19/67</u>	Total Footage Recovered 815' No Log run S.P. 928'

CORE	CORED	RECOVERY	
NO.	INTERVAL	IN FEET	REMARKS
1	1472-88	13/16'	Clay, soft, gm-gy, forams
2	1488-1504	15/16'	a.l.a.
3	1504-20	14/16'	Clay - becoming firmer - grn-gy - forams
4	1520-36	12/16'	Clay - soft - gm-gy - forams
5	1536-52	14/16'	Clay - mod firm - grn-gy - forams
6	1552-68	17/16'	a.l.a.
7	1568-84	16/16'	a.l.a. sli sdy at 1583
8	1584-1600	15/16'	Clay, brn-gy to med-gy interbedded, firmer
9	1600-16	16/16'	a.l.a., few forams
10	1616-32	17/16'	Clay, grn-gy, with white sand zones, firm, forams
11	1632-48	16/16'	a.l.a. but bec darker colored, little sand
12	1648-64	14/16'	a.l.a., but no sand
13	1664-80	17/16'	a.l.a.
14	1680-96	18/16'	a.l.a.

Sheet 2 of 5

Hole No. <u>E 67-113</u>	Date7/18/67
Drillers Water Depth1472	Coordinates
Drillers Total Depth	Raydist Loc
On Location	Total Footage Cored
Completed Hole	Total Footage Recovered

CORE	CORED	RECOVERY	
NO.	INTERVAL	IN FEET	REMARKS
15	1696-1712	15/16'	bottom 2-1/2' blew out of core bbl a.l.a. and landed on oily deck
16	1712-28	16/16'	As above, core #12, faint red cast 1714'-22'
17	1728-44	17/16'	As above, no red. Bottom 3 ft blew out on deck possible contamination
18	1744-60	17/16'	Clay, dark grn-gy, some color variation in shade
19	1760-76	17/16'	a.l.a.
20	1776-92	15/16'	Bottom 3 ft blew out of bbl - possible a.l.a. contamination
21	1792-1808	16/16'	a.l.a. Some forams and shell material
22	1808-24	16/16'	a.l.a.
23	1824-40	16/16'	a.l.a.
24	1840-56	17/16'	a.l.a.
25	1856-72	16/16'	a.l.a.
26	1872-88	17/16'	a.l.a.
27	1888-1904	16/16'	a.l.a. rare sdy laminae
28	1904-20	16/16'	a.l.a., silty-sandy at bottom 6'

Sheet 3 of 5

Hole No. <u>E 67-113</u>	Date 7/18/67									
Drillers Water Depth 1472	Coordinates									
Drillers Total Depth	Raydist Loc									
On Location	Total Footage Cored									
Completed Hole	Total Footage Recovered									

CORE	CORED	RECOVERY	
NO.	INTERVAL	IN FEET	REMARKS
29	1920-36	11/16'	a.l.a. little silt
30	1936-52	16/16'	a.l.a., few silt to sand laminae
31	1952-68	16/16'	As above core #18, some sandy zones
32	1968-84	16/16'	a.l.a.
33	1984-2000	15/16'	Clay, dark brn-gy, & dk grn-gy, bedded & mottled in part, firm, forams, rare silty lams
34	2000-16	12/16'	a.l.a., lower 6' very dark, gritty zones-forams?Sd?
35	2016-32	6/16'	a.l.a. but bec lighter gy again
36	2032-48	6/16'	a.l.a. grn-gy, rich forams, clay very dry
37	2048-64	16/16'	a.l.a.
38	2064-80	11/16'	a.l.a., clam shell @ 2075-2076
39	2080-2096	12/16'	a.l.a.
40	2096-2112	14/16'	a.l.a.
41	2112-28	14/16'	firm. Clay, interbedded brn-gy & grn-gy, sandy laminae
42	2128-44		a.l.a.

Sheet 4 of 5

Hole No. <u>E 67-113</u>	Date 7/18-19/67
Drillers Water Depth	Coordinates
The 211	Raydist Loc
	Total Footage Cored
Commission 3.77.1	Total Footage Recovered

CORE	CORED	RECOVERY	
NO.	INTERVAL	IN FEET	REMARKS
43	2144-60	12/16'	a.l.a.
44	2160-76	16/16'	a.l.a. and apparent 30°+ fracture? or dip?
45	2176-92	6/16'	a.l.a. bec more grn in bottom 6" - sharp contact
46	2192-2208	9/12'	Clay as above core #41
47	2208-24	10/16'	a.l.a.
48	2224-40	10/16'	a.l.a.
49	2240-56	15/16'	a.l.a.
50	2256-72	11/16'	a.l.a.
51	2272-88	12/16'	a.l.a. but slightly lighter shades of color
52	2288-2304	10/16'	Same as #51
53	2304-20	15/16'	same as core #41 darker again, very firm
54	2320-36	İ	a.l.a., well laminated zones
55	2336-52	13/16'	a.l.a.
56	2352-68	15/16'	a.l.a. with well defined thin beds.

Sheet 5 of 5

Hole No. <u>E 67-113</u>	Date7/18-19/67
Drillers Water Depth	Coordinates
Drillers Total Depth	Raydist Loc
•	Total Footage Cored
0 1 177 1	Total Footage Recovered

CORE	CORED	RECOVERY	
NO.	INTERVAL	IN FEET	REMARKS
			TOTAL BOAD
57	2368-84	15/16'	a.l.a. some laminae, some massive
	2000 01	13/10	
58	2384-2400	10/16	no silt
26	2364-2400	12/16'	a.l.a. to 2390.5 then massive dk-grn-gy, or sand
	l		
Winds	40 knots - sea	is 8-12'	Had to abandon hole before losing string
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APPENDIX B

The appendix contains the observational data for core E67-113. Sample numbers correspond to number of feet below sea level. Water depth at the coring site is 1472 ft. The first two samples were lost (1472 and 1473). Samples in bold print are those with more than 1% ash.

Categories for amount of ash are:

None = 0%

Trace = < 1%

Rare = 1-4%

No sample contained more than 4% ash.

The biogenic to terrigenous category is a semi-quantitative comparison of the nonopaque material in each sample. To graph these data, the following conversion was made:

f >>>> t 100% biogenic material

f = t 50% biogenic and 50% terrigenous

f <<< t 100% terrigenous

The amount of opaque material is relative to the entire sample.

Sample Data for Core E67-113

Sample No.	Sample Weight (gm)	Coarse (>38μ) Weight (gm)	Coarse Fraction (%)	Amount of Ash	Biogenic (f) to	Amount of
						Opadues (20)
1474	15.35	0.31	2.02	trace	f>>>1	-
1475	16.13	0.54	3.35	none	[>>> I	4
1476	26.34	1.15	4.37	none	f>>> t	, ,
1477	43.64	1.02	2,34	trace	· · · · ·	۰ -
1478	•	•				-
1479	21.07	0.17	0.81	trace	f	. 5
1480	15.05	0.27	1.79	trace	- -	2 5
1481	25.10	0.58	2.31	trace	<u>.</u>	3 2
1482	30.08	1.60	5.32	trace	f>>>1	; –
1483	23.25	0.48	2.06	none	f>>>1	• •
1484	34.18	0.54	1.58	trace	f>v1	. (*
1485	26.78	1.06	3.96	none	[≫]	, <u>^</u>
1486	•	•	•	•	•	; .
1487	•	•	•	•	•	• 1
1488	•	•	•	•		• '
1489	47.37	2.02	4.26	trace	f >>> t	• -
1490	29.00	0.81	2.79	trace	(*×)	٠ ٦
1491	29.18	1.17	4.01	none	[×]	; –
1492	25.42	0.92	3.62	none		
1493	23.67	69.0	2.92	trace	[**J	۱
1494	30.04	0.77	2.56	trace	f <t< td=""><td>ı ter</td></t<>	ı ter
1495	19.13	1.07	5.59	trace	f>1	,
1496	•	•	•		•	•
1497	38.45	1.20	3.12	trace	f>t	cr
1498	22.04	0.81	3.68	trace	[%]	· -
1499	14.24	0.47	3.30	none	f>>> t	. △
1500	27.94	0.62	2.22	none	f>1	5 ?
1501	31.08	92.0	2.45	trace	f>>1	-
1502	•	•	•	•	•	•
1503	•	•	•		•	•
1504	19.75	0.47	2.38	trace.	f > t	7

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Amount of	Opadnes (%)	ı	, ,	7 -	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	-	1 1	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	not recorded	•	•	•		•	•	not recorded
	Terrigenous (t)	•	1331	182	[2]	[\ \ \	f = t	[≫]	[>1	f >> t	1 < J	f>>> t	f >> t	[>×]	•	•	[≫t	f ≫1	f>1	f>>> t	5	[×]	1	f>1	f>> t	f>>1	f>1	•	•	•	•	•	•	f>> t
Amount	Of ASn	•	none	none	trace	trace	none	trace	trace	trace	trace	none	trace	trace	•	•	trace	none	trace	trace	trace	trace	trace	trace	trace - rare	trace	trace		•	•	•	•		trace
Coarse	riaction (20)	•	3.86	3.17	6.93	2.74	2.74	3.34	2.08	2.00	1.91	2.22	2.06	1.39	•	•	4.69	2.55	1.61	2.22	1.70	1.46	2.19	2.82	2.71	3.99	6.28		•	•	•	•	•	1.61
Coarse (>38µ)	WEIRING (RIII)	•	0.84	96.0	1.27	0.44	0.62	0.91	0.32	1.52	1.00	0.39	0.29	0.40	•	•	0.93	0.48	0.37	0.70	0.55	0.28	98.0	1.16	0.79	1.66	1.46	•	•	•	•	•	,	0.39
Sample Weight (gm)	**************************************	ı	21.76	30.27	18.33	16.06	22.61	27.24	15.35	30.41	52.22	17.60	14.07	28.79	•	•	19.85	18.80	23.00	31.54	32.27	19.12	39.24	41.12	29.15	41.59	23.26	•	•	•	•	•	•	24.25
Sample No		1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537

Amount of	Opaques (%)	not recorded	not recorded	not recorded	nor recorded		ጽ ፡	7		•	•	•	10	15	•	•			•		n «	'n	•	1	•	•	9	} v	, <u>c</u>	3 ¥	3 8	8	۰ ،	n é	₹ '	S.	•
	rerigenous (t)	f>t	 	• • • • • • • • • • • • • • • • • • •			1=7	1>1	•	•	•	• ([>t	f=t	•	•	•	•			1 4 4	1<1	•	•	•	•	f=t	[×]	1	! !		1	, ,	1	1 > 1	f=1	1
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Coarse	riacion (20)	1.43	1.61	2.01	2.45	1 35	1 90		• (1.49	1.1.1		•	•	•	•	1.26	23.	4	1	•	•	•	1.36	1.53	1.35	2.07	2.06		1 57	700		4.20	•
Coarse (>38µ)	9	0.26	0.46	0.86	0.77	0.42	0.49	<u>}</u>	•	•	•	770	0.47	C+:0	·	•	•	•	•	0.70	38	} '	ı	•	•	• !	0.21	0.42	0.39	0.84	0.26	•	35	0.25	1 14	1.14	•
Sample Weight (gm)	9	18.22	28.52	42.71	31.46	31.11	24.58		•	•	•	21 54	71:75 A0 SA	00.04	•	•	•	•	•	55.46	28.87	•	ı	•	•	• 1	15.49	27.48	28.97	40.58	12.62	•	21.70	25.65	26.72	C1.07	
Sample No.		1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1540	1550	000	1551	1552	1553	1554	1555	1556	1557	1558	1550	1560	200	1561	1562	1563	1564	1565	1566	1567	1568	1560	1570	277

Sample No.	Weight (gm)	Weight (gm)	Fraction (%)	Amount of Ash	Biogenic (f) to Terrigenous (t)	Amount of Opaques (%)
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	39.97	0.39	0.98	trace	Į«i	. 5
	22.84	0.43	1.88	trace	f <t< td=""><td>e en</td></t<>	e en
	18.48	0.45	2.44	trace	Į«į	י אי

Amount of	Opadnes (%)		۰ ,	n (1	n	- (*) r		1 V	۰ ۲	۳ ر	, c	1 (*	7 W	·	• ~	•	•	. –	-	◄ ;	• ~	ì - -			. 6	٧n	, v.	-		-	-	•
Biogenic (f) to	retrigenous (t)	ı	f i	fet	f>1	į v	1×1	, <u>, , , , , , , , , , , , , , , , , , </u>	f= t	[>]	į«į	Į </th <th>f<t< th=""><th>f<!--</th--><th>į «į</th><th>į «« i</th><th>f≪ı</th><th>•</th><th></th><th>fet</th><th>f<f< th=""><th>, j</th><th>Í<!--</th--><th>f=t</th><th>f<t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<></th></th></f<></th></th></t<></th>	f <t< th=""><th>f<!--</th--><th>į «į</th><th>į «« i</th><th>f≪ı</th><th>•</th><th></th><th>fet</th><th>f<f< th=""><th>, j</th><th>Í<!--</th--><th>f=t</th><th>f<t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<></th></th></f<></th></th></t<>	f </th <th>į «į</th> <th>į «« i</th> <th>f≪ı</th> <th>•</th> <th></th> <th>fet</th> <th>f<f< th=""><th>, j</th><th>Í<!--</th--><th>f=t</th><th>f<t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<></th></th></f<></th>	į «į	į «« i	f≪ı	•		fet	f <f< th=""><th>, j</th><th>Í<!--</th--><th>f=t</th><th>f<t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<></th></th></f<>	, j	Í </th <th>f=t</th> <th>f<t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<></th>	f=t	f <t< th=""><th>Į«Į</th><th>f<1</th><th>f<1</th><th>f<1</th><th>f << 1</th><th>•</th><th>f>t</th><th>f=t</th><th>J >> J</th></t<>	Į«Į	f<1	f<1	f<1	f << 1	•	f>t	f=t	J >> J
Amount	O ASII	•	trace	frace	none	trace	none	trace	trace	trace	trace	trace	trace	trace	rare	trace	trace		•	trace	trace	trace	trace	trace	trace	trace	rare	rare	trace	trace	•	trace	trace	trace
Coarse Fraction (%)	(2)	•	3.14	11.25	19.85	6.78	4.51	5.53	8.14	1.75	1.45	2.76	3.37	3.77	2.12	2.63	3.65	•	,	3.43	4.13	3.11	8.18	3.07	1.62 24	3.03	1.29	1.28	2.63	2.90	•	3.40	3.62	1.66
Coarse (>38µ) Weight (gm)		ı	0.77	2.09	2.60	1.49	96.0	1.01	1.63	0.80	0.25	0.73	0.78	0.71	0.57	0.34	1.36	•	•	0.87	1.43	0.70	1.93	69.0	0.30	0.67	0.52	0.31	0.44	0.58	•	0.69	0.56	0.40
Sample Weight (gm)		•	24.52	18.57	13.10	21.98	21.30	18.28	20.02	45.74	17.20	26.49	23.12	18.84	26.87	12.93	37.29	•		25.38	34.60	22.48	23.58	22.47	18.32	22.14	40.28	24.20	16.71	19.99	•	20.27	15.45	24.06
Sample No.		1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636

Sample No.	Sample Weight (gm)	Coarse (>38μ) Weight (gm)	Coarse Fraction (%)	Amount of Ash	Biogenic (f) to	Amount of
,						Charles (A)
1637	36.42	96.0	2.64	trace	f>1	-
1638	20.23	1.10	5.44	trace		- "
1639	33.94	2.12	6.25	frace		
1640	23.78	0.87	3.66	Tare	feert	۷ د
1641	33.03	1.62	4.90	frace	1 ×× j	۷ -
1642	15.10	0.87	5.76	trace	1 XX J	٠,
1643	24.14	1.71	7.08	Trace	1 >>> J	F
1644	37.32	0.25	0.67	rare	[<< 1	- 5
1645	23.38	0.38	1.63	trace	f > 1	2 5
1646	23.33	0.40	1.71	trace		3 7
1647	13.25	0.11	0.83	trace	· •	3 5
1648	31.74	0.79	2.49	trace	į«į	3 ⊊
1649	•	•	•	•	•	2
1650	23.27	0.59	2.54	trace	feet	. –
1651	24.72	0.53	2.14	trace	į «i	• -
1652	18.86	0.57	3.02	trace	į ««i	• •
1653	16.09	0.24	1.49	rare	f«ı	1 –
1654	25.50	0.25	0.98	trace	fet	-
1655	22.37	0.22	0.98	Trace	. J	2 5
1656	•	•	•	,	• •	3
1657	18.71	90.0	0.32	trace	f=t	· 8
1658	29.72	0.10	0.34	trace	feet	₹ ₹
1659	17.49	0.14	0.80	rare	1 % I	3 8
1660	24.70	0.14	0.57	trace	j. j	3 8
1661	25.53	0.28	1.10	frace	feect	2 -
1662	27.90	0.12	0.43	trace		- ⊊
1663	•	•		} '	•	2
1664	•	•	•	,		•
1665	27.04	0.04	0.15	acet	,	٠ ج
1666	35.96	0.10	0.28	trace		8 8
1667	18.73	0.13	0.69	Trace		ર ફ
1668	•	•	•			3
1669	35.09	0.07	0.20	trace	· [.	• 8
		• 1)	}	111	R

Amount of	Opaques (%)	08	۰ §	3 V	· ~	·	• (**	, ₇ ,	3 %	⊋ (35	5 5	: –	• 147	, ,	. •	יא מ	s vo	יא נ	, T) C	• ⊽	; -	. △	٠	-	er;	2	25	; v s	v	. X:	S &	15
	Terrigenous (t)	f> 1	f>>>1	f>>>1	f>1	[≫]	[[>1	1 ≪ J	[>, 1	f>>>1	1 <<- J	f>1	f>1	f>,	f>1	f>t	f>t	f=t	f>>1	f <t< th=""><th>f<1</th><th>1>J</th><th>f«t</th><th>f > t</th><th>1 < J</th><th>1<j< th=""><th>f>t</th><th>f>\tag{1}</th><th>f=t</th><th>f>t</th><th>f>t</th><th>f>>> t</th><th>1 < J</th></j<></th></t<>	f<1	1>J	f«t	f > t	1 < J	1 <j< th=""><th>f>t</th><th>f>\tag{1}</th><th>f=t</th><th>f>t</th><th>f>t</th><th>f>>> t</th><th>1 < J</th></j<>	f>t	f>\tag{1}	f=t	f>t	f>t	f>>> t	1 < J
Amount	Of ASh	trace	none	trace	trace	trace	trace	none	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	none	trace	trace	trace	trace	trace	trace	trace	none	trace	none	none	trace	none
Coarse	rraction (%)	0.48	0.62	69:0	2.44	2.32	0.94	0.87	3.24	0.59	0.61	1.55	1.62	0.36	0.28	1.10	0.53	0.51	2.30	0.82	1.53	1.98	2.08	4.65	2.77	1.59	1.24	0.94	0.72	1.30	0.46	0.83	0.38	0.45
Coarse (>38µ)	weigiii (giii)	0.08	0.21	0.15	1.17	0.34	0.18	0.26	0.73	0.19	90.0	0.40	0.47	0.07	80.0	0.15	60.0	80.0	0.51	0.14	0.30	0.32	0.52	69.0	09:0	0.42	0.10	0.23	0.25	0.16	0.0g	0.20	0.05	0.09
Sample (weight (gm)	VCIKIIL (KIII)	16.56	33.74	21.60	47.96	14.63	19.05	29.87	22.54	31.94	9.87	25.73	29.02	19.58	28.45	13.68	17.10	15.57	22.18	17.01	19.59	16.16	24.97	14.84	21.63	26.40	8.06	24.42	34.73	12.27	8.77	24.21	13.30	19.99
Samula No	Sample 140.	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	168	1695	16%	1697	1698	1699	1700	1701	1702

Amount of	Opadnes (%)	2	2 4	CI 21	3 Y	3 5	3 v	י ני	2 د	?	•	•	۰ ۷	3 S	8 €	₽ 8	\$ *	? ?	3 K	? S	₹ 7	, K	7 1	;	. –	•	- ⊽	! -	~	9	? ~	-	- 63	
	(1) SELLORS (1)	f>1	f >>> t	533	5 >>> 1	· · · · · · · · · · · · · · · · · · ·		· · · · ·	(33)	1 <>< J	•		· {}			1 × j		. <u>.</u> .	f>1	 !!	, <u>,</u>		f>>>1		f>>> t	f>>1	[>>>]	f>1	f>1	f > t	f>> t	f>> t	f>>> t	f>>> t
Amount of Ash	100	trace	frace	trace	none	none	none	trace	frace	none	•	•	trace	none	none	none	none	none	trace	trace	trace	trace	frace		trace	trace	trace	trace	trace	trace	trace	trace	trace	none
Coarse Fraction (%)		0.44	0.65	0.30	0.53	0.75	1.13	1.29	0.74	0.94			0.09	0.02	0.81	0.11	0.05	0.13	0.25	0.26	0.02	0.07	2.73		1.52	2.52	5.29	2.71	7.19	6.92	14.64	3.24	2.38	2.94
Coarse (>38μ) Weight (gm)		0.11	0.15	0.08	0.02	0.13	0.14	0.35	0.17	0.15	•	•	0.03	0.00	0.14	0.02	0.01	0.03	30.0 30.0	90.0	0.00	0.03	0.75	•	0.43	0.89	1.57	0.92	1.91	1.90	2.24	0.70	0.54	1.08
Sample Weight (gm)		25.16	22.95	26.29	13.14	17.24	12.38	27.15	22.83	15.88	•	•	34.82	25.87	17.35	18.20	21.14	23.12	35.87	22.92	21.17	42.32	27.44	•	28.38	35.36	29.70	33.94	26.58	27.47	15.30	21.60	22.65	36.75
Sample No.		1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	7171	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735

Amount of	Obadaes (20)	_	' ▽	. 2	• ⊽	: -	-	. ☆	' ▽	25	8	; X3	8	•	8	3	25) S	3 8	8	} ·	99	2	ද ද	4	10	'n	8	15	22	35	8	2	. 30
Biogenic (f) to	(1) Smonas (1)	[>>> I	f>>>1	f>>> t	1 << j	f>1	f>>> t	f>>> t	f>>> 1	[>×]	f>1	f>>> t	f>> t	•	1 < J	f>1	f>1	f>1	f>1	[×]	•	f=t	f>1	f>1	1 <j< th=""><th>f>>1</th><th>1 < J</th><th>f>>> t</th><th>f>>1</th><th>f>>> t</th><th>f>>> t</th><th>1 <<< J</th><th>f>>> t</th><th>f>>> t</th></j<>	f>>1	1 < J	f>>> t	f>>1	f>>> t	f>>> t	1 <<< J	f>>> t	f>>> t
Amount	100	none	none	trace	none	trace	none	trace	trace	trace	none	trace	trace	•	trace	trace	trace	trace	trace	none		trace	none	none	trace	trace	none	trace	trace	none	trace	trace	trace	trace
Coarse	(2)	2.12	5.08	7.37	5.61	5.36	5.79	5.20	5.34	0.64	0.44	0.25	0.55	•	0.32	0.89	0.45	0.82	0.72	0.62	•	2.45	0.57	0.71	1.00	1.18	0.55	0.52	0.37	0.60	0.43	0.51	0.22	0.37
Coarse (>38µ) Weight (gm)	4	0.79	1.55	1.68	0.54	1.58	1.70	1.01	1.27	0.17	0.09	90.0	0.22	•	90:0	0.22	0.17	0.11	0.18	0.13	•	96.0	0.16	0.09	0.34	0.42	0.21	0.12	0.14	0.14	0.02	0.14	0.08	0.08
Sample Weight (gm)		37.35	30.49	22.81	9.63	29.47	29.38	19.41	23.79	26.43	20.28	23.99	40.01	•	18.99	24.79	37.75	13.37	25.14	21.10	•	39.15	28.12	12.68	33.86	35.62	38.39	22.86	37.87	23.32	16.46	27.28	36.51	21.73
Sample No.		1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768

Amount of	Opaques (%)	45	£	\$ 4	8	8	} v o	8	45	8	8	8	8	45	\$2	S	8	45	8	0	45	'n	က	•	-	23	ଚ୍ଚ	v	10	01	10	ν.	10	10
_	rerigenous (t)	[>>> I	f>>>1	f>>>1	f>>> t	f>>> 1	f>>> 1	1>>> I	f>>> t	f>>1	f>1	f>>> t	1 < j	f>>>1	f>>> t	[>>> t	1 < J	f>>1	f>> t	I <><> I	f>> t	f>>t	f>> t	•	f>>>1	f>>> t	f>>> t	f>>> t	f>>> t	f>>> t	1 <<< j	f>>> t	f>>> t	f>>> t
Amount	Of ASh	none	trace	trace	trace	trace	trace	trace	trace	trace	none	none	none	none	trace	trace	trace - rare	trace	trace	none	trace	trace	none	•	trace	trace	trace	none	none	none	trace	none	none	none
Coarse	Fraction (70)	0.41	0.67	0.62	0.52	0.39	0.51	0.26	0.23	0.47	0.39	0.32	0.52	1.22	0.73	0.72	0.82	0.59	0.63	1.13	0.52	4.25	5.03	•	0.64	0.18	0.21	0.47	0.76	1.17	1.01	1.16	1.44	0.81
Coarse (>38µ)	WEIGHT (KIII)	0.18	0.19	0.13	0.17	0.13	0.18	90.0	0.07	0.16	0.07	0.02	0.16	0.36	0.15	0.17	0.23	0.13	0.13	0.22	80.0	1.31	0.73	•	0.17	0.05	0.05	0.09	0.17	0.30	0.19	0.12	0.48	0.27
Sample Weight (gm)	WEIGHT (EIII)	43.86	28.41	21.05	32.82	33.58	35.30	23.40	30.24	33.91	17.74	21.95	30.92	29.44	20.68	23.47	28.04	22.08	20.60	19.50	15.47	30.84	14.51	•	26.52	27.41	23.27	19.15	22.44	25.58	18.85	10.32	33.35	33.48
Somula No		1769	1770	1771	1772	1773	1774	1775	1776	1771	1778	1779	1780	1781	1782	1783	178 28	1785	1786	1787	1788	1789	1790	1791	1792	1793	17 8	1795	17%	1797	1798	1799	1800	1801

Amount of	Opaques (%)	-	, , ,	, v	· –	•	•	, <u>c</u>	3 1	-	. –	· C	-	· •	, <u>c</u>	, vo	15	2	رم (20	ନ୍ଦ	01	4	સ	-	0	0	ς.	-	0	0	_	-	
	Terrigenous (t)	f>>>1	[>×]	f>1	1 < J	[>×]	1 << J	[>ו]		f>1	Į«I	į×į	fiit	f<1	1 <<< J	f=t	f≂t	f=t	f≡t	1×J	1 << J	f=t	f>>> 1	1 <<< j	f≫t	f>>1	1 <> J	1 ∻ J	f>> t	f>> t	f ≫t	f>>> t	f>>> t	f≫t
Amount	Of ASh	trace	trace	trace	trace	none	trace	trace	•	none	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace - rare	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace
Coarse	rraction (%)	0.69	0.55	0.94	1.10	1.00	1.01	0.78	•	1.46	2.87	2.60	3.03	2.28	0.93	1.90	1.59	1.16	0.92	0.59	0.63	1.33	0.56	0.43	3.22	4.57	4.40	1.57	3.93	4.03	6.48	5.52	4.92	7.62
Coarse (>38µ)	weight (gill)	0.14	0.20	0.41	0.32	0.34	0.17	0.23		0.24	0.87	0.82	1.36	1.8	0.26	0.70	0.46	0.26	0.15	0.07	0.17	0.32	0.23	90.0	0.60	1.56	1.74	0.31	1.29	0.73	1.97	1.49	1.13	1.93
Sample (Weight (gm)	Weight (gill)	20.34	36.09	43.63	29.06	33.98	16.78	29.49	•	16.40	30.29	31.52	44.88	45.69	27.96	36.82	28.88	22.49	16.35	11.85	26.79	24.04	41.14	14.05	18.65	34.13	39.51	19.76	32.79	18.11	30.41	27.00	22.98	25.34
Samula No		1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834

Amount of	Opadnes (20)	-	· 6	3 5	2	· v	ר	· •	- د	-	• V T	. —	0	· V		V 7				-	· \			· —		v	י נ	, (,-	v	, ç	} v-	, <u>c</u>	2 5	20
Biogenic (f) to	Terrifemons (t)	[***]	f>>1			. 3		533.1		£ \$\$\$ £		f>>> t	f>>> t	[>>> t	1 <<< J	f>>> t	f>1	[×]	f>1	f=t	1	f <t< th=""><th>f<<!--</th--><th>f << 1</th><th>•</th><th>Į«I</th><th></th><th>f«ı</th><th>JI J</th><th>f=1</th><th>į<!--</th--><th>; ;; ;</th><th>[>]</th><th>1 <> J</th></th></th></t<>	f< </th <th>f << 1</th> <th>•</th> <th>Į«I</th> <th></th> <th>f«ı</th> <th>JI J</th> <th>f=1</th> <th>į<!--</th--><th>; ;; ;</th><th>[>]</th><th>1 <> J</th></th>	f << 1	•	Į«I		f«ı	JI J	f=1	į </th <th>; ;; ;</th> <th>[>]</th> <th>1 <> J</th>	; ;; ;	[>]	1 <> J
Amount		trace	none	trace		trace		frace	frace	trace	trace	trace	none	none	trace	trace	trace	trace	trace	trace	trace	trace	rare	trace	•	trace	•	trace	trace	trace	trace	trace	trace	trace
Coarse Fraction (%)	2	5.53	0.74	990		0.70	} '	1.36	1.33	1.15	1.38	1.68	2.43	3.24	2.54	2.37	1.61	1.42	1.07	1.82	1.47	3.69	1.58	2.85	•	1.29	•	0.93	1.20	1.11	0.83	1.62	0.53	0.95
Coarse (>38µ) Weight (om)		1.34	0.15	0.23	•	0.21	•	0.42	0.27	0.24	0.51	0.83	0.9	0.81	0.61	0.62	0.19	0.21	0.39	0.34	0.26	1.05	0.59	0.72		0.24	•	0.24	0.42	0.25	0.31	99.0	0.09	0.21
Sample Weight (gm)		24.25	20.15	35.03	•	30.21	•	30.92	20.23	20.95	37.07	49.38	38.70	24.99	23.99	26.18	11.79	14.81	36.38	18.70	17.66	28.46	37.31	25.22	•	18.67	•	25.82	35.13	22.56	37.38	41.86	16.91	22.19
Sample No.		1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867

Amount of	Opadnes (%)	ç	3 8	3 5	2 2	3		יח	n (,	1	a (n !	. IS	32	\$	8	15	2	2 9	2 ⊆	2 5	} v-	, K	5 7	; v-	, S	3 %	; <u>~</u>	}	o ⊊	30	; ⊊	2 5	20
	Terrigenous (t)	25.	f=f)	 		. , , ,	1 % 1	181	1>1	1>>1		1>>1	14,	1 🔨	f ≫1	1 < J	f>>> [f>>1	f=t	f>>1	· ^	· ^	f >> 1	[×]	f>>> t	f>>>1	f>>> I	f>>>1	f>>> t	[***]	[>]	f>>>1	f>t	f=t
Amount	Of ASh	trace	none	none	a Jack	3	avent	in account	Tace				Lace	nace	nace	trace	trace	none	none	trace	trace	trace	none	none	trace	trace	none	trace	trace	trace	trace	trace	trace	none	trace
Coarse	FFACIION (%)	0.97	0.84	0.85	0.97	<u>;</u> '	1.17	230	1 20	1 28	07:1	1 66	9:1	1.19	7.10	1.13	0.93	1.02	2.64	1.13	0.60	0.55	0.88	0.13	1.42	1.24	0.71	1.34	0.00	0.67	0.87	1.82	1.97	0.62	0.70
Coarse (>38µ)	WEIGHT (BIII)	0.29	0.23	0.16	0.31	•	0.34	77	0.28	0.33	} .	0.33	0.05	200	0.20	0.20	0.31	0.16	0.82	0.27	0.15	0.14	0.18	0.01	0.32	0.31	0.15	0.52	0.25	0.17	0.21	0.58	0.61	0.16	0.11
Sample Weight (gm)		29.86	27.46	18.83	31.84	•	29.04	14.78	21.78	25.76		19.83	37.02	22.80	27.03	24.63	33.30	15.64	31.10	23.80	24.97	25.54	20.52	7.42	22.54	25.00	21.09	38.81	27.75	25.55	24.19	31.83	30.89	25.95	15.61
Samule No.		1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1001	7991	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900

Sample No.	Sample Weight (gm)	Coarse (>38µ) Weight (gm)	Coarse Fraction (%)	Amount of Ash	Biogenic (f) to	Amount of
						Constant of the last of the la
1901	20.74	0.15	0.72	trace	f>1	7
1902	20.91	0.17	0.81	trace	į «į	3 S
1903	30.42	0.16	0.53	trace	f <t< td=""><td>3 8</td></t<>	3 8
1904	42.07	96.0	2.28	trace	[>]	3 %
1905	20.53	0.26	1.27	none	f>1	\$
1906	46.15	0.73	1.58	trace	į v	÷
1907	36.86	0.29	0.79	frace	. · · · ·	3 €
1908	24.22	0.14	0.58	none	· * * ·	2 5
1909	50.31	0.38	0.76	trace	· · · · · · · · · · · · · · · · · · ·	3 ×
1910	38.24	0.42	1.10	trace	[>>> I	3 ×
1911	•	•	•	•		3
1912	17.95	0.16	0.89	trace		י צ
1913	39.36	0.39	0.99	trace		3 &
1914	16.36	0.14	0.86	trace	1555	3 X
1915	12.43	0.07	95.0	trace	,	3 %
1916	26.63	0.31	1.16	none		3 8
1917	19.52	0.10	0.51	trace		45
1918	26.07	0.37	1.42	none	[*]	; ×
1919	32.38	1.04	3,21	none	£>>> I	3 -
1920	9.23	0.74	8.02	none	· · · · · ·	• •
1921	20.95	69:0	3.29	none	1 <<< j	יא פ
1922	21.90	0.44	2.01	trace	J <<< J	יא י
1923	23.28	0.58	2.49	trace	f>1	יט נ
1924	25.03	0.61	2.44	trace	[>×]	
1925	18.53	0.43	2.32	trace	f>>> t	20 -
1926	25.71	0.36	1.40	trace	[>>> I	2
1927	30.29	0.35	1.16	trace	f>>> t	, v
1928	28.96	0.43	1.48	none	[**]	. 2
1929	31.73	0.42	1.32	none	[>>> I	5
1930	19.71	0.58	2.94	none	[×]	; ~
1931	39.01	2.02	5.18	trace	[≫]	·
1932	•	•		•	•	• •
1933	•	•	•	•		
				ı	•	•

Sample No.	Sample Weight (gm)	Coarse (>38μ) Weight (gm)	Coarse Fraction (%)	Amount of Ash	Biogenic (f) to	Amount of
					4	Opadnes (20)
1934	•		•	•		
1935		•	•	•	•	•
1936		•	•	•	. 4	•
1937	•	•	•	•	1 1	•
1938	25.23	0.50	1.98	trace	, , ,	· •
1939	32,23	8.	3.23	trace		- -
1940	41.25	2.18	5.28	trace	1	> <
1941	27.51	0.51	1.85			> 4
1942	22.89	0.52	2.27	frace		o -
1943	•	•	į •	,		-
1944	24.27	0.49	2.02	trace	f.33.7	, ,
1945	29.40	0.59	2.01	none		7 4
1946	45.03	0.65	1.44	none		n 4
1947	25.18	69.0	2.74	race	<u> </u>	o -
1948	23.06	0.97	4.21	trace	1 1	- -
1949	•	•	•		• • • • • • • • • • • • • • • • • • • •	>
1950	29.18	1 14	3 01	9004	. 4	, (
1951	46.44	1 33	7 60		1 < 1	5 '
1050		70.1	7.04	none	1<1	S
7561	51.0/	0.79	2.54	none	1 ∻ J	
1953	40.86	1.11	2.72	none	f>>1	ν.
1954	21.38	0.19	0.89	trace	f>t	45
1955	23.99	0.16	0.67	trace	f<1	70
1956	23.24	0.00	0.39	none	f>1	S
1957	15.53	0.51	3.28	none	f << 1	2 2
1958	25.12	0.32	1.27	frace	f II	2 5
1959	•	•	•	•	•	3 '
1960	20.00	0.19	0.95	trace	f>>1	<u> </u>
1961	19.27	0.17	88.0	trace	· ^	3 S
1962	18.74	0.11	0.59	none	f= t	8 8
1963	35.29	0.29	0.82	trace	f<	÷ ¥
1964	21.78	0.33	1.52	none	1,1	£ %
1965	21.05	0.35	1.66	trace	į «į	3 ⊱
1966	13.13	mixed with 1968	mixed with 1068	9001	• • • •	3 8
>	71.71	OOCT HITH TOVILL	IIIAGU WIUI 1700	חשבנ	1>1	2

Amount of	Opaques (%)	. 02	₹ -	-	→		-4 ga	-	5 4	า	۰.	- ⊂	o v) -	₹ -	-1	. «	י ר	٦ .	, 5	3 5	2 5	3 52	3) C	· c	·	-	V 7		m	01	15	15
	Terrigenous (t)	[3]			f>> i		· (2)	; <u>; ;</u>	f=t	•	f>> t	f>1	[*}	fst			f >> t	f>t	. '	f >> 1	<u>.</u>		[<u> </u>	f>>> t	f>t	f>t	1 < J	J>J	1>J	f << t	1 <j< th=""><th>f=t</th><th>l=1</th><th>1>J</th></j<>	f=t	l=1	1>J
Amount	of Ash	Irace	none	trace	trace	trace	trace	none	frace		trace	none	trace	trace	none		trace	trace	} ,	none	none	none	none	none	trace	trace	trace	trace	trace	trace	trace	trace	none	none
Coarse	Fraction (%)	1.68	mixed with 1966	2.72	3.54	4.32	5.19	689	4.54	•	2.41	4.68	3.99	3.71	3.31		6.48	2.54	•	0.80	0.65	1.12	1.78	1.77	2.06	1.70	2.30	2.36	5.06	2.91	1.78	1.33	2.74	1.85
Coarse (>38µ)	weight (gm)		mixed with 1966		69:0	0.67	1.85	2.25	1.58	•	0.45	1.18	1.30	1.39	1.04		1.63	0.75	•	0.31	0.11	0.15	0.23	0.25	0.43	0.35	09:0	0.43	0.37	0.63	0.32	0.30	0.70	0.42
	weignt (gm)	24.41	23.48	18.74	19.51	15.51	35.62	32.67	34.84	•	18.70	25.19	32.57	37.45	31.44	•	25.16	29.55		38.72	16.91	13.37	12.92	14.16	20.86	20.56	26.09	18.22	17.93	21.63	18.02	22.54	25.56	22.67
Commits Mo	Sample No.	1961	1968	1969	1970	1971	1972	1973	1974	1975	1976	1971	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	132	1995	1996	1997	1998	1999

Amount of	Opaques (%)	01	3 8	3 =	3 -	- ←	>	•	•	•	t	•	•	•	•	1	•	• 1	1 0	5	01	'n	v	. 0	01	: -	ı v r	21	, v -		۱	· (c)		· –	
	Terrigenous (t)	f>>> t	£ 1.	, , , , , , , , , , , , , , , , , , ,		(5)				. ,	•		•	• 1	•	1	•] \	1 ↑ 1	f>1	f>t	f ≫1	1 <j< th=""><th>f>1</th><th>f>1</th><th>f>1</th><th>f>t</th><th>f>>> t</th><th>f>1</th><th>f=t</th><th>[>>\]</th><th>· · · · · · · · · · · · · · · · · · ·</th><th>f>1</th><th>f=t</th></j<>	f>1	f>1	f>1	f>t	f>>> t	f>1	f=t	[>>\]	· · · · · · · · · · · · · · · · · · ·	f>1	f=t
Amount	Of ASI	trace	none	none	none	none	trace	•	•		ı	•	i	. 1					nace	Irace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	trace	none	trace	trace	none
Coarse	riaction (70)	1.39	0.95	1.15	3.16	3.40	5.68	•			•	•	•		•	•	•	1 0 1	1,61	0.0	3.02	2.38	1.90	2.59	4.66	2.14	1.89	2.69	3.60	3.04	2.04	1.17	3.71	2.43	3.14
Coarse (>38µ)		0.54	0.23	0.47	0.92	0.70	0.63	•	•	•	•	•	•	•	•	•	•	0.30	0.33	£ 5	9.3	0.78	0.43	1.01	0.48	0.93	0.51	0.63	1.13	1.01	0.53	0.33	1.01	1.08	0.46
Sample Weight (am)	(Find)	38.75	24.28	41.03	29.11	20.60	11.09	•	•	•	•	•	•	•	•	•	•	21.52	25.64	22.03	23.07	32.82	22.58	39.07	10.31	43.44	26.97	23.44	31.43	33.20	25.99	28.12	27.22	44.48	14.67
Sample No.		2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	20 4 4	2045	2046	2047	2048	2049	2050	2051	2021	7027	2053	2054	2055	2056	2057	2058	2029	2060	2061	2062	2063	2064	2065

Sample No.	Sample Weight (gm)	Coarse (>38µ) Weight (gm)	Coarse Fraction (%)	Amount of Ash	Biogenic (f) to	Amount of
						Opadacs (20)
2066	25.24	0.80	3.17	none	f>t	-
2067	37.87	1.17	3.09	none	£\$.	-
2068	•	•	•	•		-
2069	22.05	0.44	2.00	trace	· {}	
2070	23.13	0.73	3.16	none	£ \$2.1	> -
2071	43.67	0.90	2.06	none	. (<u>)</u>	۰ د
2072	32.98	0.41	1.24	frace		> 4
2073	33.95	0.54	1.59	none		۰ ۲
2074	27.75	1.07	3.86	frace	183	3 <
2075	23.82	26.0	3.95	trace	1 ()	-
2076	•	•	•	•		•
2077	•	•	•	•		•
2078	•	•	•	•	. ,	•
2079		•	•	•		•
2080	•	•	•		i 1	•
2081	29.81	0.81	2.72	trace	f.>.	. –
2082	21.84	1.14	5.22	Tace	f=1	· Ş
2083	25.94	0.81	3.12	trace	[×]	⊰ −
2084	37.02	0.88	2.38	trace	f =1	·
2085	23.75	0.24	1.01	none	į «į	1
980	38.29	0.55	1.44	trace	f <t< td=""><td>• v-</td></t<>	• v-
2087	30.15	0.25	0.83	trace	f>1	, <u>c</u>
2088	•	•	•		•	?
6807	30.46	0.27	0.89	trace	f>t	· •
060	22.55	99.0	2.93	trace	f=1	· 8
1603	15.94	0.11	0.69	frace	1.4	3 8
2002	•	•	•	•	•	3
2093	•	•	•	,		•
20	•		•	•		•
3095	•	•	•	1 1	• ,	•
960	•	•	•		•	•
760	32.11	0.47	1.46	trace	, I	. 2
860	12.95	0.10	0.77	ave I	i /	נו צ
	1) ()	::>	3	- \ -	3

Amount of	Opaques (%)	2	} v	, ⊊	2 5	3 ⊆	2 5	} v-	s v	ı ve	, x	3 ⊆	} '	•	, 5	3 -	- (8	40	₽		8		9	3 ⊆	2 8	8 8	8 \$	3 8	3	- 57	\$ %	} =	S
	retrigenous (t)	f>>1	feet	f=1	į. Į«i	f </th <th></th> <th>į «« i</th> <th>[<<!--</th--><th>Į <<< 1</th><th>į ««i</th><th>į «« i</th><th>,</th><th>•</th><th>£ = £</th><th></th><th>1 3 3</th><th>1>1</th><th>f<</th><th>•</th><th></th><th>f<<1</th><th></th><th>f=t</th><th>, ,</th><th>) </th><th>f>1</th><th>Į<!--</th--><th>, <u>i</u></th><th></th><th>f>>t</th><th></th><th>:</th><th>f << t</th></th></th>		į «« i	[< </th <th>Į <<< 1</th> <th>į ««i</th> <th>į «« i</th> <th>,</th> <th>•</th> <th>£ = £</th> <th></th> <th>1 3 3</th> <th>1>1</th> <th>f<</th> <th>•</th> <th></th> <th>f<<1</th> <th></th> <th>f=t</th> <th>, ,</th> <th>) </th> <th>f>1</th> <th>Į<!--</th--><th>, <u>i</u></th><th></th><th>f>>t</th><th></th><th>:</th><th>f << t</th></th>	Į <<< 1	į ««i	į «« i	,	•	£ = £		1 3 3	1>1	f<	•		f<<1		f=t	, ,) 	f>1	Į </th <th>, <u>i</u></th> <th></th> <th>f>>t</th> <th></th> <th>:</th> <th>f << t</th>	, <u>i</u>		f>>t		:	f << t
Amount	O ASI	trace	попе	frace	trace	trace	trace	none	none	trace	trace	trace		•	trace	frace		narc	trace			none		none	trace	none	trace	none	none		frace	trace	trace	trace
Coarse	riation (2)	1.05	0.87	1.66	1.60	1.13	1.24	1.43	1.25	1.05	0.95	1.52		•	0.27	880	0.53		0.18	1		0.28		0.23	0.71	99.0	2.30	1.83	0.27	·	0.47	0.75	0.81	1.94
Coarse (>38µ) Weight (gm)	(A. 1)	0.25	0.20	0. 4	0.48	0.38	0.22	0.21	0.44	0.41	0.22	0.46	•	•	0.10	0.30	0.14		0.04			0.05		0.08	0.27	0.23	0.64	0.56	90.0	•	0.18	0.11	0.16	0.83
Sample Weight (9m)	4	23.85	22.90	26.55	29.97	33.68	17.74	14.67	35.06	39.16	23.23	30.18	•	•	37.13	34.23	96 36		22.35			17.84		34.15	37.85	33.82	27.87	30.59	22.63	•	38.39	14.72	19.78	42.79
Sample No.		2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131

Amount of	Opadnes (%)	v	ب ج	3 5	1 1	3 8	3 8	3 v	n <u>C</u>	? ⊂	v) (n c	• •	> ⊊	2 v	n (5	S 7	3 5	9 6	8 5	2 6	3	32	, y	3	•	•	•	•		'n	15	S.	•
	Terrigenous (t)	feet	fer	į «į	1221	f=t	1-1 (>1	£333 E			f ≫1	[≫]	f>>>1	f>>>1	į « i	fet	53.1	£\$\$.	(3)		<u> </u>		• • •	1555	f.>.			•	•	•	• ,	f>> t	f>>> t	f>>> t	•
Amount	or Ash	none	frace	trace	trace	trace	trace	trace	frace	none	trace	trace	none	none	trace	none	trace	trace	trace	trace	trace	none	-	trace	trace	} .	•	ı) (ı	• ,	trace	trace	none	•
Coarse	rraction (%)	1.39	0.30	0.44	0.50	0.46	0.57	2.94	2.76	2.53	2.59	2.51	8.30	4.57	1.69	1.12	0.94	0.79	1.65	1.46	0.83	1.35	ļ •	0.87	0.80	•	•	•	•	•		1.13	2.00	2.81	•
Coarse (>38µ)	weight (gill)	0.46	0.12	0.22	0.12	0.13	0.22	0.92	0.78	0.63	0.47	0.98	1.76	1.91	0.52	0.30	0.26	0.31	0.42	0.35	0.24	0.39	•	0.16	0.10	•	•	•		•	000	200	66.0	0.81	•
Sample (weight (cm)	KIII (KIII)	33.10	40.22	50.13	24.11	28.23	38.72	31.30	28.22	24.92	18.18	39.10	21.20	41.82	30.78	26.79	27.80	39.20	25.40	24.04	28.75	28.81	•	18.29	12.57	•	•	•	•	•	70 24	t. 07	49.52	28.80	•
Samule No	on all the	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	1916	7017	7917	2163	±017

Amount of	Obadnes (%)	v	o v	י ר	ი ⊆	א נ	3	. ሂ	3 5	2 5	} v) er	. –	· <u>c</u>	? ~		· 7	; S	3 '		•	•						3	•	· 5	8 8	8 8	₹ 8	, V
	(1) Smons (f)	f>>1	f>>> 1	f >> 1	· ^_	feect	•	· (×)) 	! </th <th>į v</th> <th>Į«Į</th> <th>f<t< th=""><th>f<t< th=""><th>Į<1</th><th>Į«I</th><th>į «į</th><th>f <<< t</th><th></th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th></th><th>Į «« i</th><th>feect</th><th>feeci</th><th></th><th>1>>> J</th></t<></th></t<></th>	į v	Į«Į	f <t< th=""><th>f<t< th=""><th>Į<1</th><th>Į«I</th><th>į «į</th><th>f <<< t</th><th></th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th></th><th>Į «« i</th><th>feect</th><th>feeci</th><th></th><th>1>>> J</th></t<></th></t<>	f <t< th=""><th>Į<1</th><th>Į«I</th><th>į «į</th><th>f <<< t</th><th></th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th>•</th><th></th><th>Į «« i</th><th>feect</th><th>feeci</th><th></th><th>1>>> J</th></t<>	Į<1	Į«I	į «į	f <<< t		•	•	•	•	•	•	•	•	•		Į «« i	feect	feeci		1>>> J
Amount of Ash	Het I	trace	trace	trace	trace	trace		none	trace	trace	trace	trace	trace	none	rare	trace	none	trace	•	•	•	•	,	•	•	•	•	•	•	trace	none	frace	none	none
Coarse Fraction (%)		1.49	2.28	2.42	2.40	5.01	•	96'0	1.50	1.58	1.94	1.77	3.71	1.22	1.63	1.51	0.44	0.35	•		•	•	•		•	•	•	•	•	0.27	1.25	0.10	0.26	0.20
Coarse (>38µ) Weight (gm)		0.30	0.52	0.64	0.47	1.43	•	0.29	0.29	0.45	09.0	0.70	0.71	0.52	0.42	9.6	0.14	0.12	•	•	•	•	•			•	•	•	•	0.03	0.32	0.0	90:0	0.05
Sample Weight (gm)		20.19	22.85	26.49	19.59	28.52	•	30.18	19.29	28.51	30.86	39.62	19.14	42.69	25.82	42.45	32.11	34.46	•	•	•	•	•	•	•	•	•	•	•	10.98	25.54	39.23	23.07	24.41
Sample No.		2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197

Amount of	Opadnes (%)	7,	2 ⊆	2 8	2 8	S	₽ ≈	3	· Ş	ς ⊊	2	•	۶ ،	5 8	3 8	3 6	8 8	₹ \$	45	£	£ %	3 •			• 1	ı ı	•	•		· 8	ę w	٦ ٦	3 5	2 2
	rerrigenous (t)	f	feer	f <<< t	1 >>> J	feer	1 3 3	•	free	J XXX J	• • •	١ ،	foce	1	feer	feer	feeri	į «« i	f <<< 1	f <<< 1	f << 1	•	•	•	•	•		1 (feer	l cec 1	feeet	feer	į «« i	1 >>> J
Amount	100	none	trace	none	none	none	frace		none	trace	•	•	frace	frace	trace	trace	none	trace	none	none	none	•	•	•	•	•	•	•	frace	none	none	none	none	trace
Coarse	(%)	0.15	1.20	0.09	0.10	0.22	0.19	•	0.12	0.63		•	0.12	0.87	0.03	0.05	0.16	0.28	0.08	0.26	0.20	•	•	•	•	•	•	•	0.78	1.02	0.46	0.51	0.28	0.56
Coarse (>38µ) Weight (gm)	4	0.03	0.41	0.02	0.02	90:0	90:0	•	0.0	0.15	•	•	0.03	0.31	0.01	0.01	0.08	0.0	0.03	60:0	0.07		•	•	•	•	•	•	0.16	0.21	0.16	0.17	0.13	0.13
Sample Weight (gm)		20.03	34.24	23.36	19.20	27.21	31.66		33.41	23.64	•	•	24.60	35.54	35.89	18.46	51.16	32.19	39.84	34.02	35.40	•	•	•	•	ı	•	•	20.63	20.54	34.88	33.27	47.13	23.14
Sample No.		2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230

Amount of	(2) (2)	01	20	9	1	•	•	•	•	•	•) 10	J 7	3 &	3 %	3	, <u>Y</u>	3	٤ ،	2 v	י ר	, ኢ	3 ~	·	4 1	•	. =	3 X	3 S	8 &	£ %	8 8	2
Biogenic (f) to Terrigenous (t)		1 >> ;	1 **•	1 <<< 1	•		,	•	•	•	• 1	, /// ,		1885	1///	1 × × 1	1,,,,,	, , , ,		. 6000	1	1 /// 1	fer	, i	• # #	•	•	f«ı	feet	į «« i	; <u> </u>	į į	į «į	l « l
Amount of Ash		nace	none	nace	•	•	•	•	•	•	•	none	trace	trace	frace	frace	} .	frace	} .	9000	none	none	none	none	trace	•	•	trace	trace	Trace	trace	trace	none	trace
Coarse Fraction (%)	0.43	74.0	0.33	C/.0	•		•	•	•	•	,	101	20.	1.26	0.31	0.60	} .	1.15	•	0.49	1.05	1.26	0.30	0.15	0.13		•	0.62	0.36	0.55	0.42	0.37	0.43	99.0
Coarse (>38μ) Weight (gm)	71.0	0.10	0.10	07:0	4	•	•	•	•	•	•	0.21	0.20	0.18	0.0	0.16	•	0.25		0.13	0.31	0.35	0.07	0.05	0.04	•	•	0.24	0.05	0.20	0:00	0.09	0.02	0.23
Sample Weight (gm)	34 03	28.33	38.31		•	•	•	•	•	•	٠	20.12	19.20	14.27	12.84	26.58	•	21.80	•	26.80	29.44	27.86	23.04	32.57	29.81	•	•	38.42	13.81	36.42	21.22	24.12	16.45	34.89
Sample No.	2231	2232	2233	2234	2235	7000	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263

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Amount of	Opaques (%)	v	٠ ٢	3 4	? '	•	•	۰ ،	n c	> &	3 ≨	3 K	;	ž %	} v :)		-	• •••	• 67	יא נ	, ,	•	•	ı	•	· (r)	, 1	•	í	\ \		. 2	15
	Terrigenous (t)	Į«i	f=t	f>t	•	•		5.5	(33)	£\$\frac{1}{2}	1 < }	f>1	[\sqrt{1}	[*]	f>>> t	•	f>>> t	f>>1	f>>1	f>>1	f>>>1		•		•	•	1		•	•	f>1	1	f=t	f > t
Amount	Of ASh	trace	trace	none		•	•	trace	trace	trace	trace	trace	trace	none	none	•	trace	trace	none	trace	trace	•	•	•	•	•	trace	•	•	,	none	trace	trace	none
Coarse	riaction (70)	96.0	0.56	0.84	•	•		1.01	0.83	0.75	0.26	0.22	0.47	0.57	0.91	•	1.28	2.02	1.17	1.32	1.19	•	•	•	•		1.22	•	•	•	0.62	1.01	0.81	2.72
Coarse (>38µ)	Weight (gill)	0.24	0.17	0.34	•	•		0.30	0.35	0.24	0.10	90.0	0.17	0.15	0.29	•	0.32	0.49	0.51	0.34	0.39	•	•	•	,	•	0.30	•	•	1	0.19	0.28	0.12	1.33
Sample	B (8)	24.88	30.61	40.57	•	•	•	29.70	42.32	32.00	38.19	27.36	35.82	26.21	31.82		25.03	24.22	43.72	25.82	32.85	•		•	•	•	24.51	•	•	•	30.76	27.72	14.74	48.97
Samula No		2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	22%

Amount of	Opaques (%)	-	-	-	•	•	•		•	יעי	- ר	. 2	2 9	? v	2 0	· \$? ?	45	20 93	-	• 6	יא ני	, <u>c</u>	?	, ,	ı v	, ×	} v	. 8	2 9	3	; Ç	γ γ	•
	rerrigenous (t)	Į «« į	f>>1		, ,	1 1	,	•	• •	f≡t	[>]	f>1	f>1	f <t< th=""><th>f « t</th><th>f>1</th><th>f>>> t</th><th>1 <<< j</th><th>f>\(\)</th><th>f>>>1</th><th>f>1</th><th>f>1</th><th>f>1</th><th>•</th><th>•</th><th>f>t</th><th>[>>> I</th><th>f=t</th><th>(>1</th><th>Į«I</th><th>f>1</th><th>f>t</th><th>Į×J</th><th>•</th></t<>	f « t	f>1	f>>> t	1 <<< j	f>\(\)	f>>>1	f>1	f>1	f>1	•	•	f>t	[>>> I	f=t	(>1	Į«I	f>1	f>t	Į×J	•
Amount	O ASI	trace	trace			•	•	•	•	none	trace	none	none	trace	trace	trace	none	none	none	none	none	trace	none	•	•	trace	trace	trace	trace	trace	trace	none	trace	
Coarse Fraction (%)	riaction (w)	1.11	1.00	•		,	•		•	1.84	1.92	0.60	0.71	1.36	1.80	0.79	0.65	99.0	1.65	0.56	0.76	0.97	0.81	•	•	2.57	0.88	0.70	0.42	0.72	0.77	1.10	1.09	ı
Coarse (>38μ) Weight (am)	,	0.41	0.47	•	•	•	•	•		0.50	0.90	0.18	0.21	0.30	0.46	0.26	0.21	0.11	0.74	0.14	0.18	0.40	0.25	•	•	0.75	0.36	0.22	90.0	0.19	0.21	0.32	0.19	•
Sample Weight (gm)	4	36.91	47.20	•	•	•	•	•	•	27.21	46.87	30.02	29.56	22.09	25.54	32.81	32.08	16.56	44.82	25.16	23.56	41.33	30.75	•	•	29.21	40.91	31.65	19.21	26.48	27.36	29.13	17.49	•
Sample No.		2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329

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Amount of	Opaques (%)		•	•	•	•	•	•	,	જ પ	n s	۲ م	5 د	2 c	۷ ۵	-	۰, ۳	n (1	o +	→ ,-	-		•	•	٠ ,	> -	- <	> <	> <	> "	י ני	י כ	٥ د	
	lerrigenous (t)	•	1	•	•		•	•	. ,	1 > 1] <u> </u>	1.5	£\$\$	183		121	1 2	j, j	1 /	1 /	1	•	•	•	. 3		f=1	12	f . t	1 × 1	£\$1	fy.		f=t
Amount	Of ASI	•	•	1 4)		•	ı	9000		none	trace	trace	trace	none	trace	frace	frace	none	9101			1 (• ;	frace	trace	frace	trace	trace	trace	none	trace	trace	trace
Coarse	riaction (76)	•	•	•	•	•	•	1 1	1 30	1.40	0.87	1.38	1.02	1.51	1.84	1.89	1.38	0.97	2.55	3.51		•	•	•	5.30	5.75	2.77	4.37	6.16	1,43	2.22	3.65	4.21	2.56
Coarse (>38μ) Weight (gm)	(1111)	•	•	•	•	•	•	•	0.39	0.53	0.39	09.0	0.43	0.55	0.56	0.40	0.36	0.22	0.49	0.29	•		•	•	1.29	1.47	0.72	2.03	2.23	99:0	0.95	1.49	1.95	1.15
Sample Weight (gm)		•	•	•	•	•	•	•	30.03	37.90	45.00	43.39	42.31	36.36	30.50	21.17	26.03	22.58	19.24	8.26	•	•	•	•	24.32	25.56	25.95	46.46	36.20	46.27	42.72	40.80	46.28	44.90
Sample No.		2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362

Amount of	Opaques (%)	,-	- v	o €	2 ~	n -	- -	- (*	c	→	- 2	- ⊊	• •	ı -	, c	-	• •	-	- v	- c	- v		- C	>	>	· •				, Ç	32	; Ç	8 8	8
	Ierrigenous (t)	fet	£>> 1		f>1	; <u>`</u>	f>>> t	f=1	feet	f </th <th>f>1</th> <th>Į«I</th> <th>f<!--</th--><th>į×į</th><th>į «i</th><th>f > 1</th><th>f>1</th><th>f c t</th><th>į</th><th>f << t</th><th>1 2</th><th>1/1</th><th>£ \$ 1</th><th>[*]</th><th>[≫]</th><th>f>1</th><th>f>1</th><th>f>1</th><th>f>>>> 1</th><th>f>1</th><th>f=t</th><th>[×]</th><th>f<t< th=""><th>1<j< th=""></j<></th></t<></th></th>	f>1	Į«I	f </th <th>į×į</th> <th>į «i</th> <th>f > 1</th> <th>f>1</th> <th>f c t</th> <th>į</th> <th>f << t</th> <th>1 2</th> <th>1/1</th> <th>£ \$ 1</th> <th>[*]</th> <th>[≫]</th> <th>f>1</th> <th>f>1</th> <th>f>1</th> <th>f>>>> 1</th> <th>f>1</th> <th>f=t</th> <th>[×]</th> <th>f<t< th=""><th>1<j< th=""></j<></th></t<></th>	į×į	į «i	f > 1	f>1	f c t	į	f << t	1 2	1/1	£ \$ 1	[*]	[≫]	f>1	f>1	f>1	f>>>> 1	f>1	f=t	[×]	f <t< th=""><th>1<j< th=""></j<></th></t<>	1 <j< th=""></j<>
Amount	OI ASI	trace	trace	frace	none	trace	trace	trace	none	none	none	none	none	trace	none	trace	none	none	none	none	trace	none	trace	none	trace	none	none	none	none	trace	trace	trace	попе	trace
Coarse	riaction (70)	2.60	1.16	1.44	1.68	1.58	1.79	2.92	2.37	1.30	96.0	2.94	1.72	2.74	2.28	2.14	2.44	1.63	1.69	2.37	1.71	29.1	2.57	5.03	6.11	5.18	96'9	10.42	9.81	1.47	1.09	1.17	1.08	1.28
Coarse (>38µ) Weight (am)	(111)	1.62	0.49	0.33	0.80	0.65	0,34	0.88	0.70	0.40	0.37	0.71	0.47	0.87	0.52	0.56	0.54	0.39	0.53	0.80	0.59	0.30	0.77	0.81	1.49	1.36	1.92	2.08	5.55	0.74	0.46	0.35	0.39	0.46
Sample Weight (9m)	4	62.20	42.27	22.84	47.64	41.26	18.95	30.17	29.53	30.79	38.67	24.18	27.25	31.80	22.85	26.16	22.11	23.96	31.44	33.79	34.44	18.24	29.97	16.11	24.38	26.23	27.58	19.96	56.55	50.31	42.36	29.79	36.20	36.05
Sample No.		2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395

Amount of Opaques (%)	25	3	•	•	•
Amount Biogenic (f) to Amount of of Ash Terrigenous (t) Opaques (%)	[%]			, ,	•
Amount of Ash	none	•	•	•	•
Coarse Fraction (%)	0.94	•	•	•	•
Sample Coarse (>38µ) Weight (gm) Weight (gm)	0.41	•	•	•	•
Sample Weight (gm)	43.46	•	•	•	ı
Sample No.	2396	2397	2398	2399	2400

APPENDIX C Electron-microprobe data for samples 1543, 1564, 1640, 1640 (2), 1856, and 2178

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C = 30311 On	90.725 NO. OXYGENS = 0 NO. ITERS. = 2	99	0.364		_		8	297	260.9		7	20.00	3208		6,3	20.00	ZRES	S.			
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SANFLE: 1151-12 £67-113 2178

APPENDIX D

This appendix consists of tephra data from core E67-113 compared with tephra data from the database at the U. S. Geological Survey, Menlo Park, California. The database contains tephra from most North American and many Central and Latin American volcanic eruptions.

The best 50 matches are calculated using four combinations of major elements for each sample - I. 1543, II. 1564, III. 1640, IV. 1640 (2), V. 1856, and VI. 2178. The combinations of elements are:

Na, Si, Al, and Ca Na, Si, Al, K, and Ca Na, Si, Al, K, Ca, and Fe Na, Si, Al, K, Ca, and Mg

The first correlation on each page is the sample used in the comparison against itself. Similarity coefficients are in the last column for each comparison.

l. List	Matches	for CUMP. NO. 1898	for e	for elements: Na, Al	Na. Al.	S1, Ca			of Update: 2/12/90	2/90			
	C.No Sampie Number	Date	Sio2	A1203	Fe203	MqC	Hn0		T102	Na20	K20	K20 Total.R	Sim. Co
								4					
-	1898 E67-113 1543 T151-1	11/10/87	74.47	17.18	0.10	0.85	0.01	0.28	0.03	2.46	4 6.4	100.00	0000
7	2165 WCR-88-C	12/7/88	76.95	11.79	1.09	0.05	0.07	0.26	0.12	2 45		100.02	1.0000
m	2161 WCR-88-A (LO FE) T17	12/7/88	75.83	12.80	1.22	0.05	0.10	0.30	01.0	20.0	2.20	1000	24.00
ማ		8/56/85	76.82	12.65	0.88	0.03	0.06	0.28	0.12	2 96	200	100	0.6920
.n	1449 126-1176 t115-11	1/28/85	78.18	12.32	96.0	0.04	0.10	0.30	0.12	2.18	5.80	00.001	0.8042
	1900	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.53	100	0.6723
	1834	8/24/87	77.36	12.31	•	0.05	0.10	0.32	90.0	2.77	6.47	100	0.8606
 30 (1899	11/10/87	75.86	16.37	0.23	0.69	0.02	0.46	00.00	2.78	3.59	100.00	0.8570
5	1836	8/25/87	77.08	12.69	0.57	0.05	0.09	0.34	0.02	2.75	6.38	100.02	0.6557
	286		76.15	12.32	1.37	0.07	0.10	0.33	0.24	2.81	6.61	100	0.6537
		11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	00.0	2.49	4.4	100	0.634.0
	FLV-10-CS	8/24/87	77.11	12.62	0.57	0.02	0.08	0.34	0.02	2.78	6.37	66.66	0.8522
	1452 126-1303 til5-14	1/28/86	77.67	12.53	0.89	0.04	0.08	0.39	0.11	2.44	5.84	99.99	0.8495
-	933 DR-40V	******	76.23	-	2.05	0.00	0.04	0.21	0.13	2.41	Ξ.	100.00	0.8489
		/8/01/11	72.20		0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.00	0.8468
12	18.1 5 10.00-0-1-1 B 1 B1	2070070	27.75	- '	1.16	90.0	90.0	0.38	0.08	2.39	6.45	66.66	0.8459
		9/30/6/	14.6	7,	0.53	90.0	60.0	0.35	0.10	2.77	5.92	100.02	0.8451
				٠.	0.42	0.02	0.03	0.33	0.07	2.94	5.95	100.00	0.8427
		0/16/00	27.75	7.	40.0	20.0	0.09	0.29	90.0	3.53	5.23	100.00	0.8354
	822 GS-66	10/57/0	76.43	12.00	9.5	5.0	9.0	0.33	0.05	3.16	5.78	100.00	0.8343
22			76. BB	12.02	96.1	10.0	0.0	0.19	0.11	2.50	6.71	99.99	0.8342
_		11/11/87	78.22	12.23	65.0	200	9 6	25.0	80.0	9.50	2.6	66.66	0.8337
	TTC-20	7/21/87	77.70	12.58	95.0	50.0	9		90.0	200	0 0	100.001	0.8323
		2/24/88	77.15	12.70	9.0	50.0		42	0.0	5.5	67.0	100.00	0.8304
	GV-76-8, T16		78.03	12.88	0.46	0.03	0.03	0.45	5.0	2.4B	, ,	99.66	0.8302
	FLV-120B-TC	8/1/8	77.74	12.72	0.72	0.05	0.07	0.33	0.12	3.22	5.03	100.00	0.8277
	FLV-120A-TC	8/1/8	77.90	12.70	0.72	0.05	0.08	0.34	0.09	3.11	5.02	100.01	0.8274
	1520 JF BS TPS-7 T120-2	4/29/86	76.33	12.86	0.78	90.0	0.02	0.40	0.11	2.78	19.9	100.00	0.8273
	1967 FIU-20-44 M147 4	7/21/87	77.68	12.57	0.60	0.05	0.07	0.32	90.0	3.33	5.32	100.00	0.8260
32.1		9/30/87	77.46	12.55	0.53	90.0	0.08	0,39	60.0	2.17	6.67	100.00	0.8230
		1/28/86	77 58	12.51	7.60	20.0	0.00	0.21	0.13	2.74	6.84	100.00	0.8226
	FLV-41-8W	9/30/87	77.68	12.65		9 6		֓֞֞֞֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	71.0	2.30	20.6	100.00	0.8221
		10/27/87	77.79	12.63	0.64	0.04	1 0	200	900	9 6	4.4	100.00	0.6213
	FLV-29-WW T146-13	8/25/87	76.85	12.65	0.55	0.06	0.08	0.41	0.06	2.20	! =	99.99	0.8206
	1901 E67-113 2178 T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.0	3.58	3.12	100,00	0.8182
	E10-45 00 m.40	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.8182
	18/3 FLV"43-WW 1148-4 1820 TTC-25 T148-1	10/27/87	77.97	12.33	0.67	0.02	0.10	0.29	0.07	3.88	4.67	100.00	0.8181
		10/17/1	56.77	12.47	0.56	0.03	90.0	0.31	90.0	3.58	4.99	99.99	0.8180
		1/25/49	77.00	13.52	0.60	5.0	0.10	0.32	0.07	3.86	4.56	100.00	0.8168
43	RC-17	60/67/1	72 46	13.02	?;	50	9:	0.36	0.11	3.20	5.05	100.00	0.8166
			77.35	12.33	100	70.0	100	25.0	07.0	2.5	2.87	100.001	0.8149
	1818 TTC-23 T144-9	7/21/87	77.58	12.62	0.23	0.0			86	200		900	0.0143
46 1		1/27/86	77.50	13.01	1.32	0.02	0.04	0.49	0.12	2.37	5.08	100.00	0.8133
		9/14/89	76.94	12.48	96.0	0.05	90.0	0.39	0.08	2.93	6.11	100.00	0.8130
	1874 FLV-46-WW T148-5	10/27/87	77.91	12.40	9.08	0.02	0.08	0.30	0.07	3.84	4.69	66.66	0.8129
4 r.	266 PICO-7(1), T39-8		76.83	12.88	0.76	0.03	0.05	0.31	0.05	3.94	5.14	66.66	0.8116
			76.64	12.49	1.45	0.00	ი. ე	0.28	90.0	4.49	4.52	66.66	0.8116

Listing of 50 closest matches for COMP C.No Sample Number	P. No. 1898 for elements: Na, Al, Date SiO2 Al203 Fe203	tor el S102	Al203	Na, A1, Fe203	S1, K Mg0	Can Mn0	Date of	Update: Ti02	2/12/90 Na20	K20	Total	, i
	1	1 1 1 1				-	1					
2000	20701711	:		,		;						
1898 267-113	11/10/87	74.47	17.18	0.10	0.85	0.0	0.28	0.03	2.46	4.64	100.00	
	11/10/8/	79.20	10.70	0.21	0.0	0.0	0.47	00:	2.04	4.66	100.00	0.8766
1367 RO-107-1	0/26/85	76 97	12.04	000	5.0	9	00.00	0.12	2 : 0	= 1	9	•
107 56 11.46-10	10/22/02	70.07	10.01	9.00	50.0	9.0	0.28 0	0.12	2.96	6.20	00.001	
10/3 FLV-43-48	/8//2/01	7	12.33	79.0	0.02	0.10	0.29	0.07	3.88	œ	חם. ססנ	•
18/2 FLV-44-WW	10/5//8/	67.77	12.63	0.64	0.04	0.10	0.59	0.05	3.93	4.54	וח.חחו	
1664 PICO 1630	10/21/86	76.93	13.52	0.60	0.04	0.10	0.32	0.07	3.86	4.56	c	n ASON
18/4 FLV-46-WW T	10/27/87	77.91	12.40	0.68	0.02	0.08	0.30	0.02	3.84	4.69	99.99	N. 8482
2357	8/1/89	77.90	12.70	0.72	0.05	0.08	0.34	60.0	3.11	5.03	100.001	0.846R
2358 FLV-120B-TC	8/1/89	77.74	12.72	0.72	0.05	0.07	0.33	0.12	3.22	5.03	100.00	0.8467
1575	8/18/86	77.75	12.39	0.64	0.02	0.09	0.29	90.0	3.53	5.23	100.00	N. 8457
447 65W130, T31-3		76.64	12.49	1.45	0.00	90.0	0.28	90.0	4.49	4.52	99.99	D. 8441
	12/7/88	76.95	11.79	1.09	9.05	0.07	0.26	0.12	2.45	7.23	100.001	n. 8441
1900	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.01	
	9/30/87	77.68	12.65	0.55	0.04	0.11	0.31	60.0	3.58	4.99	100.00	0.8430
1875	10/27/87	77.99	12.30	0.72	0.03	0.02	0.31	0.04	3.82	4.71	99.99	0.8406
1899	11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	0.00	2.78	3.59	100.00	0.8404
1820 TTC-25 T144-11	7/21/87	77.93	12.47	0.56	0.03	90.0	0.31	90.0	3.58	4.99	99.99	0.8403
2161	12/7/88	75.83	12.80	1.22	0.05	0.10	0.30	0.10	2.24	7.38	100.02	n.8399
	7/21/87	77.70	12.58	0.58	0.05	90.0	0.31	0.05	3.38	5.29	100.00	0.839A
1719 TTC-17	4/23/87	77.76	12.71	0.55	0.05	0.10	0.33	0.07	3.74	4.69	100.00	N. A3A6
1452 126-1303	1/28/86	77.67	12.53	0.89	0.04	0.08	0.39	0.11	2.44	5.84	99.99	0.8385
1882 FLV-38-WW	9/30/87	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79	100.00	N. R.3R.D
1881	8/25/87	77.41	12.76	0.71	0.04	90.0	0.32	90.0	3.81	4.83	100.00	0.8372
2203	1/25/89	77.40	13.02	0.76	0.04	90.0	0.36	0.11	3.20	5.05	100.00	0.8371
1816	7/21/87	77.68	12.57	0.60	0.05	0.02	0.32	90.0	3.33	5.32	100.00	0.8353
1833	8/24/87	77.81	12.36	0.58	0.05	0.11	0.31	90.0	3.80	4.9	99.99	n.8344
1838 FLV-13	88/25/87	77.48	12.82	0.60	0.04	0.08	0.33	0.04	3.85	4.75	œ.	0.8343
1768	5/28/87	77.20	12.93	0.58	0.05	0.0	0.33	60.0	4.08	4.64	99.99	n.8337
15 BCF-1,	:	77.17	13.12	0.75	0.15	0.04	0.37	0.19	3.59	4.63	100.01	0.A337
	7/21/87	77.58	12.62	0.71	0.03	0.03	0.32	0.03	3.58	5.10	100.00	n. A333
	1/2//86	77.50	13.01	1.32	0.04	0.0	0.49	0.12	2.37	5.08	100.00	D. A333
77/1	4/23/8/	7.7	12.63	90.0	0.03	9.0		0.0	3.87		100.00	D. 8324
100/ FLV-39-WW	10/05/6	76.77	10.01	900	96	9 6	000	0.10		75.4	20.02	0.000 C
2088	10/6/88	77.54	12.82	6.0	200	90	35.0	90.0		4	100	0.8322
1834 FIV-0-CC	0/24/07	36 66	12 21	9 6	90	10	0.33	90	2.77	47	100.00	0.8319
115	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	78.03	12.88	0.40	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.8315
1871	10/27/87	78.00	12.32	0.56	0.03	0.08	0.32	90.0	3.79	4.84	100.001	n. A309
1860	10/30/87	77.47	12.02	2.01	0.05	0.05	0.35	0.15	3.42	4.51	100.00	0.8304
1902 E67-113 1856 T151-11	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	0.00	2.49	3.43	100.00	0.8302
	12/22/88	77.74	12.50	0.42	0.05	0.03	0.33	0.02	2.94	5.95	100.00	0.8301
1836	8/25/87	77.08	12.69	0.57	0.05	0.0	0.34	0.07	2.75	en .	100.02	0.8300
1718	4/23/87	77.76	12.62	0.59	0.04	0.11		90.0	3.73	4.76	_	n. 8300
5 00		76.83	12.88	0.76	0.03	0.05		0.05	3.94	_	66.66	0.8299
	4/23/87	77.50	12.51	0.58	0.02	0.11		0.05	3.69	4.88	100.001	0.8295
446 65W129(2), T30-3		76.81	17.18	1.60	0.01	0.05	0.28	0.05	4.66	4.36	100.00	0.8292
1043	07/18/84	77.39	12.67	0.57	0.04	0.08		0.06	4.11	4.77	100.01	0.8292
FLV-40-WW T147-1	9/30/87	77.97	12.55	0.55	0.0	0.10	0.34	0.09	3.78	4.57	99.99	0.8290
50 1817 TTC-22 T144-8	7/21/87	77.81	12.60	0.59	0.0	0.05		90.0	3.73	4.78	100.00	0.8288

Listing of 50 closest matches for COMP C.No Sample Number	COMP. NO. 1898 Date	for el	A1203	for elements: Na, Al, SiO2 Al203 Fe203	S1, K	, Ca, F	Fe Date	of Upd	of Update: 2/12/90		0 1 1	
	1							:	258			DT
1 1898 E67-113 1543 T151-1	11/10/87	74.47	-	9	9	5	9	6	;	•		
68		75 79	14 88	2:	9.0		9 6	200	2.40		100.02	1.0000
15	11/10/87	75.20	16.70	10	2.0		0.90		2.4.5	25.0	00.001	0.8182
1699	11/10/87	75.86	16.37	0.23	69.0	0.02	0.46		2.7			0.0039
1902 E67-113 1856 T151-11	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	00.0	2.49	3.43	100.00	0.7643
1900 E67-113 16	11/10/87	76.81	15.88	0.30	ů	0.01	0.48	0.01	2.41	3.52	100.01	0.7581
1872 FLV-44-WW	10/27/87	77.79	12.63	0.64	0.04	0.10	0.29	0.05	3.93	4.54	100.01	0.7364
1664	10/21/86	76.93	13.52	0.60	ó	0.10	0.32	0.07	3.86	4.56	100.00	0.7361
1873 FLV-45-WW	10/27/87	77.97	12,33	0.67	0.02	0.10	0.29	0.07	3.88	4.67	100.00	0.7359
1367 BO-107-1 7	8/26/85	76.82	12.65	0.88	0	90.0	0.28	0.12	5.96	6.20	100.00	0.7331
1869 FLV-41-WW	9/30/87	77.68	12.65	0.55	۰.	0.11	0.31	60.0	3.58	4.99	100.00	0.7328
12 1449 126-1176 til5-11	1/28/85	78.18	12.32	96.0	9.0	0.10	0.30	0.12	2.18	5.80	100.00	0.7322
1074 FTU-46-88 TIAB-5	10/22/02	77 91	12.30	7 0	200	200	200) (4.0		00.001	0.7314
1575	8/18/86	77.75	12.39	9.00	0.00		0.30	3 6	20.0		86.00	0.7308
1820	7/21/87	77.93	12.47	0.56	0.03	0.06	0.31	0.06	3.58	9	00.00	0.7300
1882	9730787	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79	100.00	0.7292
18 1719 TTC-17 T138-12	4/23/87	77.76	12.71	0.55	0.05	0.10	0.33	0.07	3.74	4.69	100.00	0.7292
115		78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.7291
2357	8/1/89	77.90	12.70	0.72	0.05	0.08	0.34	0.09	3.11	5.05	100.01	0.7288
2358 FLV-120B-TC	8/1/89	77.74	12.72	0.72	0.05	0.02	0.33	0.15	3.25	5.03	100.00	0.7287
1015	7/21/87	77.70	12.58	0.58	0.05	90.0	0.31	0.05	3.38	5.29	100.00	0.7285
1867 FLV-39-WW	78/05/6	77.61	12.59	0.53	9 6	9.0	0.35	0.10	2.77	2.65	100.02	0.7255
7707	10/17/0	10.//	12.30	0.0			15.0	90.0	9 0		7	0.7241
25 1816 TTC-21 T144-7	18/17/101	20.77	12.37	9.0	20.0) c	0.32		200	0.32	00.00	0.7238
1760	20/2/01	77 20	12 02	27.0	200	3 6			20.5	7,7	60.00	0.7235
1030	97.25/87	77 48	12.93	0.00	0 0	900	2.5			40.4	66.66	0.7233
1834	8/24/87	77.36	12.31	35.0				90		4.7		0.7230
1712 TTC-9A T	4/23/87	77.51	12.83	0.59	0.05	0.10	0.34	0.07	3.87	4.65	100.01	0.7224
FLV-43-W	10/27/87	78.00	12.32	0.56	0.03	0.08	0.32	90.0	3.79	4.84	100.00	0.7222
1851 FLV-48-WW	8/25/87	77.41	12.76	0.71	0.04	90.0	0.32	90.0	3.61	4.83	100.00	0.7212
1868	9/30/87	77.97	12.55	0.55	0.0	0.10	0.34	60.0	3.78	4.57	99.99	0.7211
1836 FLV-11-CS	8/25/87	77.08	12.69	0.57	0.05	60.0	0.34	0.07	2.75	6.38	100.02	0.7209
1043	07/18/84	77.39	12.67	0.57	0	0.08	0.32	9.0	.	4.77	100.01	0.7202
30 1710 TIC-8 TI38-3	4/23/8/	20.00	15.81	90.0	0.00	7:		0.0	200	8. 4.	100.01	0.7200
FI.V-128	1/25/80	22.70	12.02	60.0		1 0	50.0	3 :	2 .	9 0	1000	0.7195
1672 84 NV 14-2	10/21/86	77.72	12.49	0.58	0.05	0.10	0.33	0.0	4.03	4.63	100.00	0.7191
1817	7/21/87	77.81	12.60	0.59	0.04	0.05	0.34	90.0	3.73	4.78	100.00	0.7190
1835	8/24/87	77.11	12.62	0.57	0.05	0.08	0.34	0.07	2.78	6.37	99.99	0.7188
	12/7/88	76.95	11.79	1.09	0.05	0.07	0.26	0.12	2.45	7.23	100.01	0.7187
2088	10/6/88	77.54	12.82	0.67	0.05	90.0	0.32	90.0	4.02	4.49	100.00	0.7184
1711	4/23/87	77.64	12.65	0.58	0.0	0.10	0.34	0.07	3.69	4.88	66.66	0.7182
1818 TTC-23 T144-9	7/21/87	77.58	12.62	0.71	0.03	0.03	0.32	0.03	3.58	5.10	100.00	717
46 1837 FLV-12-CS T145-15	8/25/87	77.15	12.80	0.60	0.0	60.0	0.33	0.05	3.16	5.78	100.00	0.7178
	00/07/1	77.17	12 12	0.69	5 6	9 6	25.0	100		4 6	1000	717
1813	747177	77.41	12.61	9		0		90		9	100.001	0.7167
	9/19/86	77.59	12.55	0.58	0.0	0.10	0.33	90.0	3.87	4.87	66.66	0.7166

(181	o but	Listing of 50 closest matche	20	for COMP. NO. 1898	tor el	tor elements: Na,	Na, Mg,	Na, Mg, Al, S1,	, ×	Ca Date	of Upd	ate: 2/	12/90			
	C.No	C.No Sample Number	L	Date	S102	A1203	Fe203	Mgo	Mno	_	T102	T102 Na20 K20		Total, R	Sim. Co	
					! ! !	t 1 1			:					;		
-		E67-113 1543		11/10/87	74.47	17.18	0.10	0.85	0.01	0.28	0.03	2.46	4.64	100.02	1.0000	
~		E67-113 1564		11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100,00	0.8697	
ტ		E67-13 1640		11/10/87	75.86	16.37	0.23	0.69	0.02	0.46	0.00	2.78	3.59	100.00	0.8356	
4 :		E67-113 1640 (2) T15		11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.01	0.8183	
'n.		E67-113 1856	T151-1	11/10/87	77.21	15.64	7	0.49	0.00	0.51	0.00	2.49	3.43	100.00	0.7879	
0 1		E67-113 2178		11/10/87	75.77	16.08	•	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.7693	
۰ ٥	1/67	E67-113 2178	T1517	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.7693	
0 0		DODE-1, 19-3,	, low cotal		70.7	14.68	0.11	0.49	0.01	96.0	0.01	2.43	5.32	100.00	0.7628	
ב י		126-1, 1/-13,	-13, pd +115-11	1/20/05	71.77	13.12	2.0	2.0	6.04	0.37	0.19	9.59	4 .63	100.01	0.7242	
:			11:01:04:04:04:04:04:04:04:04:04:04:04:04:04:	50/07/1	01.07	12.32	96.0		0.10	0.30	0.12	2.18	5.80	100.00	0.7227	
1:		,	0.4.0 3.4.0 = 3	6/20/85	79.07	12.65	0.88	0.03	90.0	0.28	0.12	2.96	6.20	100.00	0.7201	
7 5	1664		7132-5	10/2/01	76.03	12.03	40.0	9.0	0.0	67.0	0.02	3.93	4.54	100.01	0.7182	
4		່ ຍ	T196-7	8/7/89	77.90	12.70	22		9	34	3	9 -		90.00	0.7162	
15			T196-8	8/7/89	77.74	12.72	0.72	0.05	0.02	0.33	0.12	3.22	5.03	100.001	0.7153	
91		FLV-45-WW TI		10/27/87	77.97	12.33	0.67	0.02	0.10	0.29	0.07	3.88	4.67	100.00	0.7149	
17		WCR-88-C (LO FE) T17	FE) T177-15	12/7/88	76.95	11.79	1.09	0.05	0.07	0.26	0.12	2.45	7.23	100.01	0.7132	
18		6R008A, T66-1	-	10/25/83	69.98	15.75	2.74	0.77	0.05	2.82	0.52	3.82	3.54	99.99	0.7114	
13		FLV-46-WW T148-5	148-5	10/27/87	77.91	12.40	0.68	0.02	0.08	0.30	0.02	3.84	4.69	99.99	0.7107	
20		FLV-41-WW T		9/30/87	77.68	12.65	0.55	0.04	0.11	0.31	0.09	3.58	4.99	100.00	0.7104	
7		WCR-88-A (LO FE) T17	FE) T177-13	12/7/88	75.83	12.80	1.22	0.05	0.10	0.30	0.10	2.24	7.38	100.02	0.7098	
22		TTC-20 T144-6	9	7/21/87	77.70	12.58	0.58	0.05	90.0	0.31	0.05	3.38	5.29	100.00	0.7096	
23		-		8/18/86	77.75	12.39	0.64	0.02	0.09	0.29	90.0	3.53	5.23	100.00	0.7087	
24		TTC-17 T138-12	-12	4/23/87	77.76	12.71	0.55	0.05	0.10	0.33	0.02	3.74	4.69	100.00	0.7087	
		FABY 37 T115-2	-5	1/27/86	77.50	13.01	1.32	0.07	0.04	0.49	0.12	2.37	5.08	100.00	0.7081	
	1882	3	147-12	9/30/87	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79	100.00	0.7081	
27		126-1303 tll	t115-14	1/28/86	77.67	12.53	0.89	0.04	90.0	0.39	0.11	2.44	5.84	99.99	0.7066	
	1875	FLV-47-WW T148-	9	10/27/87	77.99	12.30	0.72	0.03	0.07	0.31	0.04	3.85	4.71	99.99	0.7064	
		TTC-25 T144-11		7/21/87	77.93	12.47	0.56	0.03	90.0	0.31	90.0	3.58	4.99	99.99	0.7062	
3 :	0701	TIC-21 TI44	Ç	7871277	77.68	12.57	0.60	0.05	0.07	0.32	90.0	3,33	5.32	100.00	0.7058	
7 6		T. MM-65-A74		9/30/87	77.61	12.59	0.53	0.00	60.0	0.35	0.10	2.77	5.92	100.02	0.7058	
9 6			1-01-1-1 1-01-1-1	1/25/80	77.41	13.02	0.71	5.0	90.0	0.32	9.6	3.81	4. n	100.00	0.7055	
34		FLV-8-CS T145-11	45-11	8/24/87	77.81	12.36	0.58	0.05	3 :	3.0	0 0		9.4	00.00	7052	
35		TTC-6 T139-4		5/28/87	77.20	12.93	0.58	0.05	0.09	0.33	0.09	4.08	4	99,99	0.7046	
36		TTC-9A T138-5	91	4/23/87	77.51	12.83	0.59	0.02	0.10	0.34	0.07	3.87	4.65	100.01	0.7039	
33		8			76.64	12.49	1.45	0.00	90.0	0.28	90.0	4.49	4.52	99.99	0.7035	
		ຜ	-	88/25/87	77.48	12.82	0.60	0.04	0.08	0.33	0.04	3.85	4.75	99.99	0.7031	
		S	T145-12	8/24/87	77.36	12.31	0.56	0.05	0.10	0.32	90.0	2.77	6.47	100.00	0.7030	
6					70.64	14.97	3.96	0.83	0.02	2.40	0.81	3.52	2.81	66.66	0.7029	
4		FLV-11-CS T	T145-14	8/25/87	77.08	12.69	0.57	0.05	0.09	0.34	0.02	2.75	6.38	100.02	0.7015	
2		19, T10	en .		67.58	16.11	2.88	0.69	0.10	1.74	0.78	4.85	5.26	66.66	0.7012	
		T138-		4/23/87	77.50	12.81	0.58	0.05	0.11	0.34	0.05	3.69	4.88	100.01	0.7011	
4					76.15	12.32	1.37	0.02	0.10	0.33	0.24	2.81	6.61	100.00	0.7006	
£ .	. 7977	T189-1 912-M		5/8/89	72.22	14.03	2.75	0.54	0.03	1.64	0.54	3.79	4.46	100.00	0.7005	
		_		7/21/87	77.58	12.62	0.71	0.03	0.03	0.32	0.03	3.58	5.10	00.00	0.7003	
		TTC-16 T138-11		4/23/87	77.76	12.62	95.0	90.0	110	36	3 6	7.03	4.03	100.00	6995	
6					76.88	12.81	0.89	0.03	0.07	0.32	0.08	30	5.61	66.66	0.6995	
20	1026 K	KRL-71082N-3 (591) T58-2		6/22/84	67.94	16.62	2.48	0.77	0.00	2.90	0.48	4.99	3.01	66.66	0.6994	
2		S-N3001/ 284		*0/77/0		70.01	4.45	``	0.00	06.3	0.48	4.43	•	3.61		77.77

H.Listing	H.Listing of 50 closest matches for COMP.	P. NO. 1903 Date	for S10	elements: 2 Al203	Na, Al, Fe203	S1, Ca Mg0	Date	of Upda	Date of Update: 2/12/90 Mno Cao T102 Na20	2/90 Na20	K20	Total.R	
t 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				-			:					
	E67-113 1564 T151-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00		4.66	100.00	1.0000
	E67-113 1640 (2) T151-2	11/10/87	76.81	15.88			0.01	0.48	0.01	2.41	3.52	100.01	0.9389
		11/10/87	75.86	16.37	0.23		0.05	0.46	0.00		3.59	100.00	921
4 1902 5 129	CO-113 1830 1131-11 GU-78-23 T16-2	11/10/8/	17.77	15.04	0.23	6.49	0.00	0.51	0.0	2.49	3.43	100.00	912
		90/96/0	77.05	12.36		5 6	0.0	7.0	∹,	1.79	7.09		0.9112
		1/27/86	77.50	13.01	20.1	0.0	20.0	200	•	2.03	6.42	100.00	0.9055
		9/30/87	79.16	12.71	• •	50.0		6.4	2 0	2.3	9.0	100.00	0.8923
	FLV-29-WW	8/25/87	76.85	12.65		0.0	0.08	0.41		: :	7.7		0.6884
			77.41	12.72	0.58	90.0	. 0	0.57	0.10	2.10	6.41		0.8823
_	126-1265	1/28/86	77.58	12.59	0.89	0.02	0	0.44	0.12	2.36	5.87		0.8809
12 131			76.22	13.26	0.85	0.03	0.00	0.48	0.09		6.37	100.00	0.8788
			78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.8788
14 1353		8/30/82	77.82	12.13	0.85	0.08	0.07	0.47	0.14	1.66	6.78		0.8766
-	BC-3	2010014	77.17	12.94	0.63	0.07	0.05	0.60	0.11	2.11	6.32	100.00	0.8749
	5E-249	47.267.85	20.55	12.75	0.57	0.07	0.07	0.53	0.08	1.77	7.16	100.00	0.8736
		9/30/8/	76.95	12.55	0.53	90.0	0.08	0.39	0.00	2.17	6.67	100.00	0.8731
	T191-6 FIV-77-HT	5/11/69	76.97	12.55	200) 0	7.0	5.0	7.7	0.20	99.99	0.8710
		1/28/85	77.26	12.70	2 6			4 4		20.7		100.00	0.070
			76.10	12.95	1.15	50.0		47	٠,	, 6	9.0	00.00	0.8693
		8/29/85	77.12	12.52	0.82	0.06	0.07	0.48	: -	2.68	9	100.00	0.8663
		8/29/85	77.36	12.59	0.58	0.05	90.0	0.40	0.11	1.61	7.04	100.00	0.8661
_		3/16/88	76.23	12.44	2.37	0.01	90.0	0.64	0.17	5.08	6	99.99	0.8616
25 122	GV-77-		77.31	13.00	0.91	0.05	0.03	0.65	90.0	2.10	5.88	99.99	0.8614
	BE-222	8/29/85	76.93	12.37	0.86	0.13	0.02	0.64	0.14	5.06	6.79	99.99	0.8607
	AMAR-1 T80-1	7/20/84	76.72	12.93	0.77	90.0	0.02	0.49	0.08	2.80	6.08	100.00	0.8605
~			76.72	11.89	1.71	60.0	0.04	0.57	0.17	2.21	6.61	100.01	0.8600
29 119	GV-77-Z, T16-14	00/2/0	70.02	12.46	1.94	5 0	9.6	0.0	22.0	2.00	0.0 0.0	99.00	0.8597
		1/25/89	26.64	75.71	200	200		9 5	200	30	90.0	90.00	0.8559
32 2199	FLV-115-WW	1/24/89	77.09	12.37	1.27	0.08	0.0	0.47	0.19	2.83	5.63	100.00	0.8555
33 2197		1/24/89	76.75	12.95	0.80	0.05	0.05	0.47	0.07	3.06	5.85	99.99	0.8555
	86LP39, T157-1	03/14/88	76.57	12.90	0.57	0.0	0.08	0.56	0.02	2.47	6.75	100.01	0.8549
35 1901	E67-113 2178	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.0	3.58	3.12	100.00	0.8547
	26/2113 21/8 1151-1 04/0-20 T164-7	734/00	73.77	90.01		0.57	10.0	2.0	3 6	20.0	3.12	100.00	0.8547
		2/28/89	76.95	12.50	0.00	000		7.0		6. U		90.00	0.6541
39 118			4	12.87	0.61	0.05	0.02	0.67	0.13	8	9	100.001	0.8533
		10/28/88	77.13	13.06	0.92	0.05	0.07	0.52	0.0	2.76	5.39	66.66	0.8500
_		11/11/87	78.22	•	0.58	0.05	0.08	0.39	0.08	2.33	6.05		
42 114	_		77.28	12.92	0.73	0.05	0.10	0.44	0.11	2.86	s.	99.99	0.8490
43 1435	DI-85-AN T114-3	12/12/85	76.10	13.08	1.29	0.03	40.0	0.67	0.08	2.21	6.50	100.00	0.8490
	FLV-112-WW LIGHT T185-4 F67-113-1543 T151-1	111/10/07	74.43	17.00	0.80	50.0	9.0	9.0	90.0	2.99	٠, م	100.01	0.8490
	126-1303 til	1/28/86	77.67	12.53	9.0		200	9 6	3 -	2.40		90.00	0.6461
	RS-7-6		76.92	11.80	1.45	0.05	0.00	0.58	0.50	1.80	2	100.00	0.8442
			76.55	13.38	1.26	0.04	0.00	95.0	0.11	2.72	ω,	100.00	0.8432
49 851	LH-4		76.91	12.63	1.19	0.05	0.03	0.49	0.10	3.01	•	100.00	0.8427
50 2200	FLV-116-WW T182-7	1/24/89	76.89	12.40	1.31	0.09	0.02	0.49	0.21	2.96	9	100.00	0.8422

																																																	•
, e 10	. :		1.0000	0.9053	0.9022	0.8973	0.8909	877	0.8766	0.8715	0.8695	0.8635	0.8604	0.8595	0.8567	0.8562	0.8330	0.6552		0.6339	0.6337	0.000	0.6332	0.8528	0.8523	0.8516	0.8512	0.8512	0.8511	0.8510	0.8508	0.8200	0.8498	2000	0.8494	0.8488	0.8488	•	0.8487	0.8487	0.8485	0.8484	0.8480	0.8480	0.0476	0.8474	0.8473	0.8471	0.8471
Total		,	100.00	100.00	100.01	100.00	100.00	100.00	100.02	100.00	100.00	100.00	100,00	100.00	100.00	200		10.00		1000	2000	100	000	00.00	66.66	100.00	100.00	100.00	66.66	99.99	100.00	100.00	99.99	10001	10.03	99.99	99.99	66.66	100.01	100.01	100.01	100.01	100.01	55.00	00.00	100.00	66.66	a	66.66
/90 K20		•	4.	4		n (; ,	•	'n	6.42	'n		'n,	ŕ	3.01	ř		•		-	71			5.15				4.63				4.83						4.59			4.4	00.	4.75	0 0 0 0 0	6.32	4.17	6.20	4.55
: 2/12/90 Na 20			5.0	2.15	4.4	5.5	2.7		2.40	7.4B	2.09	2.36	1.79	7.07	3.40	2 4	2		1 67	3.64	3.42	3.31	2.76	3.48	3.04	3.40	3.53	2.10	3.70	3.32	3.79	2.69	90.0	2.70	3.93	4.06	3.61	2.86	3.83			2.0	20.0	20.0	2	2.11	3.05	2.71	3.83
Update: Ti02			3 :	0.10	5 6		3 6		3 :	11.0	4:	0.12	6.14	. I 4	9 5		4	0.04	0.07	0.08	90.0	0.05	0.09	0.02	0.07	0.08	0.02	0.10	90.0	0.12	0.18	5.0	9 6		0.09	0.07	60.0	0.11	90.0	90.0	20.0	9 6		5 -	0.06	0.11	0.18	0.09	90.0
Date of CaO		•					5.0	٠.	u e		•	4.0		ŗ	47			0.47	0.46	0.47	0.48	0.48	'n	0.46	0.49	0.46	0.48	0.57	0.48	0.46	.4.		0.46	0.48	0.48	0.46	0.47	0.44	9.40	5.45	7.0	•	4.0	9	9	09.0	-	0.47	0.48
, Ca	!	5		8 6	100		0.0	2			20.0	500	0 0		50.0	0.04	0.05	0.0	0.02	0.0	0.08	0.08	0.07	0.03	0.08	90.0	0.03	0.05	0.03	3.0	70.0		0.0	00.0	0.05	90.0	0.04	0.10	0.0	3 6	300		600	0	0.03	0.05	0.04	0.07	0.04
Si, K Mgo					20	9	0.49	9			9.0	66	100	0.0	0.02	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.05	0.03	0.04	0.04	0.03	90.0	0.03	200	0.0		0.03	0.03	90.0	0.03	0.05	0.0			300	200		0.04	0.05	0.07	90.0	0.04	0.03
for elements: Na, Al, S102 Al203 Fe203		10			1.32		0.23	0.10	0.46	• 4	200	o a	3 0	0.68	1.65	0.79	1.66	0.70	0.74	0.70	0.81	0.75	0.92	0.71	0.74	0.78	0.72	0.58	7.7	707	1.03	0.73	0.76	0.85	1.06	1.25	0.67	5,73	0.76	2,0	0.70	2	0.72	1.26	0.91	0.63	1.29	0.87	0.77
Al203		16.70	12 21	15.88	13.01	16.37	15.64	17.18	12.88	12.10	12.59	12.03	12.70	12.86	12.72	13.00	12.65	12.63	12.77	12.69	12.98	13.15	13.06	12.96	12.67	12.55	12.97	12.72	12.73	12.71	12.37	12.73	12.62	13.26	13.06	13.00	12.18	12.92	12.89	12.72	12.81	12.69	12.54	13.38	13.00	12.94	12.27	12.59	12.93
	!	75.20	79.16	76 A1	77.50	75.86	77.21	74.47	78.03	27.06	77.58	75.69	77.26	77.53	76.57	77.06	76.64	77.72	76.52	77.61	77.18	77.01	77.13	77.35	77.71	77.78	77.26	7.7.	10.//	76.68	77.09	77.54	77.66	76.22	76.54	76.40	72.70	77 34	77.34	77.56	77.61	77.68	77.75	76.55	77.31	77.17	78.43	76.95	7
. NO. 1903 Date	;	11/10/87	9/30/87	11/10/87	1/27/86	11/10/87	11/10/87	11/10/87		9/28/AB	1/28/86		1/28/85		2/28/89		2/28/89	9/28/88		9/28/88	11/9/87	11/9/87	10/28/88	1/23/89	12/12/85	12/12/85	1/23/89		2/28/89		1/24/89		10/5/88		08/25/83	3/1/85	9/30/83	11/9/97	9/11/87		8/24/87	8/24/87	9/2/88				xx/xx/xx	9/14/89	
for COMP				-2																				i	T114-1	-								1	T62-5	61 (B/O.													
Listing of 50 closest matches C.No Sample Number		T151-3	147-12	(2) T151	FABY 37 T115-2	T151-2	T151-11	T151-1	~	~	15-13	2-5	t115-12	9-6	7		v.	1172-7		T172-9	T150-7	. oc.		ARE-BEUGZE-N TIBLE-7	ASM 62285-2 /2/ Tild	- TITE-	9-91911	11	; ; 		182-6	5-1-	T172-10	4	TULELAKE-296(200-325), THIEFT AVE 3030 1 AP 753	7-3		50-3	150-4		5-5	2-6	71-3	e-	9-15	,	-	-2	•
50 closes ple Numbe		E67-113 1564	FLV-38-WW T147-12	-113 1640	X 37 T115	E67-13 1640 T151-2	E67-113 1856	E67-113 1543	GV-76-8, T16-12	CCP-C T172-2	126-1265 t115-13	GV-78-23, T16-2	126-1254 tl		P-1 T184	PICO-21, T2-8	FBP2-1 T184-5	7-88-1A	618051, T35-5	CKAW-88-2D2 T172-9	JI-MOVA-1500 T150-7	T T-WAC	N=6 TI/5=10	N-979099	63068 al	**************************************	D-070000	TECO-26. T18-11	1 T184-3	3, T45-6	FLV-115-WW T182-6	FRIANT-1, T18-5	CRAW-88-2D3 T172-10	GV-78-29, T16-4	LAKE-296(8503 T10	GV-76-6, T16-11	JT-6387-1 T150-3	JT-41186-1 T150-	BHA-1, T18-10	FLV-2-CS T145-5	3-CS T14	CAES#1 857 T171-3	GV-78-27, T16-3	GV-77-30A, T19-15	,	CAPIS-1, TS4-1	PICO-5(1) T2-7	
No Same		903 E67		1900 E67	1461 FAB						1451 126																																		122 GV-7				
L18t1r C.	:	_	_												14 22	•	16 22		0 (19 2080			23 2221						N		•••		33 2081		-		38 114	_			42 1827		N			47 98	·		

of 50 closest matches Sample Number	for COMP. No. 1903 for elements: Na. Al, Date SiO2 Al203 Fe203	for el	A1203	Na, Al, Fe203	Si, K Mgo	, Ca.	Fe Date CaO	of Upd T102	of Update: 2/12/90 T102 Na20 K20		Total, R	Sim. Co
· · · · · · · · · · · · · · · · · · ·	1		!							:	!	
1903	11/10/87	75.20	7	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.00	1.0000
1899 E67-13 1640 T151-2	11/10/87	75.86	_	0.23	69.0	0.05	0.46	0.00	2.78	3.59	100.00	0.8946
	11/10/87	77.21	-	0.23	0.49	0.0	0.51	0.0	2.49	3.43	100.00	0.8834
1900 E67-113 1640 (2) TI	11/10/87	76.81	_	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.01	0.8685
5 1882 FLV-38-WW T147-12	9/30/87	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79	100.00	0.8192
115 GU-76-B 416-13	101111	70.07	12.10	0.10	9 6	5.0	9.50	3 :	2 0		100.02	0.8099
2376	10/12/89	77.47	13.76	64.0	5.0	0.00	0.51	0.05	2		100.00	0.28024
1461	1/27/86	77.50	13.01	1.32	0.07	0.0	0.49	0.12	2.37	5.08	100.00	0.7743
984 RC-2		77.41	12.72	0.58	90.0	0.05	0.57	0.10	2.10	6.41	100.00	0.7697
99		75.79	14.88	0.11	0.49	0.01	96.0	0.01	2.43	5.32	100.00	0.7687
104 FRIANT-2, 7	!	77.53	12.86	0.68	0.03	0.03	0.47	90.0	3.40	4.94	100.00	0.7654
FLV-28-WW	9/30/87	77.46	12.55	0.53	90.0	0.08	e i	0.0	2.17	6.67	100.00	0.7645
1864 FLV-35-WW	9/30/8/	77 72	12.63	9.0		3	0.4	2 6	9 5		00.00	0.7631
1850	8/25/87	76.85	12.65		0.0	0.08	0.4	0.0	2.20	7.13	66.66	0.7618
985 RC-3		77.17	12.94	0.63	0.07	0.05	0.60	0.11	2.11	6.32	100,00	0.7617
2080	9/28/88	77.61	12.69	0.70	0.03	0.04	0.47	0.08	3.64	4.76	100.02	0.7614
1671 84 NV 14-1	10/21/86	77.45	12.68	0.58	0.05	90.0	-	0.07	3.75	4.89	99.99	0.7613
1989 WL-5-22 (85.15m) T165-	5/22/88	77.93	12.32	0.60	0.05	90.0	÷.	0.11	3.77	4.71	100.01	0.7603
2001	5/22/88	77.54	12.80	0.61	0.0	90.0	-	0.05	3.85	4.63	100.00	0.7602
22 1252 TLM-4 T96-11 22 223 WBT-660626-N #1616-7	2/23/83	77.70	12.83		5 6	9 6	0.4 0.4	9 6			100.01	0.7501
1357	A/30/85	78.16	12.18	7.0	50.0	20.0		3 6	9	7.70	66.00	0.7595
1901	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.0	3.58	3.12	100.00	0.7592
2371	11/10/87	75.77	16.08	0.45	0.57	0.01	-	0.00	3.58	3.12	100,00	0.7592
1451	1/28/86	77.58	12.59	0.89	0.07	0.08	0.44	0.12	2.36	5.87	100.00	0.7589
452		76.52	12.77	0.74	0.04	0.05	0.46	0.0	3.67	4.72	99.01	0.7588
1865	9/30/87	77.47	12.83	0.58	0.03	0.00	0.43	0.11	3.66	4.76	96.66	0.7587
30 1595 MOD-9 T130-5	3/13/86	77.25	12.13	9.00	300	9 6	0.4	9 6	 	4.4	70.00	0.7580
381 TECO-26, T18-		77.61	12.73	0.72	0.03	0.03	0.48	0.0	3.70	4.63	99.99	0.7578
1251	5/29/85	77.20	12.87	0.54	0.04	0.0	0.43	0.0	4.03	4.70	66.66	0.7577
1889 JT-NOVA-1 T150-6	11/9/87	77.01	13.15	0.75	0.04	0.08		0.05	3.31	5.14	100.01	0.7577
1442	1 12/12/85	77.71	_	0.74	0.04	0.08	0.49	0.03	3.04 6.04	5.15	99.99	0.7575
36 Z/U PICU-ZI, TZ-8	5070075	77.00	٠.	67.0	50.0	5 6		0.0	900	, o. •	900	0.7573
128	69/67/6	77.07	12.94	0.67	0.05	90.0	0.48	0.10	3.22	5.41	100.00	0.7563
FRIANT-1,		77.54	12.73	0.73	0.03	0.03	0.48	90.0	3.56	4.83	99.99	0.7561
1827 FLV-2-CS T145-5	8/24/87	77.61	12.81	0.72	0.05	0.09	0.47	90.0	3.73	4.47	100.01	0.7556
1441 0808502 SILICIC	12/12/85	77.58	12.68	0.67	0.05	0.08	0.45	0.10	3.28	5.11	100.00	0.7556
	9/5/88	77.75	12.54	0.72	0.03	0.07	0.46	0.04	3.63	4.75	66.66	0.7553
7061	11/11/87	78.22	12.23		0.0	90.0	0.39	90.08	2.33	9.05	100.01	0.7552
44 114 GV-70-6, T16-11 44 1450 126-1254 +115-12	1/39/85	77.28	7 -	5.0	20.0	0.0	0 0 4 0	0.11	2.Bb	. v 0 v	99.99	0.7552
1828 FLV-3-CS	8/24/87	77.68	٠-	0.73	0.05	0.09	0.48	0.05	3.68	4.56	100.01	0.7546
1433 ASW 62285	12/12/85	77.78	12.55	0.78	0.04	90.0	0.46	0.08	3.40	4.85	100.00	0.7545
1683 MRSN-1 T134-4	11/25/86	77.63	12.49	0.61	0.07	0.02	0.49	0.09	3.21	5.35	100.01	0.7544
0	11/9/87	77.18	12.98	0.81	0.04	0.08	0.48	90.0	3.42	4.96	100.01	0.7543
	10/5/88	77.66	12.62	0.76	0.03	0.04	0.46	0.05	3.70	4.69	100.01	0.7540

Listi	Listing of 50 closest matches for COMP	. NO. 1903		••	Na, Mg,	Al. S1,	×	Ca Date		of Update: 2/12/90	12/90		
) i	C.NO Sample number	Vate	2015	A1203	Fe203	986	E I	CaO	Ti02	Na 20	_	Total, R	Sim. Co
										:		1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1
	4	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.00	1.0000
7	E67-13 1640	11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	00.0	2.78	3.59	100.00	0.9044
		11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.01	0.8903
	E67-113 1543	11/10/87	74.47	17.18	0.10	0.85	0.01	0.28	0.03	2.46	4.64	100.02	0.8697
Λ .		11/10/87	77.21	15.64	0.23	0.49	0.0	0.51	0.00	2.49	3.43	100.00	0.8463
	1901 E67-113 2178 T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.0	3.58	3.12	100.00	0.8152
		/8/07/11	75.79	14.06		0.50	500	0.42	90.0	3.58	3.12	100.00	0.8152
		9/30/87	70.16	12 21	44.0		5 6	0.0		56.7	25.0	100.00	0.7964
		1/27/86	77.50	13.01	1.32	0.03	0.0	0.42	0.10	2.15	, o	900	0.7661
			77.67	13.78	1.54	0.21	0.09	0.61	0.20	1.36	53.53	00.00	0.7497
		8/29/85	68.46	16.75	2.96	0.53	0.08	1.61	0.55	1.83	7.24	100.01	0.7477
	CCP-C T172-2	9/28/88	77.06	12.19	1.53	0.05	0.02	0.50	0.14	5.09	6.42	100.00	0.7364
, 4.	1451 126-1265 tils-13	1/28/86	77.58	12.59	0.89	0.07	0.08	0.44	0.12	2.36	5.87	100.00	0.7360
		1 / 20 / 05	37.78	19.11	88.7	9.0	0.10	1.74	0.78	4. 6 V	5.26	99.99	0.7353
	GV-76-8	CB / B7 / T	78.03	12.88	0.91	800	9 6	0.40		79.6		100.00	0.7350
	2229 FLV-76-WW T185-2	2/28/89	77.93	12.16	0.86	0.11	0.05	0.46	0.18	3.20	. 0	100.001	0.7300
		1/24/89	77.09	12.37	1.27	0.08	0.01	0.47	0.19	2.89	5.63	100.00	0.7271
		2/24/88	72.87	14.90	1.29	0.12	0.12	0.48	0.20	5.10	4.92	100.00	0.7261
			77.33	12.22	1.32	60.0	0.04	0.49	0.20	2.90	5.41	100.00	0.7258
	9-153,		76.68	12.45	1.63	0.07	0.02	0.47	0.18	3.79	4.71	100.00	0.7254
		6/1/89	78.32	12.39	0.73	0.10	0.0	0.53	60.0	3.20	4. 59	100.00	0.7254
	2376 FLV-148-CS T201-4	10/12/89	77.47	13.27	1.29	9 .		5 C	97.0	2.5	4.17	70.00	0.7248
	TULELAKE-715 (wh pum	xx/xx/xx	70.87	15.50	2.67	0.68	0.0	1.99	0.42	4.14	3.68	100.01	0.7245
		9/13/86	70.17	15.09	2.84	0.55	0.05	1.62	0.54	4.37	4.78	100.01	0.7239
		5/9/89	72.22	14.03	2.75	0.54	0.03	1.64	0.54	3.79	4.46	100.00	0.7238
	OT-3 T149-6	11/11/87	77.97	12.29	0.94	0.15	90.0	0.71	0.17	2.21	5.51	100.001	0.7237
		8/1/89	77.16	12.22	1.28	0.08	0.03	0.48	0.18	2.74	5.84	100.01	0.7234
	984 RC-2		77.17	12.72	0.58	9.0	9 9	0.57	9.50	2.10	4.4	100.00	0.7234
33 1		08/26/85	70.60	15.08	2.68	0.69	0.03	2.17	0.42	4.38	3.91	100.00	0.7225
	N-6 T175-10	10/28/88	77.13	13.06	0.92	0.05	0.07	0.52	0.09	2.76	5.39	99.99	0.7225
	۳ ا	10/27/88	77.20	12.17	1.90	0.10	0.03	0.69	0.30	2.13	5.49	100.01	0.7219
		08/25/83	76.54	13.06	1.06	90.0	0.05	0.48	0.0	3.93	4.74	100.01	0.7217
<u> </u>	17 BF-4, T28-7		76.05	14.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.7217
			77.53	12.86	* 4		200	0.40	900	3.6	7.4	10.66	0.7209
		8/25/87	77.22	12.84	0.75	0.02	0.05	0.49	0.10	3.09	5.39	100.00	0.7209
			75.93	14.35	0.63	0.12	0.10	0.54	0.05	3.98	4.30	100.00	0.7207
42 19		27.24/88	72.82	14.97	1.30	0.12	0.11	0.50	0.20	90.9	4.92	100.00	0.7207
		1/24/89	76.89	12.40	1.31	0.09	0.05	0.49	0.21		5.63	100.00	0.7206
	JT-NOVA-16	11/9/87	77.18	12.98	0.81	0.04	0.08	0.48	90.0	3.42	4.96	100.01	0.7205
	15 PCE: 47-19 1150-6	11/8/8/	77.01	13.15	0.75	0.04	90.0	0.48	0.05	3.31	5.14	100.01	0.7204
	270 PICO-21, T2-8		77.06	13.12	0.75	20.0	9.0	0.37		 	4.63	10.001	0.7201
48 2		2/28/89	76.64	12.65	1.66	0.03	0.05	0.47	0.14	3.35	5.02	100.01	0.7197
	~	12/12/85	77.71	12.67	0.74	0.04	90.0	0.49	0.07	3.04	5.15	66.66	0.7196
			75.69	12.92	1.84	0.01	0.05	0.47	0.14	1.79	7.09	100.00	0.7193

I Listing of 50 closest matche	usest matches tor COMP.	. NO. 1899	for e	for elements:	Na, Al,	Si, Ca	Date	jo	Update: 2/12/90	2/90			
C.No Sample Number	Jaber	Date	5102	A1203	Fe203	MgO		•	T102	Na20	0	Total, R	Sim. Co
				• • • •	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			!		1	!	!
1899	E67-13 1640 T151-2	11/10/87	75.86	16.37	0.23	9	0.02	0.46	0	2 70		00.	
		11/10/87	76.81	15.88	0.30	0.59	0.01		5			00.00	1.0000
1902	1856 T151-11	11/10/87	77.21	9	0.23	4	0.00	5.5		1000	,	100.01	0.9457
2141	16 A 2 sh		76.10	12.95	1.15	0.05	0.03	0.47	200	6.00	2	100.00	0.9339
131	T16-4		76.22	13.26	0.85	0.03	00.00	0.48		,,,	7 .		0.9338
	IW T185-3	2/28/89	76.95	12.50	0.82	0.02	0.08	0.46	50.0		, ,	00.00	9337
1497 AMAR-1	380-1	7/20/84	76.72	12.93	0.77	90.0	0.07	0.49	90.0	9 6	2 0	66.66	0.9295
2367	T197-5	9/14/89	76.95	12.59	0.87	0.04	0.07	0.47	0.0	3.5	9 6	00.00	0.9276
2276	TN-77-HT	5/10/89	76.97	12.56	0.73	0.05	0.04	0.46		2	27.7	66.66	0.9271
114	T16-11		77.28	12.92	0.73	0.05	0.10	0.44	11.0	2.0		00.00	0.9256
2231	FLV-112-WW LIGHT T185-4	2/28/89	76.98	12.66	0.80	0.03	0.07	0.46	0.06	000	9	10001	6.55.0
1903	E67-113 1564 T151-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.00	10001	0.5221
2199	FLV-115-WW T182-6	1/24/89	77.09	12.37	1.27	90.0	0.01	0.47	0.19	2.89	5.63	00.001	0.9210
0081	126-1254 t115-12 Elu-110-88 mio:	1/28/85	77.26	12.70	0.91	0.08	0.08	0.48	0.14	2.67	5.68	100.00	0.9191
1344	#- 1190-4 #104-4	68///8	77.16	12.22	1.2B	0.08	0.03	0.48	0.18	2.74	5.84	100.01	0.9184
100	DE-13-A1 1100-0 D67-113 3170 mis 13	8/53/85	77.12	12.52	0.82	90.0	0.02	0.48	0.14	2.68	6.11	100.00	0.9177
2371	71-1CI 9/1	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.9177
2197	-	11/10/8/	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.9177
2120	F-2011 CI	69/47/1		12.95	0.80	0.05	0.02	0.47	0.02	3.06	5.85	99.99	0.9167
1520	-2 T130.3	10/20/88	77.13	13.06	0.92	0.05	0.07	0.52	0.09	2.76	5.39	99.99	0.9147
2107		4/53/80	70.33	12.86	0.78	0.06	0.07	0.40	0.11	2.78	6.61	100.00	0.9122
115	-	88/87/01	75.33	13.33	1.32	60.0	0.05	0.43	0.31	3.12	6.05	100.00	0.9083
75.1	71-011		78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.9073
2000	2-0014 7	000, 400	77.33	12.22	1.32	60.0	0.04	0.49	0.20	2.90	5.41	100.00	0.9062
85.		40/87/1	70.85	12.40	1.31	60.0	0.02	0.49	0.21	2.96	5.63	100.00	0.9055
856			16.07	12.63	•	0.02	0.03	0.49	0.10	3.01	29.6	100.00	0.9051
130	T16-3		20.07	19.71	76.0	0.05	0.05	0.51	0.15	2.90	2.90	99.99	0.9045
1856 FLV-27-W	T147-3	0130.02	77.03	13.38	1.26	0.04	0.00	0.56	0.11	2.72	5.38	100.00	0.9020
1887	7150-3	9/30/6/	72.60	12.35		0.05	0.08	0.43	0.10	2.92	5.69	100.00	0.9016
1840		8/25/87	77.50	12.56	0.75	0.03	0.05	0.44	90.0	3.08	5.55	99.99	0.9013
2223	•	2/28/89	77. 77	12.04	0,,0	20.0	20.0	0.49	0.10	3.09	5.39	100.00	0.9013
1921		2/24/88	77 15	12.71	707	50.0	9.0	0.46	0.12	3.32	5.07	66.66	0.9010
	CIC FR. T114-1	12/12/85	77.71	12.67	74	0.0	5 6	2.0	9 6	6.5	6.33	66.66	0.9009
235			76.39	13.20	66.0	50.0	900			5.0	07.0	99.00	9009
392			76.75	12.66	1.72	0.03	0.03	5.5		2 20	20.0	100.001	0.9003
2232	T185-5	2/28/89	77.20	12.47	0.81	0.04	0.04	0.49	80.0	40.	9 6		7000
	T16-1		77.07	12.94	0.67	0.05	90.0	0.48	0.10	3.22	5.41	100.00	0.8994
6/2	:		76.58	13.01	0.70	0.05	90.0	0.49	0.09	3.20	5.81	66.66	0.8982
40 134 GV=78-34A, T16-7	, T16-7		77.10	12.88	0.92	0.04	0.05	0.51	90.0	3.04	5.38	100.00	0.8968
-	T-PCT	XX/XX/XX	78.43	12.27	1.29	90.0	0.04	0.48	0.18	3.05	4.17	66.66	0.8966
		11/9/87	77.01	13,15	0.75	0.04	0.08	0.48	0.05	3.31	5.14	100.001	0.8366
2352	7 7011	60/07/0	77.93	12.10	9.60	0.11	20.0	0.46	0.18	3.20	5.09	100.01	0.8963
2192	DEID-1 (HIEE) AUSAGUADNE 7170-	12/21/00	65.77	12.09	#8.0	0.05	0.03	0.50	80.0 0	3.06	5.40	100.00	0.8961
1441	5	12/21/06	27.08	12.15	1.40	50.03	0.04	0.48	0.14	3.09	5.53	100.00	0.8961
300 PRL. T25	official factors	60/71/71	96.77	B0.71) i	200	80.0	0.4°	0.10	3.28	5.1	100.00	0.8946
2224	184-4	2/28/89	76.57	12.72	1.65	. 0	\$ 0.0	0.47	9.0	3.40	. v. v.	00.001	0.8937
	100+200) T175-6	10/28/88	76.68	12.44	1.55	0.06	0.04	0.49	0.15	3.14	4 4	100.01	0.8933
50 120 GV-77-3, T15-11			77.13	12.78	0.91	90.0	0.07	0.52	0.08	3.01	5.44	100.00	0.8931

Listif C.	പ് വ	z for	COMP. NO. 1899 Date	for el 5102	ements: Al203	for elements: Na, Al, Si02 Al203 Fe203	51, K Mg0	, Ca	Date of	Date of Update: CaO TiO2	2/12/90 Na20	K20	Total	
;					-		-	1 4		1				: :
18	199 F67-13 1640 T	1151-2	11/10/87	75 96	16 27		4	6	;		1	;		
6	E67-113 1640	2) T151-2	11/10/87	76.90	15.87	0.23	9 9	70.0	0.46	0.00	2.78	3.59	100.00	1.0000
			11/10/87	77.21	15.60	2,0			\$		7.41	3.52	100.01	0.9527
	E67-113 2178	T151-12	11/10/87	75.77	16.08	4.0	65.0		0.01	99	4.6	2	100.00	0.9382
	E67-113 2178	T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42			31.5	100.00	0.9080
6 19	E67-113 1564	T151-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	00.0	2.04	4.66	00.00	0.9080
			xx/xx/xx	78.43	12.27	1.29	0.08	0.04	0.48	0.18	3.05	4.17	66.66	0.8895
	488 758-354H, Ti6-15, low	15, low total		76.93	14.04	1.46	0.03	0.01	0.52	0.10	3.62	3.29	100.00	0.8826
				77.55	12.98	0.76	0.04	0.05	0.46	0.07	4.48	3.60	99.99	0.8778
		01 - 4	10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	100.001	0.8749
•	275 PICO-40A, TB-7			77.94	12.89	0.81	0.04	0.03	0.45	0.05	3.82	3.97	100.00	0.8742
12 17	1936 NH-5 T155-8	6-3	5/15/88	77.56	13.10	0.75	0.04	0.09	0.47	0.08	4.40	3.51	100.00	0.8733
	DICO-43	\	10/77/1	76 95	200	1.20	2.5	90.0	0.56	0.21	3.59	3.47	100.02	0.8732
	114 GV-76-6, T16-11			77 28	12.90	0.73	20.0	50.0		6.6	9.63	4.02	99.01	0.8709
		•		77.78	12.86	0.75		5		11.0	99.7	35.50	55.00	0.8704
17 4				76.02	14.41	0.69	0.13	0.08	0.53	0.05	4.19	9 6	90.00	0.8693
	2120 N-6 T175-10		10/28/88	77.13	13.06	0.92	0.05	0.07	0.52		2 26		00.00	00000
_		.0		78.73	12.90	0.57	0.0	0.02	0.63	60.0	200		10001	0.8650
		, N-ASW-2, P		77.64	12.88	0.74	0.03	0.02	0.46	0.02	3.72		10.00	0.0014
		•		77.94	12.65	0.76	0.02	0.03	0.48	0.05	4.47	9	20.00	0.0043
	1844 FLV-19-WW T146	22		77.31	13.24	0.72	0.04	0.08	0.48	0.06	3.76	4.31	100.00	0.8641
	RABEK Y8 TI	S CORR K		78.72	12.90	0.57	0.09	0.02	0.63	90.0	2.97	3.98	100.01	0.8640
24 2199		32-6	1/24/89	77.09	12.37	1.27	0.08	0.01	0.47	0.19	2.89	5.63	100.00	0.8636
		£-93		75.91	14.43	0.65	0.13	0.11	0.53	0.05	4.25	3.94	100.00	0.8628
Ň			2/28/89	76.61	12.71	1.62	0.03	0.05	0.46		3.32	5.07	66.66	0.8624
	2141 HPDA-11.06 A 2 eh	4		76.10	12.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.8623
		.12	1/28/85	77.26	12.70		0 0				79.7	9.24	66.66	0.8621
30 1538	PICO 82 T12			79.30	13.14	0.67	90.0	0.0	2.0	100	79.7 78	9.0	00.001	0.8617
31 2221	KRL-880828-N	T1818-7		77.35	12.96	0.71	0.03	0.03	0.46		3.48	90.4	00.00	9608
				76.72	12.93	0.77	90.0	0.07	0.49		2.80	6.08	100.00	0.8601
	1442 03068506A SILICIC FF	CIC FR. T114-1	12/12/85	77.71	12.67	0.74	0.04	0.08	0.49		3.04	5.15	99.99	0.8601
				B/.//	12.55	0.78	0.0	90.0	0.46		3.40	4.85	100.00	0.8600
		. •		77.04	13.20	6.65	0.0	0.00	0.48		2.70	6.37	100.00	0.8597
		9		77.32	12.99	60.0	3 6	7 6	2 . O		4.4	3.75	100.00	0.8595
38 2230	FLV-111-WW	15-3	2/28/89	76.95	12.50	0.82	0.03	0.09	4.0	90.0	2.40		100.00	0.8592
	FL86C-5.41	T-136-9		77.75	12.34	1.25	0.04	0.05	0.47		3.75		100.001	0.0309
40 2140		i		78.26	12.59	1.01	90.0	0.07	0.55		3.70	3.72	100.02	0.8582
		T T185-4		76.98	12.66	0.80	0.03	0.07	0.46		2.99	5.96	100.01	0.8582
	24 FFUF-1 1184-4 20 FFU-76-40 7166-7	ς,	2/28/89	76.57	12.72	1.65	0.02	0.05	0.47		3.36	5.01	66.66	0.8581
		7.		56.77	12.16	0.86	0.11	0.02	0.46			5.09	100.001	0.8581
			•	70.07	12.77	0.74	0.0	0.02	0.46			4.72	10.66	0.8579
~		4-4	00/2/0	55.77	12.22	1.32	0.09	0.04	0.49	_		5.41	100.00	0.8577
	JT-DV4588-1	T177-3		79 10	12.22	97.7	900	0.03	0.48		2.74	5.84	100.001	0.8577
CA.	PR-77 T197-	1	9/14/89	76.95	12.59	0.87			0.44		3.17	4.93	100.01	0.8576
o	239 OAK RUN-2, T27-6	9		76.04	14.25	0.64	0.13	0.0		60.0			70.00	0.8575
50 1827		s	8/24/87	77.61	12.81	0.72	0.05	0.09	0.47	90.0	3.73	4.47	100.001	0.8574

Listing of 50 closest matches for COMP. NO. 1899 for elements: Na. Al.	hes for COMP.	NO. 1899	for el	ements:	Na, Al,	S1, K		Fe Date	Date of Update: 2/12/90	ate: 2/	12/90		
C.No Sample Number	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Date	2705	A1203	Fe203		Ano	CaO	T102	Na20		Total.R	Stm. Co
								, , , , ,		1			
1899 E67-13 1640	7	11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	0.00	2.78	3.59	100.00	1.0000
1902 E67-113 1856	-11	11/10/87	77.23	15.64	0.23	0.49	0.00	0.51	0.00	2.49	.4.	100.00	0 9485
	151-2	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.001	0.9217
1903 E67-113 1564	-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.00	0 B946
1901 E67-113 2176	-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	
2371 E67-113 217	-12	11/10/87	75.77	16.08	0.45	0.57	0.0	0.45	0.00	3.58	3.12	חסו.	0 841B
2376		10/12/89	77.47	13.76	0.43	0.11	0.0	0.51	0.05	3.51	4.17	100.01	0.A1A3
115			78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	S	100.00	0 7964
1454 RABEK Y8 T115-6	2	01/27/86	78.73	12.90	0.57	60.0	0.07	0.63	0.08	2.97	3.97	100.001	n.7876
1470	×	1/2//86	78.72	12.90	0.57	60.0	0.07	0.63	0.08	2.97	3. 9A	נט.חסר	n.7872
11 337 SALTON-2, T2-14			77.55	12.98	0.76	0.04	0.05	0.46	0.02	4.48	3.60	99.99	0.7819
598 SM-ASH-34, T56-7		07/01/83	77.08	13.59	0.54	0.10	90.0	0.54	0.08	3.95	4.07	100.001	0.7797
1453 LOS CHOCOYOS SC-7	T116-3	01/28/86	78.24	12.84	0.44	0.11	0.0	0.65	0.10	3.36	4.16	66.66	0.7791
_		5/15/88	77.56	13.10	0.75	0.04	0.09	0.47	0.08	4.40	3.51	100.00	0.7789
7			70.07	12.90	5.73	50.0	50:00	6.47	0.05	5.6	4.02	99.01	0.7782
017			16.07	C	0.00	51.0	11.0	6.53	en.0	4.25	٠. د د د	100.00	0.7780
•		7/19/00	77 75	12.92	200	9 9	3 6	4.	11:0	7.80	v .	66.66	0.7779
17 BE-4 #20-7		00/61//	20.77	14.93	0.00	0.0	9 6	24.0	0.12	4.35	3.72	100.00	0.7777
			0.07	14.34	0.00	51.0	9 6	0.52	0.0	4.04	4.15	100.00	0.7775
7-0F1 'Y7C7-F 0CF			70.07	16.61	9.0	0.13	90.0	55.0	0.05	4.19	3.90	100.00	0.7772
		78/05/6	19.//	12.35	40.0	0.0	900	0.43	0.10	2.95	5.69	100.00	0.7772
2 4 5				12.03	10.0	50.0	50.0	0.45	30.0	3.82	76.5	100.00	0.7758
15.30		707 37 3	9.7	12.80	0.70	50.0	20.0	0.45	0.00	4.27	3.75	100.00	0.7757
0000		09/6/6	74.50	13.14	9.0	90.0	9.0	0.71	90.08	2.78	3.22	100.00	0.7746
٠			5.01	14.25	40.0	0.13	50.0	0.54	0.06	4.43	3.82	100.00	0.7744
1844	ugot #2	4136187	7.13	13.03	0.00	200	9	95.0	90.0	4.35	3.64	100.02	0.7744
1898		11/10/87	74 47	17.19	27.0		5 6		9 6	2.70	15.9	100.00	0.7734
1	ASW-2. P		77.64	12.88	74	9 0	0.0	0.20		2.40	4.0	700.05	0.7728
338			77.84	12.72	69.0	0.03	0.01	0.48	20.0	4.42	3 7 5	100.001	0 7718
	B-7	1/23/89	77.35	12.96	0.71	0.03	0.03	0.46	0.07	3.48	4.90	66.66	0.7713
1671 84 NV 14-1		10/21/86	77.45	12.68	0.58	0.05	90.0	0.46	0.07	3.75	4.89	66.66	0.7710
			75.93	14.35	0.63	0.12	0.10	0.54	0.05	3.98	4.30	100.00	0.7710
		xx/xx/xx	78.43	12.27	1.29	0.08	0.04	0.48	0.18	3.05	4.17	99.99	0.7710
	•	30701701	77.53	12.86	9.0	0.0	0.03		0.00	3.40	4.94	100.00	0.7709
725		60/71/71	20.77	90.21	9.0	0.0	90.0	0.45	0.10	3.28	2:1	100.00	0.7707
2001	Ca fract.	5/22/AA	77.54	12.80	9 5	70.0	3 6	0.4g	0.0	,	10.5	10.001	0.7706
1442	ď	L.	77 71	12 67	7.		9 6				2 .	00.00	0.7686
1989	65-		77.93	12.32	09.0	0.05	0.0		0.11	3.77	4.71	100.001	0.7682
1865			77.47	12.83	0.58	0.05	0.0	0.43	0.11	3.66	4.76	96.66	0.7680
			77.61	12.81	0.72	0.05	0.0	0.47	90.0	3.73	4.47	100.01	0.7678
128			77.07	12.94	0.67	0.05	90.0	0.48	0.10	3.22	5.41	100.00	0.7672
			77.32	12.99	\sim	0.04	0.05	ē	0.05	3.90	4.44	100.00	0.7671
1252		5/29/85	77.26	12.83	0.58	0.04	0.08	0.45	0.08	3.95	4.74	100.01	0.7669
452			76.52	12.77	0.74	0.04	0.02	0.46	0.07	3.67	4.72	99.01	0.7667
47 1174 ALT-4 t89-1			77.64	12.84	0.64	0.08	0.05	0.50	0.10	3.86	4.28	99.99	0.7666
7661		#8/07//	70.72	12.93	2.0	90.0	90.0	9.4.0	90.0	7.80	90.0	100.00	0.7666
50 2150 JT-DV45BB-1 T177-3	e		78.19	12.38	0.75	0.0	0.0	0.44	0.07	3.17	4.93	100.001	0.7658

C.No Sample Number	r. NO. 1699 Date	10r 510	2 A1203	Fe203	Myo	Ano.	CaO	; ⊢	Na 20	K20	Total,R	Sim. Co
1 1899 E67-13 1640 T1512	11/10/87	75.86	•		0 7	:				:		:
E67-113 1640 (11/10/87	76.81	15.88	0.30	0.59	0.07	0.40	9 6	2.78	3.59	100.00	1.0000
1903 E67-113 1564 T151-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.00	100.01	9364
1902 Eb/-113 1856 T151-1	11/10/87	77.21	•	0.23	0.49	0.00	0.51	0.00	2.49	3.43	100.00	0.9002
2371 E67-113 2178	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.8943
1898 E67-113 1543 T151-1	11/10/87	74 47	12.08	2.0	0.57	•	0.42	0.0	3.58	3.12	100.00	0.8943
673 TULELAKE-715 (/8/xx/xx	70.87	14.50	2,52	20.0	0.0	0.28	0.03	2.46	4.64	100.02	0.8356
653 6R008A, T66-1	10/25/83	69.98	15.75	2.74	0.77	9 6	1.99	0.45	4.14	3.68	100.01	0.7908
68 DSDP-1, T9-3, low to		75.79	14.88	0.11	0.49	0.0	20.0	0.0	29.6	4.0	99.99	0.7763
654 57M(1), TSS-3 (not orig oxida	XX/XX/XX	5.	۰	2.90	0.71	0.07	2.45	0.44	3.45	3.32	100.00	0.7744
1842 FLV-17-WW T146-5	8/25/87	71.88	15.85	2.30	0.60	0.05	2.15	0.29	3.72	3.15	66.66	0.7707
671 THE FLAVE-715 (+22 2002)		70.60	15.08	2.68	69.0	0.07	2.17	0.42	4.38	3.91	100.00	0.7695
	//** 7	70.79	15.00	2.65	99.0	0.08	•	0.44	4.79	3.62	100.01	0.7684
638 TULELAKE-712, T67-3	11/18/83	70.03	15.10	2.69	6.65	0.07	٠	0.46	4.69	3.68	100.01	0.7668
1740	4/22/87	77.25	13.45	2.5	40.0	0.07	•	0.45	4.64	3.69	100.00	0.7654
1124 T-693 T83-12	10/12/84	71.02	14.62	2.67	0.67	90.0	2.00	0.21	. 4 . 4	3.47	100.02	0.7639
639 TULELAKE-712	11/18/83	70.25	15.31	2.83	0.77	90.0	2.20	0.46	. 5.	9 9	90.00	0.7636
\$C11	12/4/84	71.75	14.69	2.57	0.63	90.0	2.17	0.46	4.26	3.41	100	0.7618
_	xx/xx/xx	78.43	12.27	1.29	0.08	0.04	0.48	0.18	3.05	4.17	99.99	0.7606
2376	10/21/86	71.66	14.65	2.76	0.62	0.08	1.71	0.64	4.57	3.31	100.00	0.7562
1366	8/26/85	72.51	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	100.01	0.7557
436 4-252A, T40-7		76.02	14.41	69.0	0.13	0.08	0.53	200	3.07 0.07	9 6	100.01	0.7534
218		75.91	14.43	0.65	0.13	0.11	0.53	0.05	4.25	3.94	100.00	0.7504
27 869 LE-25		73.87	÷.	2.03	0.36	0.07	1.73	0.28	3.01	3.11	100.00	0.7501
11	10,51701	76.05	14.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.7499
2374	10/12/89	77.09	13.00	2.78	9.79	0.08	2.18	0.49	4.92	3,63	100.01	0.7497
		76.04	14.25	0.64	0.13	0.09	0.54	0.06	4.43	20.00 20.00	90.00	0.7478
1095 61384-24 ASW TB1-12	9/4/84	70.95	14.70	3.20	0.56	0.10	1.82	0.55	3.94	4.16	96.66	0.7444
	8/26/85	69.82	15.16	3.25	0.68	0.10	1.92	0.63	5.30	3.12	96.66	0.7442
ASW-6985-1 1	08/26/85	69.68	15.16	3.27	7.0	0.10	1.98	0.67	5.25	 	100.00	0.7440
CB-25		77.97	11.42	1.78	0.13	0.03	0.44	0.51	3.71	4.01	100.00	0.7433
		76.93	14.04	1.46	0.03	0.01	0.52	0.10	3.62	3.29	100.00	0.7427
1427 ASW-6985-2 T103-2 881 1454 DADEK VO TIIC-4	08/26/85	71.17	15.46	2.49	0.53	0.07	1.69	0.45	4.77	3.40	100.00	0.7421
	1/2//86	78.73	12.90	0.57	90.0	0.07	0.63	0.08	2.97	3.97	100.01	0.7421
FLV-76-WW T185-2	2/28/89	77.93		0.8	0.11	0.02	0.46	-	3.20	2	10.00	0.7417
TULE LAKE 71	5/30/84	71.49	14.92	2.41	0.55	0.05	1.64	0.41	4.60	3.93	100.00	0.7415
		77.55	12.98	92.0	0	0.05	0.46	0	4.48	•	99.99	0.7411
824 GS-70 96 DSDD-173-1-4/11		70.64	14.97	3.96	0.83	0.05	2.40	0.81	3.52	2.81	99.99	0.7402
		75.93	14.72	2.1.0		90.0	\$1.7 0	2 20	9.78	10.6	96.66	0.7396
	6/22/84	67.94	16.62	2.48	0.77	0.00	2.90	0.48	4.99	3.81	99.99	0.7391
FLV-115-WW T182-6	1/24/89	77.09	12.37	1.27	0.08	0.01	0.47		2.89	5.63	100.00	0.7390
95 DSDP-173-1-3(70.43	15.03	3.14	0.68	0.08	2.25	99.0	4.80	2.93	100.00	0.7386
C-5011 88-6860-868 CTCT	8/56/85	69.83	15.17	3.27	99.0	0.10	1.88	•	5.33	3.09	66.66	0.7385

IV, List:	ing (matches tor	COMP. NO. 1900	tor el	tor elements:	Na, A1,	Si, Ca	Date	of Update: 2/12/90	te: 2/1	2740			
J 1	C.No	C.No Saaple Number	Date	2102	A1203	Fe203	Mg.		CaO	T102	Na20	K20	Total, R	Sim. Co
							• • • • • • • •	i !	•				!	!
-	1900		11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3	100.01	1,0000
	1905	E67-113 1856 T151-	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	00.0	2.49	3.43	100.00	0 9722
	1899		11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	0.00	2.78	. 2	100.00	0.9457
	1401	FABY 37 T115-2	1/5//86	77.50	13.01	1.32	0.07	0.04	0.49	0.12	2.37	9	100.00	0.9433
	1903		11/10/87	75.20	16.70	0.21	0.71	0.01	⋖	0.00	2.04	4.66	100.00	0.9389
: ۵	131	GV-78-29, T16-4		70.22	13.26	0.85	0.03	00.0	0.48	60.0	2.70	6.37	100.00	0.9300
	115	GV-76-8, T16-12		78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.9262
	1450		1/58/85	77.26	12.70	16.0		0.08	0.48	0.14	2.67	5.68	100.00	0.9241
	1344	BE-15-Al Tlub-b	8/53/82	77.12	12.52	0.82		0.07	0.48	0.14	2.68	6.11	100.00	0.9209
	1451	126 1265 (115-13	1/28/86	77.58	12.59	0.89		90.0	4	0.12	2.36	5.87	100.00	0.9197
11 2	2276		5/10/89	76.97	12.56	0.73		0.04	0.46	0.11	2.64	6.44	100,00	0.9150
	2367		9/14/89	76.95	12.59	0.87	0.04	0.07	0.47	0.09	2.71	6.20	66.66	0.9149
T 51	1497		7/20/84	76.72	12.93	0.77		0.07	0.49	90.0	2.80	6.08	100.00	0.9133
	2356	FLV-110-WW T196-4	68/1/8	77.16	12.22	1.28		0.03	0.48	0.18	2.74	5.84	100.01	0.9111
	1927	B6LP39, T157-1	03/14/88	76.57	12.90	0.57	0.04	0.08	95.0	0.07	2.47	6.75	100.01	0.9105
7 91	2141	HPDA-11.06 A 2 sh		76.10	12.95	1.15		0.03	0.47	0.13	2.87	6.24	66.66	0.9063
	0212	N-6 TI75-10	10/28/88	77.13	13.06	0.92		0.07	0.52	0.09	2.76	5.39	99.99	0.9036
	1921	86LP-38 T154-7	2/24/88	77.15	12.70	0.58	0.05	90.0	0.42	60.0	2.59	6.33	99.99	0.9002
	2073	CCP-C T172-2	9/28/88	27.06	12.19	1.53		0.05	0.50	0.14	2.09	6.42	100.00	0.8979
	6617	FLV-115-WW T182-6	1/24/89	77.09	12.37	1.27		0.01	0.47	0.19	2.89	5.63	100.00	0.8971
	0577	FLV-111-WW T185-3	2/28/89	76.95	12.50	0.82	0.05	0.08	0.46	90.0	2.87	6.23	66.66	0.8958
770	051	GV=78-27, T16-3		76.55	13.38	1.26		0.00	0.56	0.11	2.72	5.38	100.00	0.8956
	1617	FLV-1118-WW T182-4	1/24/89	76.75	12.95	0.80	0.02	0.02	0.47	0.02	3.06	5.85	99.99	0.8954
	7651	126-1303 t115-14	1/28/86	77.67	12.53	0.89		0.08	0.39	0.11	2.44	5.84	99.99	0.8945
	100	LE-4		76.91	12.63	1.19		0.03	0.49	0.10	3.01	5.62	100.00	0.8936
	25.0	FLV-116-WW T182-7	1/24/89	76.89	12.40	1.31	60.0	0.02	0.49	0.21	5.96	5.63	100.00	0.8934
	70,	RC-11		77,33	12.22	1.32		0.04	0.49	0.50	2.90	5.41	100.00	0.8934
	114	6V-/6-6, TI6-II		77.28	12.92	0.73	0.05	0.10	0.44	0.11	2.86	5.50	66.66	0.8917
	000			76.85	15.61	an .		0.05	0.51	0.15	2.90	5.90	66.66	0.8914
	1000		8/25/87	76.85	12.65	0.55		90.0	0.41	90.0	2.20	7.13	66.66	0.8908
	2000	FLV-10-WW T.460-4	8/25/87	77.22	12.84	0.75	0.07	0.05	0.49	0.10	3.09	5.39	100.00	0.8907
	120	00010-100 1183-3 60-70-22 mid-1	68/57/1	76.64	11.96	1.79		0.02	0.56	0.25	2.30	6.39	99.98	0.8906
	2221	8		77.07	12.94	0.67		90.0	0.48	0.10	3.22	5.41	100.00	0.8900
	1677	TIBS-4	68/87/7	76.98	12.66	0.80		0.07	0.46	90.0	2.99	5.96	100.01	0.8898
36.			11/0/02	7.77	12.67	0.74		0.08	0.49	0.07	3.04	5.15	99,99	0.8897
		2011	/9/6/11	10.77	13.15	0.75	0.0	90.0	0.48	0.05	3.31	5.14	100.001	0.8884
38	235	911	60/07/7	07.//	12.97	18.0		9.04	0.49	0.08	3.04	5.82	66.66	0.8881
		LH-41		76.59	200	200		90.0	200	000	1.0	9 .	66.66	0.6877
		FL86C-5.41 B 1 sh		77.20	12.21	91.1		90.0	200	900	2000	18.6	700	2/88.0
		FLV-34-WW T147-8	9/30/87	76.85	12.43	69.0		9	25.0	9.5	6.50		66.66	0.0000
42		CAPIS-1, T54-1		78.43	12.27	1.29	0.08	0.0	0.02	19	20.7	4 17	90.00	0.8801
		RFIP-1 (HIFE) AV24SHARDS T179-		77.08	12.15	1.46		0.04	0.48	0.14	3.09	. 5	100.00	0.8854
				77.10	12.88	0.92		.05	L/O	0.08	3.04	5.38	100.00	0.8853
		T196	8/7/89	77.35	12.69	0.84		0.03	0.50	0.08	3.06	5.40	100.00	0.8849
9 1		FLV-38-WW T147-12		79.16	12.71	0.54		90.0	0.42	0.10	2.15	4.79	100.00	0.8845
	265	TECO-30G, TI7-14		76.75	12.66	1.72		0.03	•	0.13	2.78	5.36	100.01	0.8840
		1000		78.22	12.23			0.08	0.39	0.08	2.33	6.05	100.01	0.8829
50 1		T175-6	10/28/88	76.68	12.44	1.55	90.0	0.04	0.49	0.15	3.14	5.46	100.01	0.8822
	,			70.39	11.91			.04	0.54	0.17	2.70	6.12	100.001	0.8822

Listing of	of 50	closes	50 closest matches for	COMP	NO. 1900	for el	elements:	Na. Al.	S1, K		Date of	Update:	2/12/90			
ייייייייייייייייייייייייייייייייייייי	Id mas o	C.No Sample Number		:	Date	S102	A1203	Fe203	MgO	Mn0	CaO	T102	Na 20	K20	Total, R	Sim. Co
					l		•		: : : : : : : : : : : : : : : : : : : :	! !		:				!
		13 1640			11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.53	100 001	0000
			T151-1		11/10/87	77.21	15.64	0.23	0.49	00.0	0.51	00.00	2.49	7.4	1000	00000
3 1899		E67-13 1640	T151-2		11/10/87	75.86	16.37	0.23	0.69	0.02	0.46	0.00	2.78		00.001	0.9720
		13 1564	E67-113 1564 T151-3		11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	00.00	2.04	4.66	100	0.000
					1/27/86	77.50	13.01	1.32	0.07	0.04	0.49	0.12	2.37	5.08	100.00	0.8033
6 1901		13 2178	2178 T151-12		11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.8817
N		E67-113 2178	æ		11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.00	3.58	3.12	100.00	0.8817
8 488		54H, T1	15, low	total		76.93	14.04	1.46		0.01	0.52	0.10	3.62	3,29	100.00	0.8812
		-1, T54-1	7		xx/xx/xx	78.43	12.27	1.29	0.08	0.04	0.48	0.18	3.05	4.17	66	0.8773
_		BRICE-2 T-136-7	136-7		4/22/87	77.25	13.45	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02	0.8711
		-8, T16	-12			78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.8683
		NH-5 T155-8			5/15/88	77.56	13.10	0.75	0.04	0.09	0.47	0.08	4.40	3.51	100.00	0.8679
		FLV-148-CS	T201-4		10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	9.08	3.51	4.17	100.01	0.8660
-		126-1254 til5-1	15-12		1/28/85	77.26	12.70	0.91	90.0	0.08	0.48	0.14	2.67	5.68	100.00	0.8633
		SALTUN-1, T20-3	F-0			77.94	12.65	0.76	0.02	0.03	0.48	0.05	4.47	3.61	100.01	0.8593
507 01		LUCK-4, 141-3	,			77.42	13.05	0.88	0.05	0.0	0.50	0.10	4.52	3.45	100.01	0.8574
-		FLV-19-WW T146-7			8/25/87	77.31	13.24	0.72	0.0	0.08	0.48	90.0	3.76	4.31	100.00	0.8570
		TULELAKE-542, TOI	, T61-12(2)		08/26/83	77.31	13.35	0.87	0.0	0.05	0.55	0.08	4.17	3.53	100.00	0.8564
		SALTON-2, T2-14	-14			77.55	12.98	0.76	0.04	0.05	0.46	0.02	4.48	3.60	66.66	0.8564
		4-252A, T40-7	,			76.02	14.41	0.69	0.13	0.08	0.53	0.05	4.19	3.90	100.00	0.8561
21 277		•			, , ,	76.85	12.90	0.73	0.03	0.03	0.47	0.05	3.93	4.02	99.01	0.8560
~		265 tl	t115-13		1/28/86	77.58	12.59	0.83	0.07	0.08	0.44	0.12	2.36	5.87	100.00	0.8557
23 338			T20-4			77.84	12.72	69.0	0.03	0.01	0.48	0.07	4.41	3.75	100.00	0.8546
_			T147-12		9/30/87	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79	100.00	0.8545
		-29, T1	T16-4			76.22	13.26	0.82	0.03	0.00	0.48	0.09	2.70	6.37	100.00	0.8545
		-19, T3	T35-8			75.84	13.05	2.12	0.09	0.05	0.66	0.27	2.63	4.32	99.00	0.8535
27 2120		N-6 T175-10	, - OC.		10/28/88	77.13	13.06	0.92	0.0	6.6	20.0	50.0	2.76		70.00	0.8535
		T28-7	7.071			76.05	14.34	9.00	2	90	25.0		4.04	4.15		0.8320
30 1344		-A1 T1	T106-6		8/29/85	77.12	12.52	0.82	90.0	0.02	0.48	0.14	2.68	6.11	100.00	0.8520
~		82 T124-9	6-1		5/5/86	79.30	13.14	0.67	90.0	0.04	0.71	0.08	2.78	3.22	100.00	0.8508
		PICO-40A, T8-7	7		,	77.94	12.89	0.81	0.0	0.03	0.45	0.05	3.82	3.97	100.00	0.8505
		RABEK Y8 T115-6	9-6		01/27/86	78.73	12.90	0.57	0.0	0.07	0.63	0.08	2.97	3.97	100.01	0.8496
34 2330		FLV"IIU"WW TI96-4			897779	20.77	12.22	1.28	90.0	20.0	0.48	9.18	2.74	5.84	100.01	0.8495
36 2140		KABEK 18 T113-0 C FLA6C-5.41 C 2 eb	KABER IS TIID-6 CORK K FIREC-5-41 C 2 sh		98//7/1	78.76	26.21	70.0	50.0	0.0	50.0	90.0	2.97	3.98	100.01	0.8492
		LOCK-3, T41-2				77.38	13.02	0.83	0.0	0.05	0.52	0.12	4.57	3.45	100.00	0.8486
38 1442		506A S	LICIC FR.	T114-1	12/12/85	77.71	12.67	0.74	0.04	0.08	0.49	0.02	3.04	5.15	66.66	0.8484
		•	T27-6			76.04	14.25	0.64	0.13	0.0	0.54	90.0	4.43	3.82	100.00	0.8483
40 1889			T150-6		11/9/87	77.01	13.15	0.75	0.04	0.08	0.48	0.05	3.31	5.14	100.01	0.8477
		F-100, T22-4				77.78	12.86	0.75	0.03	0.05	0.45	90.0	4.27	3.75	100.00	0.8476
72 1500		CA-18-7/, TIB-3	7.0		207 37 3	70.07	13.38	1.20	0.0	9.00	0.56	0.11	2.72	5.38	100.00	0.8473
		11641	7.		7/30/04	76.73	12.53	1.00	50.0	200	50.0	500	71.	30.00	100.00	0.8468
45		_	, Œ		10/07//	77.78	12 94	7,00	9 6	3 6		500	7.00	9.6	00.00	0.8465
ä		PR-77 T197-5	١.		9/14/89	76.95	12.59	0.87	0.0	0.07		0.0	2.71	6.20	00.00	0.8454
_		JT-NOVA-1600	T150-7		11/9/87	77.18	12.98	0.81	0.04	0.08	0.48	90.0	3.42	4.96	100.01	0.8454
		LOCK-2, T-41-1	-1			.,	12.94	0.85	0.05	0.05	•	90.0	4.42	3.30	99.99	0.8452
49 751						77.33	12.22	1.32	0.09	0.04	0.49	0.20	2.90	5.41	100.00	0.8448
50 339	9 SALTON-5,	N-5, T2	T2-10			77.38	12.82	0.76	0.04	0.05	4.	0.05	4.58	3.84	66.66	0.8444

matches for	COMP. NO. 1900	for	elements:	Na, Al	, S1, K	Ca.	Fe Date		of Update: 2/12/90			
C.No Sasple Nusber	Date	2013	A1203	Fe203	:	Mno	CaO	Ti02	Na20	K20	Total, R	Sim. Co
									• • • •	!		!
E67-113 1640	11/10/87		15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100	0000
1902 E67-113 1856 T151-1	11/10/87		15.64	0.23	0.49	0.00	0.51	00.0	2.49	3.43	_	0.9383
1899 E67 · 13 1640 7	11/10/87		16.37	0.23	69.0	0.05	0.46	0.00	2.78	3.59	100	0.9217
1903 E67-113 1564	11/10/87		16.70	0.21	0.71	0.01	0.47	00.0	2.04	4.66	100	0.8685
1901 E67-113 2178	11/10/87		16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	-	0.8459
2371	11/10/87		16.08	0.45	0.57	0.01	0.42	00.00	3.58	3.12	100	0.8459
2376	10/12/89		13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	100	0.8379
115		78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100	0.8322
1802	9/30/87	79.16	12.71	0.54	0.05	0.08	0.42	0.10	2.15	4.79		0.000
1454 RABEK Y8 T115-6	01/27/86	78.73	12.90	0.57	0.09	0.07	0.63	0.08	2.42	3.07	•	7567
	01/28/86	78.24	12.84	0.44	0.11	0.09	0.65	0.10	3.36	4	90	0.7957
1470 RABEK Y8 T115-6 CORR	1/27/86	78.72	12.90	0.57	0.09	0.07	0.63	0.08	2.97	3.98	100	0.7954
598 SM-ASH-34, T56-7	07/01/83	77.08	13.59	0.54	0.10	90.0	0.54	90.0	3.95	4.07	_	0.7953
14 2147 5AFZ-5, T167-8, 10 Cm 10sh		77.15	13.53	0.55	0.05	0.09	0.58	0.08	4.35	3.64	100	0.7903
000	5/15/88	77.56	13.10	0.75	0.04	0.0	0.47	0.08	4.40	3.51	100.	0.7899
917		75.91	14.43	0.65	0.13	0.11	0.53	0.05	4.25	3.94		0.7874
7		76.05	14.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.7871
950		76.02	14.41	69.0	0.13	0.08	0.53	0.05	4.19	3.90	100.00	0.7859
239 OAK RUN-2,		76.04	14.25	0.64	0.13	0.09	0.54	90.0	4.43	3.82	100.00	0.7851
33B SALTON-ZA,		77.84	12.72	0.69	0.03	0.01	0.48	0.07	4.41	3.75	100.00	0.7846
100	8/25/87	77.31	13.24	0.72	0.04	0.08	0.48	90.0	3.76	4.31	100,00	0.7836
1538	5/5/86	79.30	13.14	0.67	90.0	0.04	0.71	0.08	2.78	3.22	100.00	0.7836
1401	1/27/86	77.50	13.01	1.32	0.02	0.04	0.49	0.12	2.37	5.08	100.00	0.7823
9 5		77.94	12.65	0.76	0.02	0.03	0.48	0.05	4.47	3.61	100.01	0.7818
•		76.85	12.90	0.73	0.03	0.03	0.47	0.05	3.93	4.02	10.66	0.7818
1361	03/14/88	76.57	12.90	0.57	0.0	0.08	0.56	0.02	2.47	6.75	100.01	0.7816
2013	201010	70.93	14.35	0.63	0.12	0.10	0.54	0.05	3.98	4.30	100.00	0.7802
337 SALTON-2	00/61//	27.70	12.93	0.60	0.05	9.0	0.42	0.12	4.35	3.72	100.00	0.7796
1921	007 4070	27.75	12.98	9.30	0.04	0.05	0.46	0.07	4.48	3.60	66.66	0.7794
1174 ALT-4	3/1/85	77 64	12.70	9.0	0.0	90.0	0.42	0.09	2.59	6.33	66.66	0.7790
1864	0/30/63	77.03	10.21		90.0	5	0.50	0.10	3.86	4.28	66,66	0.7789
128	100016	77.30	12.69	0.00	9.00	0.0	0.49	0.10	3.76	4.65	100.00	0.7778
1683	11/25/06	77.63	12.34	9.0	20.0	90.0	0.48	0.10	3.22	5.41	100.00	0.7764
2126	10/22/00	76.03	14.44	70.0	9.0	9.0	0.49	0.09	3.21	5.35	100.01	0.7760
1856 FLV-27-WW 1	9/30/87	77 81	13.64	10.0		100	0.51	90.0	60.0	4:41	66.66	0.7755
1165 ALT 3 T87-	12/24/84	77 77	12.53		0.0	9 6	5.43	0.10	2.65 C C C C C C C C C C C C C C C C C C C	5.69	100.00	0.7753
03068506A	• • •	77.71	12.67	20.0	5 6	50.0	0.51	0.10	3.87	4.28	96.66	0.7748
1450 126-1254 tl15-12	1/28/85	77.26	12.70	0.91	0.0	9 0	4.0	3		. T	70.00	0.7745
104 FRIANT-2,		77.53	12.86	0.68	0.03	0.03	0.47	0.06	3.40	9 6		0.7737
1164	12/24/84	77.89	12.55	0.65	0.08	0.05	0,50	0.10	3.91	4.27	100.00	0.7731
	11/9/87	77.01	13.15	0.75	0.04	0.08	0.48	0.05	3.31	5.14	100.01	0.7731
254		77.78	12.86	0.75	0.03	0.05		90.0	4.27	3.75	100.00	0.7730
13		77.38	12.94	0.74	0.04	0.02	0.48	0.03	4.23	4.12	99.98	0.7728
1907 OT-2 T149-5	11/11/87	78.22	12.23	0.58	0.05	0.08	0.39	0.08	2.33	6.05	100.01	0.7717
286		77.49	12.81	0.73	0.03	0.02	0.49	0.08	4.45	3.91	100.01	0.7717
47 1671 84 NV 14-1	10/21/86	77.45	12.68	0.58	0.05	90.0	0.46	0.07	3.75	4.89	66.66	0.7714
2220 VBT 000020 0		77.42	13.05	99.0	0.05	0.04	•	0.10	4.52	3.45	100.01	0.7714
THIFT AVE-642 TELLS	1/23/89	77.26	12.97	0.72	0.03	0.03	0.48	0.07	3.53	4.91	100.00	0.7712
776-3487	08/55/83	77.31	13.35	0.87	0.09	0.05	0.55	0.08	4.17	3.53	100.00	0.7711

Listi	matches tor	CUMP. NO. 1900	for	Glements:		Al, Si,	٠ س	Ca Date			2/12/90			
، ن	C.No Sample Number	Date	5102	A1203		•	Mno	O	T102 Na20			Total, R	Sim. Co	
							1 1 4 4 1							
-	Et7-113 1640 (11/10/87		15.88	0.30	0.59	0.01	0.48	0.01	4	3 53	000	0000	
	E67-113 1856 TIS1-1	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	0.00	2.49	3 6	10.00	00000	
e .	E67-13 1640 T151-2	11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	0.00	2.78	3.59	100.00	0.9364	
	E67-113 2178	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	S	3.12	100.00	0.8958	
N .	E67-113 2178 T151-1	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.8958	
		11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	0	4.66	100.00	0.8903	
		11/10/87	74.47	17.18	0.10	0.85	0.01	0.28	0.03	2.46	4.64	100.02	0.8183	
	os Daural, T9-3, Low total	!	75.79	14.88	0.11	0.49	0.01	96.0	0.01	2.43	5.32	100.00	0.8179	
	1842 FLV-17-WW T146-5	8/52/87	71.88	15.85	2.30	09.0	0.05	2.15	0.29	3.72	3.15	66.66	0.7805	
		4/22/87	77.25	13.45	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02	0.7683	
		1/27/86	77.50	13.01	1.32	0.02	0.04	0.49	0.12	2.37	5.08	100.00	0.7642	
7 :	1306 B7-1/2-TM1-ZZ T104-Z	8/26/85	72.51	13.42	3.12	0.59	0.03	1.96	0.71	3.67	4.00	100.01	0.7618	
	ACU-4006-7 T133-2	10/21/86	71.66	14.65	2.76	0.62	90.0	1.71	0.64	4.57	3.31	100.00	0.7593	
		08/5/80	71.17	15.46	2.49	0.53	0.07	1.69	0.45	4.77	3.40	100.00	0.7589	
	-032 V6-10-AT-CT	BB/B/71	71.75	14.69	2.57	0.63	90.0	2.17	0.46	4.26	3.41	100.00	0.7586	
2 1		XX/XX/XX	70.87	15.50	2.67	0.68	90.0	1.99	0.42	4.14	3.68	100.001	0.7577	
	1005 61384-24 ACM T01-12	XX/XX/XX	78.43	12.27	1.29	0.08	0.0	0.48	0.18	3.05	4.17	99.99	0.7536	
		#0/#/C	2.50	٠	3.20	0.56	0.10	1.82	0.55	3.94	٠	99.98	0.7534	
		10/1/104	77.77	14.91	2.26	0.51	60.0	1.50	0.50	5.05	3.46	66.66	0.7529	
;		10/17/03	10.77	13.76	. 4. E. 4.	0.11	0.00	0.51	0.05	3.51	4.17	100.01	0.7527	
_	1011 THE LAKE 715 (602) 474-9	11/10/03	20.5	15.19	2.70	0.64	0.07	1.97	0.45	4.64	٠	100.00	0.7525	
•	LX-25	#0 /00 /n	72.07	76.61	2.41	6.55	20.0	1.64	0.41	4.60	•	100.00	0.7525	
			76.07	10.04	2.03	9 :	.0.0	1.73	0.28	3.01	•	100.00	0.7520	
	TULELAKE-715 (int pum)	**/**/**	70.07	14.41	60.0	51.0	B 6	0.53	0.05	4.19	3.90	100.00	0.7501	
.,	PU-17 T201-2	10/12/89	20.07	13.61	7.07	20.0	0.07	1.97	0.46	4.69	3.68	100.01	0.7493	
			75.93	14.00	77.0	7.	5.0		0.25	3.20	53	100.00	0.7489	
58	17 BF-4, T28-7		76.05	14.34	56.0	3.5	1 0	50.0	0.0		9.0	100.00	0.7472	
		8/7/89	72.25	14.56	2,54	5.54	0.0	30.0	5 6	5 4		100.00	0.7469	
		xx/xx/xx	70.79	15.00	2.65	99.0	0.08	96.1	44.	7.79	3.5	100.01	7463	
	653 6R008A, T66-1	10/25/83	69.98	15.75	2.74	0.77	0.05	2.82	0.52	3.82	. 5.	000	7441	
	OAK RUN-2, T27-6		76.04	14.25	0.64	0.13	0.09	0.54	90.0	4.43	3.82	100.00	0.7437	
			76.93	14.04	1.46	0.03	0.01	0.52	0.10	3.62	3.29	100.00	0.7428	
	9-216 1-83-1 942-E	5/9/89	72.22	14.03	2.75	0.54	0.03	1.64	0.54	3.79	4.46	100.00	0.7428	
		30/06/1	74.92	13.02	2.25	0.41	0.03	1.26	0.49	4.11	3.51	100.00	0.7424	
		1/20/03 5/15/00	20.77	12.70	16.0	80.0	0.08	0.48	0.14	2.67	2.68	100,00	0.7420	
38	TULELAKE-542, T61-12(08/26/83	77 23	12.25		9.00	0.10	1.72	0.53	5.15	4.20	66.66	0.7407	
	WL-4-31 (81,15M) T16	5/15/88	68.68	16.37	2.28	20.0	5	65.7	90.0	4.17	3.53	100.00	0.7391	
	654 57H(1), T55-3 (not orig oxids)	xx/xx/xx	71.59	15.64	000	, ,		70.7	70.0	11.0	9.20	100.01	0.7374	
	T-693 T83-12	10/12/84	71.02	14.62	2 67			•	F •	•	C	100.00	0.7373	
		07/02/85	72.17	14.51	69.0	•		2.00	֓֞֜֜֝֓֜֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֓֓֓֓֡֓֓֡֓֡֓֡֓֡	50.0		100.00	0.7369	
			75.84	13.05	2.12	0.09	0.0	99.0	76.0	1 0 4	10.0	00.00	0.7358	
			72.31	15.24	2.48	0.57	0.06	1.94	77.0		20.5	00.66	7367	
	7 ASH CREEK-1, T28-1		75.93	14.35	0.63	0.12	10	24		100	70.4	66.66	2000	
		5/15/88	77.56	7	0.75	0.04	0.09	67.		3.38		100.00	7246	
47 8			72.63	14.47	2.41	0.51	0.05	1.80	0.49	4.52	3.11	90	7.24	
-	DARKE, TS9-A4 (not org oxds)	xx/xx/xx	72.15	14.90	2.35	0.53	0.04	1.83	0.44	4.75	3.01		0.7335	
50 B	RABER 18 1115-6	01/27/86	78.73	•	0.57	60.0	0.07	0.63	90.0	2.97	3.97		0.7334	
	,		72.30	14.54	2.46	0.52	0.05	1.80	0.50	4.71	3.11	99.99	7334	

List	ing of	matches tor	COMP. NO. 1902	tor	Ŋ		Ω	Date	of Upda	of Update: 2/12/90	2/90				
	C. No Sa	C.No Sample Number	Date	S102	A1203	Fe203	Mgo	Mno	Cao	T102	Na20	K20	Total, R	Sim. Co	
						:		:		1		:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
-		-	11/10/87		15.	0.23	0.49	0.00	0.51	0, 00	2.49	3.43	00 001	0000	
~		2) T15	11/10/87		15.88	0.30	0.59	0.01	0.48	0.01			200	00000	
e		FABY 37 T115-2	1/27/86		13.	1.32	0.07	0.04	0.49	0.12	2.37	5.08	1000	0.9752	
4		E67-13 1640 T151-2	11/10/87		~	0.23	0.69	0.02	0.46	00.0	2.78	3.59	100.00	0.9339	
S.		86LP39, T157-1	03/14/88		12.	0.57	0.04	0.08	0.56	0.02	2.47	6.75	100.01	0.9298	
9 1		N-6 T175-10	10/28/88		13.	0.92	0.05	0.02	0.52	60.0	2.76	5.39	66.66	0.9292	
7		GV-78-29, T16-4		76.22	13.	0.85	0.03	0.00	4	0.09	۲.	6.37	100.00	0.9246	
		_			12.	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.9228	
	1450 12	126-1254 tl15-12	1/28/85	77.	12.7	0.91	0.08	0.08	0.48	0.14	2.67	5.68	100.00	0.9213	
					13.	1.26	0.04	0.00	ŝ	0.11	2.72	5.38	100.00	0.9183	
		AMAR-1 T80-1	7/20/84		~	0.77	90.0	0.07	0.49	0.08	2.80	6.08	100.00	0.9176	
75		BE-15-A1 T106-6	8/29/85		12.52	0.82	90.0	0.02	0.48	0.14	2.68	6.11	100.00	0.9174	
		LM-10	•		_	0.97	0.05	0.05	0.51	0.15	2.90	5.90	99.99	0.9151	
	1903 E6		11/10/87		-	0.21	0.71	0.01	•	0.00	2.04	4.66	100.00	0.9128	
C T		TIAT-O FLV://-HI	5/10/89			0.73	0.05	0.0		0.11	2.64	6.44	100.00	0.9113	
		C=/ATT //=>	87176			0.87	0.04	0.07	0.47	60.0	2.71	6.20	66.66	0.9105	
	104 66				7	0.92	0.04	0.05	0.51	0.08	3.04	5.38	100.00	0.9103	
		FLV-Jano-un-ort-un-	9730787	76.85		0.62	0.08	90.0	0.62	0.10	2.52	6.22	100.00	0.9082	
1 0		7-770-88 T780-7	69///8		7 :	1.28	0.08	0.03	0.48	0.18	2.74	5.84	100.01	0.9077	
3 :		1ECO-306, 11/-14		76.75	7	1.72	0.03	0.03	0.55	0.13	2.78	5.36	100.01	9906.0	
		CV=//=3, 113-11 UH=CTMA (2) +00-14	37,007,00		77	0.91	0.06	0.07	0.52	0.08	3.01	5.44	100.00	0.9060	
		GV-78-21 T15-15	50 /07 /7		::	00.0	90.0		40.0	0.17	2.70	6.12	100.01	0.9050	
24		I.MS.		77 56		26.0	9 0	9 6	0.52	80.0	3.07	5.18	66.66	0.9046	
		126-1265 tll5-13	1/28/86	77 58		9 9	0.0		0.00	7.0	2.70	9.5	100.00	0.9039	
56		T87-13	12/24/84			20.0	,00	90.0		21.0	2.36	5.87	100.00	0.9027	
		-I. T39-2					900	5 0	0.0	90.00	20.03		100.01	0.9016	
		FLV-75-FC T196-6	8/1/89	77.35		0.84	0.05	0.0		900	2.5	0 0	70.00	1106.0	
		HPDA-11.06 A 2 sh		76.10		1.15	0.05	0.03	0.47	0.0	2.87	2 4	00.00	0.9009	
				77.33		1.32	0.09	0.04	0.49	0.20	2.90	5.41	100.00	0.8998	
31		H	9/28/88	77.06		1.53	0.05	0.02	0.50	0.14	2.09	6.42	100.00	0.8993	
		H	2/24/88			0.58	0.05	0.08	0.42	0.09	2.59	6.33	66.66	0.8990	
	2372 080	T201-1	10/12/89			1.84	0.05	0.03	0.59	0.21	2.60	5.58	100.00	0.8989	
		nooin-100 1183-3	1/25/89	76.64	•	1.79	0.07	0.02	0.56	0.25	2.30	6.39	99.98	0.8979	
		F-07 - 10 - 21 - 07 - 07 - 07 - 07 - 07 - 07 - 07 - 0	00,100	76.91		1.19	0.02	0.03	0.49	0.10	3.01	2.62	100.00	0.8979	
		120 TA 1102-7	60/47/1	72.09	•	1:31	60.0	0.02	0.49	0.21	2.96	5.63	100.00	0.8977	
38		T190-5 FLV-121-WW	5/10/89	76.61	•	47.0	9 6	50.0	0.56	0.10	2.80	5.21	100.00	0.8975	
		08309-A (2) T201-1	10/13/89			9			75.0	3	2.63	07.0	00.00	0.8972	
		FLV-16-WW T146-4	8/25/87			0.75	0.02	0.05	0.49	10	90.		70.00	1769.0	
		T201-4			_	0.43	0.11	0.00	0.51	0.05	3.51	4.17	10001	0.8965	
2.0		IC FR	7	5 77.71	_	0.74	0.04	0.08	0.49	0.07	3.04	5.15	66.66	0.8959	
			2/28/89		_	0.81	0.04	0.04	0.49	0.08	3.04	5.82	66.66	0.8943	
	7730 FLV	T186	2/28/89		12.70	0.81	0.04	0.04	0.50	0.10	3.17	5.57	100.00	0.8940	
		201107 T14-8	12/12/85		12.35	1.51	0.02	0.05	0.51	0.11	3.16	5.31	100.00	0.8937	
		FLV-113-WW 1162-6	1/24/89		12.37	1.27	0.08	0.01	0.47	٦.	2.89	5.63	100.00	0.8931	
		FLV-111-FE FIDE:2	3730787		12.95	0.64	0.02	0.07	0.62	0.12	2.69	5.96	66.66	.893	
		030685068 STITCT FP T114-12			12.50	0.82	0.02	0.08	0.46	90.0	2.87	6.23	0	0.8914	
50 1	1854 FLV	T147-1	9/30/87	77.60	12.63	12.0	0.05	0.07	0.51	0.10	3.27	5.09	99.99	0.8911	
			,		16.40	70.0))	.o.0	0.56	0.10	2.89	2.66	100.001	0.8908	

of 50 closest matches for Sample Number	COMP. NO. 1902 Date		for elements: Na, Al SiO2 Al203 Fe203	Na, Al, Fe203	Sı, K Mgo	. Ca Mno	Date of CaO	Update: Ti02	2/12/90 Na20	K20	Total.R	Stm. Co
149111111111111111111111111111111111111	1	1 4 1 1	 			:		-			-	1 1 1 1 1
1902 E67-113 1856 T151-11	11/10/87	77.21	15.64	0.23	0.49	0.00		0.00	2.49	3,43	100.00	0000
1900	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	וח חחו	A 4776
1899 E67-13 1640 T151-2	11/10/87	75.86	•	0.23	0.69	0.02	0.46	0.00	2.78	3.59		
		76.93	14.04	1.46	0.03	0.01	•	0.10	3.62	3.29	חט טטו	
1740	4/22/87	77.25	13.45	1.26	0.15	0.08	•	0.21	3.59	3.47	100.02	0.8904
1461	1/27/86	77.50	13.01	1.32	0.02	0.04	0.49	0.12	•	S.08	100.00	N. AR32
FLV-148-CS	10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	וט. טטו	
1903 Eb7-113 1564	78/01/11	75.20	16.70	N	0.71	0.01	•	0.00	2.04	4.66	100.00	
1901	11/10/87	75.77	16.08	•	0.57	0.01	0.45	0.0	•	3.12	100.00	A7A
2371 E67-113 2178	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	חח. חחו	
1538	5/5/86	79.30	13.14	0.67	90.0	0.04	0.71	0.08	2.78	3.22	100.00	
12 209 LOCK-4, T41-3		77.42	13.05	0.88	0.05	0.04	0.50	0.10	4.52	3.45	100.001	
2120	10/28/88	77.13	13.06	0.92	0.05	0.07	0.52	60.0	2.76	5.39	99.99	
14 208 Lock-3, T41-2		77.38	13.02	0.83	90.0	0.05	0.52	0.12	4.57	3.45	100.001	
668	XX/XX/XX	;	12.27	1.29	90.0	5 6	5.4	0.18		4.1	7	1. HA 4H
207 LOCK-2. T-41-1	20.07.00	77.79	12.94	0.6	0.03	90	0.0	9 0			90	0.8691
436		76.02	14.41	69.0	0.13	0.08	0.53	0.05	4	3.90	100.00	O. BAB4
211		75.84	13.05	2.12	60.0	0.02	99.0	0.27	2.63	4.32	99.00	n. AKKn
17		76.05	14.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.8651
218		75.91	14.43	0.65	0.13	0.11	0.53	0.05	4.25	3.94	100,00	0.8649
1454	01/27/86	78.73	12.90	0.57	60.0	0.07	0.63	0.08	2.97	3.97	100.01	0.8635
1470 RABEK YB T115-6	1/27/86	78.72	12.90	0.57	0.09	0.02	0.63	0.08	2.97	3.98	100.01	0.8631
2140		78.26	12.59	1.01	0.08	0.03	0.55	0.04	3.70	3.72	100.02	0.8628
		78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.00	0.8623
051		70.55	13.38	1.26	0.04	0.00	0.56	0.11	2.72	5.38	100.00	0.8621
27 1542 CHV-3 T124-13	5/5/86	77.65	12.33	1.58	0.03	0.03	S	0.13	4.12	3.60	100.00	0.8604
4691	0073173	20.0	14.25	40.0	0.13	0.09	0.54	0.0	4.43	3.85	100.00	0.8601
1450	100/00/1	30.76	13.10	0.0	6.04	90.0	ď	0.08	4.40	3.51	100.00	0.8596
31 1106 61384-34 ASE TRO-7	1/28/83	78.00	12.70	16.0	900	90.0	2. c	0.1	2.67	5.68	100.00	0.8578
298	07/01/83	77.08	13.59			9 6	0.01	2 6	2.5	7.1.	100.01	0.8577
127		77.16	12.94	0.92	0.06	0.00	0.52	0.08	3.07	2	0000	0.850
134		77.10	12.88	0.92	0.04	0.05	0.51	0.08	3.04	5.38	100.00	0.8557
2131 CCPC-5.36		78.14	12.58	1.01	90.0	90.0	0.56	0.09	3.62	3.87	99.99	0.8555
1739	4/22/87	77.88	_	1.05	0.02	90.0	0.53	0.0	3.73	4.04	100.00	0.8545
		75.93	_	0.63	0.15	0.10	0.54	0.02	3.98	4.30	100.00	0.8537
36 IIIB 01484-47 ASW T83-6	10/12/84	77.53	٠,	0.83	0.10	0.05	0.57	0.08	4.38	3.50	100.00	0.8535
2321	6/1/89	70.73	12.00	1.72	5.0	0.0	20.0	51.0	9.78	5.36	100.01	0.8533
636	08/17/83	77.08	13.15	0	0.10		200		. A		100.00	0.8531
2147 SAFZ-5, T167-8, lo Ca		77.15	13.53	0.55	0.05	0	5.58	0.0	4.35		100.02	0.8517
GV-77-3, T15-11		77.13	12.78	0.91	90.0	0.07	0.52	0.08	3.01	5.44	100.00	0.8509
1442 03068506A SILICIC FR. T114-	12/12/85	77.71	12.67	0.74	0.04	0.08	0.49	0.02	3.04	5.15	66.66	0.8499
1145 15-VI-84-7 T85-7	_	77.41	12.97	0.86	0.10	90.0	0.58	0.09	4.40	3.51	96.66	0.8498
46 1165 ALT 3 T87-2	12/24/84	77.77	12.68	0.63	60.0	0.05	•	0.10	3.87	4.28	96.66	0.8497
336		77.99	12.51	7.0	9 6	500	0.5	9 5	7.80	5.21	100.00	0.8496
-	A/25/87	77 31	13 24	2,0	200	300	9	0.0	74.4	70.5	100.001	0.0490
625	09/02/83	77.88	12.39	1.20	0.02	0.0	0.53	0.04	3.76	4.11	100.00	0.8485

Listin C.	Listing of 50 closest matches for COMP C.No Sample Number	COMP. NO. 1902 Date	for el S102	A1203	for elements: Na, Al, S102 Al203 Fe203	S1, K Mq0	, Ca,	Fe Date CaO	of Upd Ti02	of Update: 2/12/90 TiO2 Na20 K20		Total.R		٤
:		1 1 1 1 1 1	:			1			!			!		
	902 E67-113 1856 T151-11	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	0	9 40	43	000		
	1899 E67-13 1640 T151-2	11/10/87	75.86	16.37	0.23	0.69	0.02	9 9				100.00		٠.
		11/10/87	76.81	15.88	0.30	0.59	0.01	0.48		2 . Y			C 46 C	
		11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4		0 0034	,
5 23	FLV-148-CS T201-4	10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	100.01	n. 8239	, σ
	1901 E67-113 2178 T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.0	3.58	3.12	100.00	O. RISK	æ
•	151-1	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.0	3.58	3.12	100.00	n. 8156	·c
	115 GV-70-6, II.6-12 1464 Dabev vo mise-4	30, 50, 10	78.03	12.88	0.46	0.03	0.03	0.45	0.11	2.48	5.53	100.001	D. RO14	σ
		11727786	78.73	12.90	0.57	60.0	0.02	0.63	0.08	2.97	3.47	100.001	n.7RKA	Œ
•	CM-ACH-14 TEK-7	03/10/100	72.97	12.90	0.57	60.0	0.07	0.63	0.08	2.97	3.98	100.001	0.7A65	ç
12 15		58/10//0	90.77	13.59	0.54	0.10	90.0	0.54	0.08	3.95	4.07	וח.חחו	N.7851	_
		01/28/86	78.30	13.14	0.67	90.0	0.0	0.71	0.08	2.78	3.22	100.00	0.7850	_
,			76.97	14.04	* * *	1 6	9.0	6.00	0.10	3.36	4.16	99.99	n.7An	_
	BF-4. T28-7		76.05	14.04	9.4	3 .	5 6	0.52	0.10	3.62	3.29	100.00	0.7744	0
	218 MILLVILLE-5, T28-3		75.03	14.54	9.0	? .	3:	20.0	0.04	4 .04	5.15	טט טטר		đ
			77. 15	20.00	6.00	0.13	0.11	0.53	0.05	4.25	3.94	100.00	n.7747	_
18	4-2524 T40-7		61.//	20.21	0.00	2.5	50.0	0.58	0.08	4.35	3.64	100.02	0.7794	•
	2-0-1 (W17.7 + 00.0		70.07	14.41	60.0	0.13	0.08	0.53	0.05	4.19	3.90	חם. מס נ	0.7742	٠.
	1740 BDICE-3 12.196-7	2010014	40.6	14.25	0.64	0.13	0.0	0.54	90.0	4.43	3.82	100.00	0.7766	ے
		/0/77/1	7	14.40	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02		ď
		00/1/1/00	76.95	12.50	20.0	0.12	0.10	0.54	0.05	3.98	4.30	100.00	n 7723	۳.
•		20 /17 /20	72.27	12.30	, ,	20.0	9 0	9.50	0.07	2.47	6.75	100.01	A177.0	a
24.0	200 TOCK 2, 141-2		27.10	13.02	28.0	9.0	0.0	0.52	0.12	4.57	3.45	100.00	0.7712	
_	51 U-30-EU 7147	20,00,0	76.//	13.05	98.0	0.05	0.0	0.50	0.10	4.52	3.45	100.01	0.769A	œ
•		18/05/6	79.10	12.71	0.54 0.04	0.05	0.08	0.42	0.10	2.15	4.79	100.00	n.7695	ی
_	1165 Atm 3 #87-2	10/04/04	77.73	12.94	0.85	9.05	0.05	0.51	0.08	4.42	3.30	66.66	0.7693	۳.
28		08/26/83	77.7	12.00	200	500	9.0	0.51	0.10	3.87	4.28	99.98	0.76R9	σ.
	CRAW-88-3H T176-5	10/27/88	76.037	12.53		5 6	6:		80.0	4.17	3.53	100.00	0.76RA	oc i
	NH-5 T155	5/15/88	77.56	13.10	72.0		100	0.01	90.0	7.07	•	7	0.7477	
		10/11/84	78.09	12.58	0.73	0.08	0.0		900	200	7.7		0 7672	
		10/28/88	77.13	13.06	0.92	0.05	0.02	0.52	60.0	2.76	5.39	99	0.7672	٠,
		3/1/85	77.64	12.84	0.64	0.08	0.05	0.50	0.10	3.86	4.28	99.99	0 7669	a
		1/27/86	77.50	13.01	1.32	0.07	0.04	0.49	0.12	2.37	5.08	100.00	0.7650	_
35 1898	98 E67-113 1543 T151-1	11/10/87	74.47	17.18	0.10	0.82	0.0	0.28	0.03	2.46	4.64	100.02	0.7643	~
	ALT 2A	69/1/9	78.32	12.39	0.73	0.10	0.05	0.53	60.0	3.20	4.59	100.00	0.7636	می
		BB/47/71	77.69	12.55	0.65	90.0	0.02	0.50	0.10	. 61	4.27	טט. טטו	ก. 761 ล	. س
=		0/36/07	77.00	13.00	9.0		20.0	55.0	60.0	3.45	5.22	100.00	0.7611	_
		10/57/0	75.79	13.64	7.0		9 6	9.0	9 6	3.76		100.00	0.7607	
Ä			77.56	12.63			9.0	5.50			, 0	90.00	7,697	
-	03068506A SILICIC FR.	12/12/85	77.71	12.67	0.74	0.04	0.08	0.49	0.07	3.04	5	00 00	0.7601	
	LM-2		77.99	12.51	0.74	0.06	0.03	0.56	0.10	2.80	5.21	100.00	0.759	
	SALTON-2A,		77.84	12.72	69.0	0.03	0.03	0.48	0.07	4.41	3.75	100.00	n. 7598	œ
	FLV-34-WW	9/30/87	76.85	12.93	0.62	90.0	90.0	0.62	0.10	2.52	6.22	100.001	0.7542	_
~		9/30/87	77.58	12.69	09.0	90.0	0.07	0.49	0.10	3.76	4.65	100.00	N.7584	
47 3			77.94	12.65	0.76	0.02	0.03	0.48	0.05	4.47	3.61	וח הסו	0.75A4	
0		11/25/86	77.63	12.49	0.61	0.07	0.07	0.49	0.09	3.21	5.35	100.001	0.7580	٠,
49 1854 50 1118	54 FLV-25-WW T147-1 18 61484-47 ASH T83-6	9/30/87	77.60	12.45	0.61	0.07	0.07	0.56	0.10	2.89	3.66		0.7577	.
;		F0/77/01	70.77	74.30	20.0	2.5		٠.٥	5.5	07.5	90.7			•

Listi	matches tor	COMP. NO. 1902		ements:	for elements: Na, My,	•	, ¥	Ca Date	of Upd	ate: 2/	12/90		
י כ	C.No Sample Number	Date	5102	A1203	Fe203	Mgo	Mno	CaO	T102	T102 Na20 K20		Total, R	Sim. Co
			!					•		1	1		
-	E67-113 1856 T151-11	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	0.00	2.49	3.43	100	0000
	E67-113 1640	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.03	0.9489
		11/10/87	75.86	16.37	0.23	69.0	0.02	0.46	0.00	2.78	3.59	100.00	0.9002
	1901 E67-113 2178 T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	0.8737
	E67-113 2178 TIS1-1	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3,12	100.00	0.8737
			75.79	14.88	0.11	0.49	0.01	96.0	0.01	2.43	5.32	100.00	0.8475
	E67-113 1	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.00	0.8463
		4/22/87	77.25	13.45	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02	0.7931
_		11/10/87	74.47	17.18	0.10	0.85	0.01	0.28	0.03	2.46	4.64	100.02	0.7879
			73.87	15.54	2.03	0.36	0.07	1.73		3.01	3.11	100.00	0.7856
		12/4/84	71.71	14.91	2.26	0.51	0.09	1.50		5.05	3.46	99,99	0.7779
12 1		07/02/85	72.17	14.51	2.63	0.49	0.05	1.73		4.64	3.31	100.00	0.7765
	ASW-6985-2 7	08/26/85	71.17	15.46	2.49	0.53	0.07	1.69	0.42	4.77	3.40	100.00	0.7750
•		10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	100.01	0.7721
			74.92	13.02	2.25	0.41	0.03	1.26	0.49	4.11	3.51	100.00	0.7712
91	2374 PU-17 T201-2	10/12/89	77.09	13.55	1.31	0.19	0.04	0.84	0.25	3.20	3.53	100	0 7683
			76.02	14.41	69.0	0.13	90.0	0.53	0.05	4.19	3.90	100.00	0.7679
-		7/28/84	72.85	14.66	1.98	0.42	0.02	1.61	0.41	4.56	3.43	00	0.7660
			76.05	14.34	0.65	0.13	90.0	0.52	0.04	4.04	4.15	100.00	0.2651
		9/19/86	72.88	13.84	2.42	0.50	0.08	1.52	0.54	4.97	3.24	00 00	0.7650
	218 MILLVILLE-5, T28-3		75.91	14.43	0.65	0.13	0.11	0.53	0.05	20.2	0	66.00	26.00
		9/19/86	72.25	14.12	2.30	0.47	0.11	1.15	0.53	2.00	4.06	99.99	0.7640
			76.93	14.04	1.46	0.03	0.01	0.52	0.10	3.62	3.29	100.00	0.7638
		10/21/86	73.84	13.96	2.26	0.45	0.04	2.10	0.28	3.89	3.19	100.01	0.7634
			70.05	15.05	3.43	0.50	0.07	1.68	0.49	5.42	3.31	100.00	0.7629
9 5			72.38	14.56	2.49	0.50	0.05	1.80	0.49	4.62	3.11	100.00	0.7629
•	1113 CADRAS III.2-4	10/22/85	73.18	15.21	2.63	4	0.07	1.87	0.37	3.55	5.69	100.01	0.7628
			72.38	14.74	2.38	49	0.03	1.77	0.49	4.71	3.01	8	0.7624
			72.63	14.47	2.41		0.05	1.80	0.49	4.52	3.11		0.7613
	887 CB-15		2.0	14.25	49.0	0.13	0.09	0.54	90.0	4.43	3.85	8	0.7610
32 15		7/19/86	75.50	10000	7.18		0.04	1.57	0.44	4.61	3.41		0.7606
33 16		8/25/82	30.5	16.30	200		0.04 0.04	1.49	2.17	3.74	5.69		0.7604
34 14		1/27/86	77 50	12.02	2.30	9.00	50.0	2.15	0.29	3.72	3.15	99.99	0.7599
35 12		5/3/86	77.30	13.01	1.32		0.04 0.04	0.49	0.12	2.37	5.08	100.00	0.7598
		60.77	72.70	77.77	7.51	0.51	90.0	1.74	0.45	4.88	3.25	66.66	0.7592
			74 22	13.10	2.20		50.03	1.97	0.35	4.23	2.80	100.00	0.7591
	862 LM-18		75.67	13.93	7.10	9.48	9.0	1.87	0.43	4.01	2.81	100.00	0.7575
39 20		10/2/88	73.41	14.61	1.61		9 6	1.61	0.13	3.01	3.41	66.66	0.7575
40 15		7/17/86	77.19	13.50	7	2 5	5 6	90.7	97.0	3.95	3.10	100.00	0.7574
41 23		8/7/89	72 25	14.56					0.20	3.19	3.26	66.66	0.7568
7			70.22	14.85	2 . J.	***	36	1.68	0.53	4.66	3,18	100.01	0.7565
		8/26/85	74.24	13.05			5.0		0.50	5.52	3.21	100.001	0.7565
	324-M-RT T76-2	7/28/84	71 86	90.41			70.		0.64	3.43		100.02	0.7561
			75.48	14 53			01.0		0.44	4.77		100.00	0.7557
	ASW-61085-15	9/23/85	77.69	12.40			0.0		0.29	2.81	3.01	100.00	0.7554
		_	77.31	13.35		200	300		51. 0	 	80.0	100.01	0.7554
_	M7610 T124-7	5/5/86	73.36	14.56			0.03	0 0	90.0	7.7	200	100.00	0.7553
מו היי	515 MOD-4 (2) (373) T119-14	4/28/86	74.85	14.90	1.26	39	0.12	م د	0.12	3.59	200	99.99	7552
5	2		72.30	14.54	2.46	25	0.05	1.80	0.50	4.71	3.11	99.99	0.7545

VI. Last	Ling (Wilisting of 50 closest matches for COMP, No. C.No Sample Number	. No. 1901 Date	for	elements:	Na, Al,	Si, Ca	Date	of Upda	of Update: 2/12/90	2/90	Š		i
					•					7011		27	. I	31 . E.S
	1901		11/10/87	75.77	16.08	0.45	0.57	0.01		0.00	Š	3.12	100.00	1.0000
	2371	E67-113 2178 T151-12	11/10/87	75.77	16.08	0.45	u.57	0.01		0.00	3.58	3.12		1.0000
า ช	201	1187-6 103-8 10-70 T2 4	5/8/89	76.09	13.16	96.0	0.02	0.03	0.41	90.0	3.57	5.69	99.99	•
·v	41	BT-11D2, T13-13		77.17	13,13	0.76	0.0	500		9.0	3. ve	77.4	00.00	0.9402
•	719			77.20	12.92	62.0	0.04	0.04		0.02	3.60	6.6		0 0200
	293			77.29	12.84	0.73	0.03	0.02	0.42	0.07	3.68	4.91	66.66	
89	1897	E	11/9/87	77.17	12.92	0.56	0.04	0.10	0.42	0.07	3.45	5.28	100.001	
	2004		19-JUL-8	77.24	12.73	0.77	0.03	0.05	0.41	0.07	3.58	5.12	Ç	0.9372
2 :	67 (77.84	12.73	0.77	0.03	0.05	0.45	90.0	3.52	4.57	99.99	•
12	2006	TECO-10, T17-1 FLV-56-CS T166.6	7/19/99	76.77	13.09	0.78	9.0	0.03	0.42	9.08	3.78	•	100.00	٠
	375	4	00.61	77.09	12.90	3		9 6	7.0	90.0	3.72	4.92	100.00	0.6355
	2005		7/19/88	77.07	12.89	0.73	0.03	0.02	0.41	0.02	3.66		100	
15	268	PICO-14, T1, N-ASW-64, P		77.15	12.67	0.83	0.04	0.10	0.43	0.07	3.55	5.16	_	
	380			76.58	13.07	0.76	0.03	0.03	4	0.02	3.65	5.37	100.00	0.9344
	2375	FLV-136-WP	10/12/89	77.63	12.74	0.72	0.03	0.03	4	0.05	3.61	4.75	99.99	0.9342
	1940		4/30/88	76.78	12.47	1.48	0.03	0.03	0.43	0.12	3.60	5.07	100.01	0.9334
A C	3 2	BI-IICI, TI3-10		77.71	12.59	0.72	0.03	0.04	₩.	90.0	3.67	4.76	100.00	ċ
	1865		20,00,00	70.84	13.16	0.74	9.0	90.0	er .	0.07	3.56	5.08	100.00	ċ
	27		1970576	77.53	12.65	0.00		50.0	2.4		9.6	4.76	90.08	0.9327
	1772		5/27/87	77.84	12.60	0.72	0.05	0.0		0.00	3.62	6.4	2 5	0 9307
	1166		12/24/84	77.26	12.68	0.76	0.04	0.05		90.0	3.67	2	_	0.9302
52	2194		1/24/89	77.63	12.95	0.70	0.02	0.02	•	90.0	3.72	4.45	•	0.9301
26	288			77.01	12.81	0.73	0.03	0.04	4	0.07	3.81	5.07		0.9300
	663		08/26/83	77.64	12.67	0.74	0.03	0.03	•	0.07	3.66	4.73		0.9297
	1167	WEB-3 TB7-12 FIU-43-CC T170-0	12/24/84	77.41	12.52	0.76	0.0	0.05	•	90.0	3.52	5.2	99.98	0.4242
308	36.	BT-11A1, T13-6	3/3/88	77.55	12.72	90.0	500	90.0	0.43	9.0	3.77	5.23	10.001	0.4242
	1732	CHT-3 T137-13	4/21/87	77.55	12.62	0.75	0.05	0.05	. 4	0.00	3.67	4.86	100.02	: c
	295	PICO-152, T39-1		76.98	12.97	0.79	0.03	90.0	0.42	0.05	3.89	4. AO		Ċ
33	384	TEC0-29, T17-6		76.68	13.12	0.81	0.04	0.04	0.43	0.07	3.85	4.96	_	
9°	387	TECO-308-2, T17-9		76.88	13.08	0.74	0.03	0.04	0.44	0.07	3.75	4.9R	נט. טטנ	N 9271
5 6	382	TECO-28A, T17-4		76.74	13.09	0.81	0.03	0.04	0.43	0.06	3.85	4.94	99.99	0.4270
37	200	DICO-143, T36-4		76.45	12.91	0.75	50.0		2 4		9 6	A. 4.	90.00	0.9262
38	374	TECO-6, T14-1		77.47	12.84	0.73	0.03	0.0	0.41	0.05	3.76	4.67	100.00	0.9262
39	383	TECO-28B, T17-5		77.00	12.89	0.75	0.04	0.03	0.43	90.0	3.80	5.00	100.00	1926.0
	1730		4/21/87	77.44	12.50	0.80	0.05	90.0	4	0.04	3.69	4.99	100.00	•
	2278		5/10/89	74.55	13.45	1.17	0.07	0.10	0.37	0.19	3.58	6.52	100.00	0.9253
42	271	PICO-23, T2-11		77.28	12.87	0.77	0.04	0.05	0.42	0.07	3.89	4.61	100.00	0.0249
4.	9	BT-11D1, T13-12	30/0/6	77.47	12.75	0.74	0.03	0.0	0.41	5.0	97.6	5 . 70 2 . 70	100.00	0.4740
	662	BT-1C, T62-10	08/26/83	77.47	12.75	0.73	0.03	0.03	0.43	0.07	3.77	4.72	100.00	0.9243
46	442	63CJ-26(1), T1, N-ASW-2, P		77.37	12.69	0.73	0.04	0.05	4	0.08	3.60	4.99	100.00	0.9241
	30			77.95	12.25	0.71	0.03	0.05	0.41	90.0	3.53	5.00	99.99	0.9240
	1032		6/22/84	77.31	12.55	0.67	0.04	0.0	4	90.0	3,65	5.29	100.01	
4	1894	¥JC-1-87 T1	11/9/87	77.28	12.91	0.73	0.0	0.05	0.44	0.07	3.74	4.75	100.01	0.9238
	2007		00/61//	****	17.71	.07	70.0		*	5	2.07	, ,	77.70	

Listi	Listing of C.No S	ing of 50 closest	matches	tor COMP.	NO. 1901 Date	for e.	elements:	Na, Al,	S1, K	S. K.	Date of	Update:	2/12/90	\$		
, ,				1					- !			7071	Make .	K20	Total, K	SIM. CO
															ı	
-		E67-113 2178	T151-12	-	1/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	1.0000
		£67-113 2178	Ŋ	-	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.0	3.58	3.12	100.00	1.0000
		758-354H, T16-15, lo	30	total		76.93	14.04	1.46	0.03	0.01	0.52	0.10	3.62	3.29	100.00	0.9206
		E67-13 1640 T151-2	T151-2	-	1/10/87	75.86	16.37	0.23	0.69	0.05	0.46	0.00	2.78	3.59	100.00	0.9080
		E	14	•	4/22/87	4.	12.78	99.0	0.07	90.0	0.42	0.10	4.53	2.94	66.66	0.8987
9		C)	T-136-7	•	4/22/87	77.25	13.45	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02	0.8927
			2-5	7	//19/88	77.75	12.93	09.0	0.05	90.0	4	0.12	4.35	3.72	100.00	0.8881
3 0 (PICO-76, T36-6	۰ ص			76.92	12.92	0.76	0.03	0.05	0.40	0.05	4.16	3.72	99.01	0.8880
D		PICO-74, T36-5	'n			76.55	12.99	0.74	0.03	0.04	0.45	0.02	4.12	4.05	99.01	0.8874
		BT-1C, T13-5				77.84	12.73	0.77	0.03	0.02	0.45	90.0	3.52	4.57	66.66	0.8862
		PICO-40A, T8-7				77.94	12.89	0.81	0.04	0.03	0.45	0.05	3.85	3.97	100.00	0.8860
		BT-11DZ, T13-13	. 53	•		77.17	13.13	0.76	0.05	0.04	0.45	0.05	3.73	4.66	œ.	0.8855
	3 5617	_	82-1	-	1/24/89	77.63	12.95	0.70	0.05	0.02	0.43	90.0	3.72	4.45	96.66	0.8843
7 4		J62-22-3 DICO-143 T24-4	T-136-11	4	/22/87	78.75	12.53	0.63	90.0	90.0	0.41	0.08	4.59	2.88	66.66	0.8841
_		F1CU-143, 130-4 F67-113 1640 (2) T15	(2) 4151-2	•	79/01/11	76.43	16.31	9.79	2.0	0.0	0.42	90.0	3,93	4.43	99.01	0.8818
		PICO-78(3) T36-7		4	10 101 11	76.61	90.01	200	60.0	70.0	0.48	0.01	2.41	3.52	100.01	0.8817
		SAFZ-4 T167-7		2	7/19/88	78.09	12 61	2.72	5.0	5 6	2.6	20.0	4.13	4.16	99.01	0.8812
			•	•	00/61/	9 6	16.21	70.0	0.00	BO: 0	0.37	60.0	4.66	3.19	100.00	0.8801
		IMOS1A T141-14	14	ď	6122182	11.11	72.70	5.73	50.0	0.04	0.42	0.07	3.80	4.50	100.00	0.8801
		I.D-70 T3 4	•	ו	101171		77.00	27.0	0.05	0.04	0.43	0.08	3.62	4.62	100.00	0.8796
22 2		•	T201-3		98/61/01	77.62	12.31	9.79	200	0.0	0.43	0.07	3,58	4.93	100.01	0.8787
				•	60 /31 /0	77 20	1000	7.00	3 6	50.0	0.43	0.05	3.61	4.75	66.66	0.8787
		T-11C1, T13-	10			77.71	12.50	0.73			6.43	0.00	9.60	4.91	100.00	0.8783
_		NH-5 T155-8		S	5/15/88	77.56	13,10	0.75	9 0		0.42	90.0	20.5	3.76	100.00	0.8778
		PICO-41A. T8-8	•			77.38	12.94	0.73				0.0		70.0	100.00	0.8775
	293 P	PICO-141, T39-7	2			77.29	12.84	0.73	0.03	0.00	7.4	.00	10.6	,	7	0.8775
28 11			6 7-10	6	9/30/87	77.47	12.83	0.58	0.05	0.0	0.43	0.11	3.66	•	90.00	0 0773
		FLV-148-CS T2		Ā	10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	נטייטטר	0.8772
			Fe av. 8			78.80	12.84	0.60	0.05	0.07	0.39	0.08	4.42	2.76	100.001	0.8766
-	1902 EC	E67-113 1856	T151-11	-	11/10/87	77.21	15.64	0.23	0.49	0.00	0.51	0.00	2.49	3.43	100.00	0.8765
, ,	_	10007A T102-1		•		77.97	11.42	1.78	0.13	0.03	0.44	0.51	3.71	4.01	100.001	n.8759
		BT-2, T62-15	•	ōč	671/83	78.35	12.32	0.75	0.04	0.05	0.43	0.05	4.37	3.67	100.00	n A759
		PICO-23, T2-11		5		77 20	12.07	7.0	50.0	0.03	0.43	0.07	3.66	4.73	100.001	0.8757
36		TECO-7, T14-2				77.09	12.90	. 6		9 6	2.0) o		4.	100.00	n. A756
		P-100, T22-4				77.78	12.86	0.75	0.03	0.05	0.45			20.0		A7.45 0.00 0.00 0.00
		8				77.53	12.65	0.74	0.03	0.04	0.42	0.06	3.71	4.81	00	0.8755
	11 9002	FLV-56-CS T1	,	-	7/19/88	77.18	12.83	0.77	0.04	90.0	0.42	90.0	3.72		100.00	0.8752
		FLESC-S.41 IO F. 10	e 10 10 10 10 10 10 10 10 10 10 10 10 10	ر •		78.83	12.71	0.59	0.04	0.05	•	0.05	4.55	2.76	99.98	0.8751
		TECO=6 - 114-1	1-00	Ň	68/87/7	77.74	12.66	0.75	0.05	0.04	0.43	0.07	3.79	4.51	100.001	N. A75N
. 6		BT-1. T2-13				7	12.84	0.73	0.03	0.04	•	0.05	3.76	4.67	100.00	0.8746
		ARCH-88-1 T172	12-1	à	00/00/00	35.11	16.21	9.0	50.0	0.03	•	0.05	3.85	4.57	99.99	0.8744
		TECO-10, T17-1	•	ñ		76.00	12.73	0.74 0.74	9.0	0.03	•	0.02	3.87	4.44	100.001	
		PICO-43, T36-3				76.07	13.03	9.0		50.0	0.42	0.08	3.78	5.0	100.00	N A742
		BT-11A1, T13-6				77 55	12.30	5,0	50.0	0.03	0.47	0.05	3.93	4.02	99.01	0.8738
		J82-22-4 T-136-12	16-12	4	4/22/87	78.84	12.58	0.0		200		9.0	3.69	4.78	99.99	0.8735
		HPDA-11.06 10Fe, Ca	e, Ca 4sh	i		78.27	12.98	0.58	0.0	0.07	0.36	0.00	40.4	2. H.Z	00.00	0 8728
20	337 SA	SALTON-2, T2-14	₹.			77.55	12.98	0.76	0.04	0.05	0.46	0.07	4.48	3.60	99.99	n 8726

Listing of 50 closest matches for COMI	COMP. NO. 1901 Date	•	for elements: SiO2 Al203	Na, Al, Fe203	Si, K	Mno.	Fe Date CaO	of Upd T102	of Update: 2/12/90 TiO2 Na20 K20		Total, R	Sim. Co
							; ; ; ;	! !				1 1 1 1 1
1901	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.50	3.12	100.00	1,6000
2371	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100,00	1.0000
FLV- 148-C	10/12/89	77.47	13.76	0.43	0.11	0.00	0.51	0.05	3.51	4.17	10.001	0.8903
2013 SAFZ-2	7/19/88	77.75	12.93	0.60	0.05	90.0	0.42	0.12	4.35	3.72	100.00	0.8651
2015 SAFZ-4	7/19/88	78.08	12.91	0.57	0.05	0.08	0.37	0.09	4.66	3.19	100.00	0.8650
7701	/B/77/6	78.43	12.78	99.0	0.07	90.0	0.45	0.10	4.53	2.94	99.99	0.8625
	78/05/6	77.47	12.83	0.58	0.05	0.0	0.43	0.11	3.66	4.76	99.98	0.8604
1001	CB/67/C	77.20	12.87	5. S	0	60.0	0.43	0.09	4.03	4.70	66.66	0.8573
/601	11/9/87	77.17	12.92	0.56	Ó	0.10	0.42	0.07	3.45	5.28	100.001	0.8573
2146 HPDA-11.06 10Fe, Ca 48h		78.27	12.98	0.58	0.04	0.07	•	0.08	4.63	2.99	100.00	856
11 2130 FLGSC-5.41 TO Fe 10 Ca 3 Sh		78.83	12.71	0.59	0.04	0.05	•	0.05	4.55	2.76	96.66	0.8564
	4/22/87	78.75	12.53	0.63	90.0	0.06	•	0.08	4.59	2.88	66.66	955
		78.80	12.64	0.60	0.05	0.07	•	0.08	4.45	2.76	100.001	0.8555
	4/77/8/	78.84	12.58	0.60	0.06	0.07	0.39	0.10	4.54	2.85	100.00	0.8524
_	6//01/83	20.75	13.09	6.54	0.10	90.0	0.54	0.08	3.95	4.07	100.01	0.8520
1050 TEN-3-C0 (3):21M/ 110	99/77/6	79.07	12.00	0.55	0.02	0.07	٠	0.0%	3.64	5.15	100.00	0.8502
2062	CD/67/C	36.77	12.96	95.0	0.05	60.0	0.42	60.0	4.22	4.54	100.001	0.8501
1452 106 CUOCOVOR 66-2 B115	97.57.88	10.07	17.94	95.0		60.0	0.43	90.0	3.77	5.23	a	0.8482
	01/26/86	76.24	12.84	4.0	0.11	0.09	•	0.10	3.36	4.16	99.99	0.8466
1249 TLN-1 T96-8	5/20/85	77. 28	12.26	25.0	60.0	5 6	: •	10.0	2.41	3.52	100.01	0.8459
2194	1/24/89	77.63	12.05		5.0	5 6		900	4.0		100.02	0.8454
1252	5/20/85	77 26	20.01		20.0		•	90.0	3.76		95.66	•
24 1899 E67-13 1640 T151-2	11/10/87	75.86	16.37	0.23	69.0	0.0	. 4				10001	0.6421
1671	10/21/86	77.45	12.68		0.05	0.06		20.0	37.5	; a	00.00	0150
2001	5/22/88	77.54	12.80	0.61	0.01	90.0	0.45	0.05		4.63	100.00	0.0414
1529 85-G-54 T113-2	10/22/85	77.45	12.65	0.57	90.0	90.0	0.38	0.0	3.69	5.05	100.00	0.8412
2147		77.15	13.53	0.55	0.05	0.09	S	0.08	4.35	3.64	100.02	0.8410
		76.55	12.99	0.74	0.03	0.04	0.42	0.07	4.12	4.05	99.01	0.8408
281		76.92	12.92	0.76	0.03	0.05	0.40	0.05	4.16	3.72	99.01	0.8387
31 284 PICO-78(3), T36-7		76.59	12.86	0.72	0.04	0.04	0.42	0.05	4.13	4.16	99.01	0.8385
1716	2016614	76.05	14.34	0.65	0.13	0.08	0.52	0.04	4.04	4.15	100.00	0.8377
1772	5/27/87	77.90	12.39	0.08	0.0	9.50	0.36	0.05	3.79	4.51	66.66	0.8374
34 BT-118	10/17/6	20.//	00.21	7.7	0.00	5.0	5.43	90.0	3.62	4.62	100.00	0.8372
		77.17	13.13	20.0	3 6		24.0	90.0	20.0	4.78	66.66	0.8367
2375 FLV-136-WP T2	10/12/89	77.63	12.74	0.72	0.03	0.03	4.0		7	4.75	90.00	0.0300
38 953 DR-66		77.71	12.70	0.73	0.03	0.04	0.42	0.07	3.80	4.50	100.00	0.8361
1715	4/23/87	77.70	12.69	0.62	90.0	0.09	0.38	0.07	3.81	4.58	100.00	0.8360
53		77.84	12.73	0.77	0.03	0.05	0.42	90.0	3.52	4.57	66.66	0.8359
		75.91	14.43	0.65	0.13	0.11	0.53	0.05	4.25	3.94	100.00	0.8358
38 BT-11C1, T13-10		77.71	12.59	0.72	0.03	0.04	0.42	90.0	3.67	4.76	100.00	0.8357
1989	5/22/88	77.93	12.32	09.0	0.05	90.0	0.46	0.11	3.77	4.71	100.01	0.8356
44 1868 FLV-40-WW T147-14 AC 1644 ETU-22-UU M142 11	9/30/87	77.97	12.55	0.55	0.04	0.10	ຕ	0.09	3.78	ŝ	66.66	0.8350
200	78/05/6	7.74	12.65	0.55	0.05	90.0	0.40	0.09	3.17	5.28	100.01	0.8347
599	07/01/83	26.07	12.35	0.03	71.0	0.10	6.0	50.0	3.98	i.	100.00	0.8346
276	2017	77.38	12.94	0.03	0.03	0.0	2,47	0.1.0	4.35 0.50	20.4	00.00	0.8345
49 293 PICO-141, T39-7		77.29	12.84		0.03	0.00	42	20.0	9.6	? 0	00.00	0.0340
	6/1/89	78.43	12.39	0.64	90.0	0.05	0.40	0.09	3.33	4.59	99.98	0.8337

ist	ing o	isting of 50 closest matches	Losest	for	COMP. NO. 1901	for el	ements:	for elements: Na, Mg, Al, S1,	A1, S1,	Ч	Ca Date	ō	Update: 2/12/90	12/90			
- '	C. R	Sample	Aumber		Date	5102	A1203	Fe203	M _q 0	Muo	CaO	Ţ	Na 20		Total.R	Sim. Co	
									!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	!		!		1 1 1 1 1 1	1		
		E67-113 2178		T151-12	11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	0.00	3.58	3.12	100.00	1.0000	
			2178		11/10/87	75.77	16.08	0.45	0.57	0.01	0.42	00.00	3.58	3.12	100.00	1.0000	
m			1640 (2) T151-2	11/10/87	76.81	15.88	0.30	0.59	0.01	0.48	0.01	2.41	3.52	100.001	0.8958	
		E67-13 1640	1640 1	T151-2	11/10/87	75.86	16.37	0.23	•	0.02	0.46	0.00	2.78	3.59	100.00	0.8943	
		E67-113 1856 T151-11	1856	T151-11	11/10/87	77.21	15.64	0.23		0.00	0.51	00.0	2.49	3,43	100.00	N. 8737	
		FLV-17-WW T146-5	₩ T14	9-9	8/25/87	71.88	15.85	2.30	•	0.05	2.15	0.29	3.72	3.15	99.99	0.8388	
		E67-113 1564 T151-3	1564	T151-3	11/10/87	75.20	16.70	0.21	0.71	0.01	0.47	0.00	2.04	4.66	100.001	0.8152	
		FLV-108-WW		T196-2	8/1/89	72.25	14.56	2.54	0.54	0.02	1.68	0.53	4.66	3.18	100.001	0.8010	
σ.		DR-68M				72.31	15.24	2.48	0.57	90.0	1.94	0.47	4.33	2.61	99.99	0.7976	
		CB-8				72.63	14.47	2.41	0.51	0.05	1.80	0.49	4.52	3.11	99.99	0.7959	
		MADRAS T112-4	r112-4		10/22/85	73.18	15.21	2.63	0.44	0.07	1.87	0.37	3.55	5.69	100.01	0.7937	
12		CB-9				72.30	14.54	2.46	0.52	0.05	1.80	0.50	4.71	3.11	99.99	0.7935	
		57H(2), T59-A4 (not o	T59-A4	(not org oxda)	xx/xx/xx	72.15	14.90	2.35	0.53	0.04	1.83	0.44	4.75	3.01	100.001	N.792A	
		MOD-4 (2	2) (373	1) T119-14	4/28/86	74.85	14.90	1.26	0.39	0.12	1.86	0.12	3.59	2.90	99.99	0.7419	
		RUSH CR-1 T133-2	-1 TI	3-2	10/21/86	71.66	14.65	2.76	0.62	0.08	1.71	0.64	4.57	3.31	100.00	n.7913	
		ASW-6985-2 T103-2 8el	3-2 T10	13-2 8el	08/26/85	71.17	15.46	2.49	0.53	0.07	1.69	0.42	4.77	3.40	100.00	0.7912	
17		CB-7				72.38	14.56	2.49	0.50	0.05	1.80	0.49	4.62	3.11	100.00	0.7905	
18		57H(1), T55-3 (not or	T55-3	(not orig oxida)	xx/xx/xx	71.59	15.64	2.90	0.71	0.07	2.45	0.44	3.45	2.75	100.00	0.7895	
		RBW-80-133C, MSH6-1	1330, 1	ISH6-1		72.70	15.16	2.26	0.50	0.03	1.97	0.35	4.23	2.80	100.00	D.7894	
		PF-88-E T169-2	T169-	ij	10/2/88	73.41	14.61	2.14	0.43	0.04	2.06	0.26	3.95	3.10	100.00	0.7893	
		PAOH-3(A) T132-15	U TIE	12-15	10/21/86	73.84	13.96	2.26	0.45	0.04	2.10	0.28	3.89	3.19	100.001	N.7884	
		ASW 61186-5C T129-1	3e-sc	T129-1	8/19/86	71.11	15.43	3.27	0.52	0.13	1.41	0.56	4.82	2.74	99.99	n.78R2	
		WA 9-F T127-6	T127-6		7/18/86	75.57	12.38	1.43	0.49	0.04	1.49	2.17	3.74	5.69	100.001	0.7880	
		B7-1/2-TM1-Z2 T104-2	CH1-22	T104-2	8/56/85	72.51	13.42	3.12	0.59	0.03	1.96	0.71	3.67	4.00	100.001	0.7879	
		BRICE-2 T-136-7	T-13	16-7	4/22/87	77.25	13.45	1.26	0.15	0.08	0.56	0.21	3.59	3.47	100.02	N.7878	
			L ASM 1	181-12	9/4/84	70.95	14.70	3.20	0.56	0.10	1.82	0.55	3.94	4.16	99.98	0.7871	
			1-9A	T86-8	12/4/84	71.75	14.69	2.57	0.63	90.0	2.17	0.46	4.26	3.41	100.00	0.7857	
		M7810 T124-7	1124-7		5/5/86	73.36	14.56	2.19	0.44	0.03	2.08	0.26	4.03	3.05	100.00	0.7856	
53		HOD-4, T12-9	112-9			73.66	16.09	1.30	0.35	90.0	1.80	0.13	3.71	90	100.00	0.7856	
30		DR-63				74.27	13.93	2.16	0.48	0.04	1.87	0.43	4.01	2.B	100.00	0.7844	
31		CL-0315			08/16/83	73.62	14.20	2.11	0.50	0.04	2.22	0.35	4.13	2. B4	נט.מטו	0.7830	
32		BUR-872,	, T59-E	11	xx/xx/xx	70.15	15.13	3.39	0.57	0.08	1.88	0.47	5.40	2.94	100.01	0.7826	
					,	72.38	14.74	2.38	0.49	0.03	1.77	0.49	4.71	3.0	100.00	n 7893	
			88-12		5/2/85	72.29	14.33	2.51	0.51	90.0	1.74	0.45		3.7.7	7	0.780.0	
32	2070	PF-88-E (2)	3	T173-6	9/28/88	73.65	14.46	2.13	0.42	500	7.00	97.0		70.5		7780	
			B-716		2016/03	74.66	24.03			3 6						7206	
		DI-DS (O 6CM)	7057	1-0011	2/17/86	74.31	13.86	1.03	4	900	2.15		00	9	00	0.7781	
			7-62	1124-10	5/5/86	73.31	14.49	2.27	0.43	0.04	2.11	0.30	4.06	3.00	100.001	0.7776	
		TULE LAKE 715 (682) T	KE 715	(682) T74-8	5/30/84	71.49	14.92	2.41	0.55	0.05	1.64	0.41	4.60	3.93	100.00	0.7774	
			E-715 ((wh pum), T59-A1	xx/xx/xx	70.87	15.50	2.67	ം	90.0	1.99	0.45	4.14	3.68	100.01	0.7769	
42	734	S-13				73.48	14.15	2.26	0.50	0.04	1.89	0.45	4.42	2.81	100.00	0.7766	
	1602	HOD-16 T130-12	T130-1	21	9/13/86	72.88	13.84	2.42	0.50	90.0	1.52	0.54	4.97	3.24	99.99	0.7766	
			4-0 Té	36-6	12/4/84	71.71	14.91	2.26	0.51	0.09	1.50	0.50	5.05	3.46	66.66	0.7765	
45		JCD-8, T1-16, P	T1-16,			73.66	14.98	1.85	0.36	0.07	1.30	0.35	4.38	3.06	100.01	0.7761	
			H, T16-	-15, low total		76.93	14.04	1.46	0	0.01	0.52	0.10	3.62	3.29	100.00	0.7759	
	1068		T T76-;	~ 1	7/28/84	71.86	14.99	2.43	₹ 1	0.10	1.96	0.44	4.77	2.96	100.00	0.7756	
9 9	000					73.87	10.01	2.03	0.36	0.0	1.73	0.2B	3.01	11:0	100.00	0.775	
4 C	726 2068	LD-94 PF-88-T	T170-14	4.	9/3/88	73.68	14.25	2.08	0.46	0.09	1.86	0.35	4.32	2.91	100.00	0.7755	•
	,)	•		22.2	, , ,	,	1	;	:	1		;		•		