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Geochemistry of the Fairfield Group, Canning Basin, W.A.

by E.C. Druce & B.M. Radke

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I SUMMARY

The carbonate geochemistry of the Fairfield Group serves to distinguish the previously recognized formations. The oldest unit, the Gumhole Formation, is characterized by high Mn and Pb, and low Mg values. In contrast the elemental concentrations in the Yellow Drum Sandstone are within previously determined averages for dolomitic and clastic-bearing carbonate rocks, and the concentrations in the Laurel Formation are average for non-dolomitic limestones.

Samples from the Gumhole and Laurel Formations can be separated using agglomerative polythetic programs and Q-mode factor analysis, demonstrating that the differences in geochemistry, although slight, are statistically significant.

The only unit with widespread outcrop is the Gumhole Formation, and within it elemental concentrations vary significantly and show that clastic input into the basin was greatest in the southeast part of the northerly margin.

The minor element geochemistry suggests that there has been enrichment of Pb and Zn in the sequence, particularly in the Gumhole Formation.

II INTRODUCTION

This report presents the carbonate geochemistry of the Fairfield Group (Upper Devonian-Lower Carboniferous), in the Canning Basin, Western Australia.

During a field survey in 1972 outcrops and drillcore of the Fairfield Group were sampled for palaeontological, petrological, and geochemical analyses. The sampling was devised so as to provide effective biostratigraphic information. Thus there was a geographic bias towards areas where reasonable sections could be measured.

The geochemical survey had three main objectives: firstly to determine whether geochemical data could be used to distinguish similar lithological units, secondly to provide information which could be used, together with petrological and sedimentological data, in environmental interpretation and finally to determine whether enrichment of base metals had taken place within the units studied.

The geochemical data obtained were treated statistically, using polythetic agglomerative and ordination programs and Q-mode factor analysis in a successful attempt to distinguish similar lithological units. Environmental information was gained by comparing means for individual elements with mean values obtained worldwide for different carbonate rock types. Cumulative frequency diagrams were used to assess the probable number of base-metal populations in each stratigraphic unit.

(i) Regional geology

The Canning Basin, situated in northwestern Australia, covers an area of 450 000 sq km and consists of rocks of Ordovician to Recent age, described in Guppy, Lindner, Rattigan, & Casey (1958), and Veevers & Wells (1961). The Fairfield Group comprises Upper Devonian to Lower Carboniferous rocks (Druce & Radke, in prep.) and crops out only on the northeast margin of the basin (Figure 1). These rocks overlie and interfinger with a reef complex of late Middle Devonian to late Late Devonian (late, but not latest, Famennian) age. They are conformably overlain by Carboniferous to Permian rocks on their northern margin. In the subsurface, the interbedded limestone and terrigenous sediments which comprise the Fairfield Group extend across the Fitzroy Trough, perhaps to its southern margin.

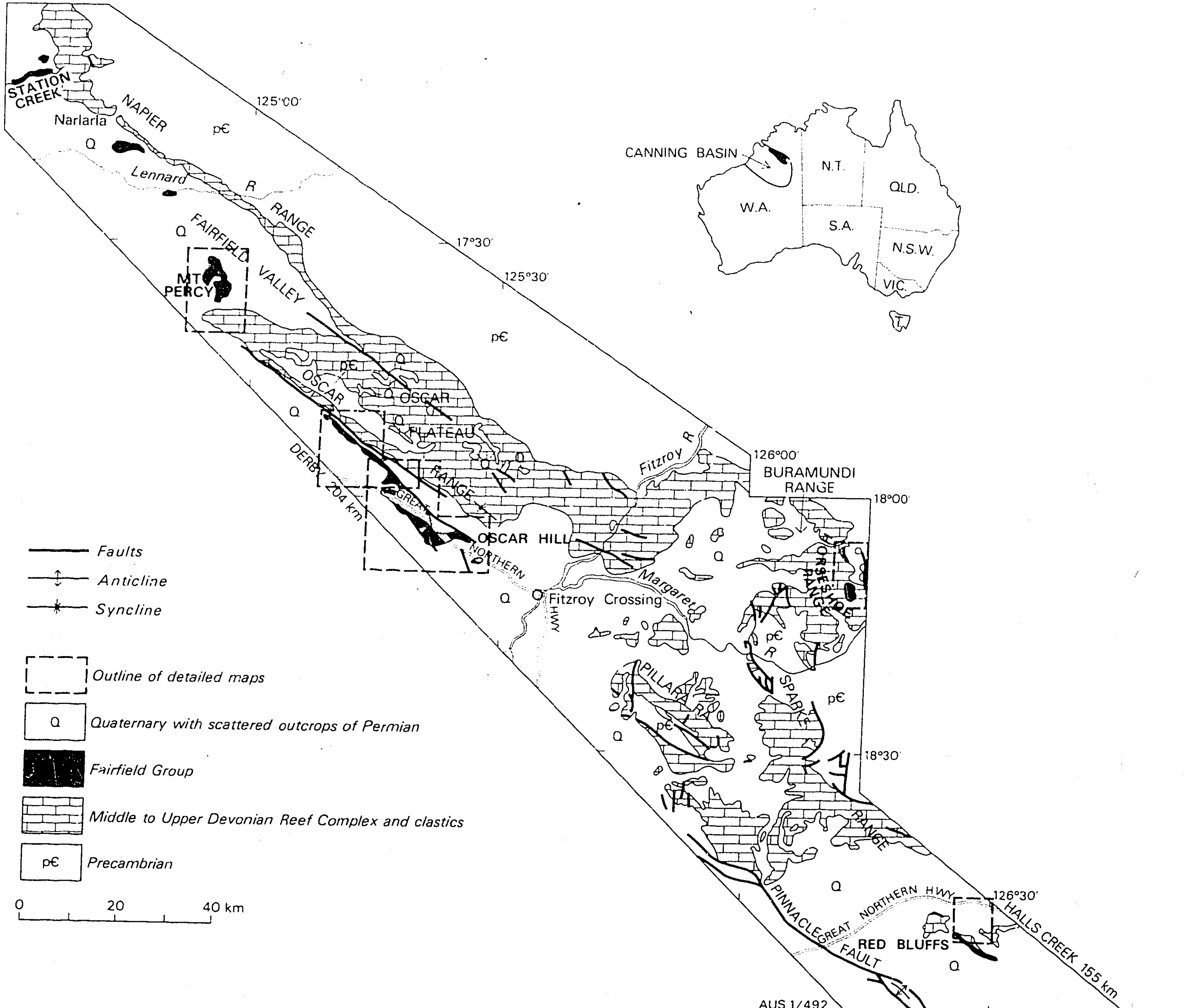

Fig 1. Locality and outcrop map, Fairfield Group.

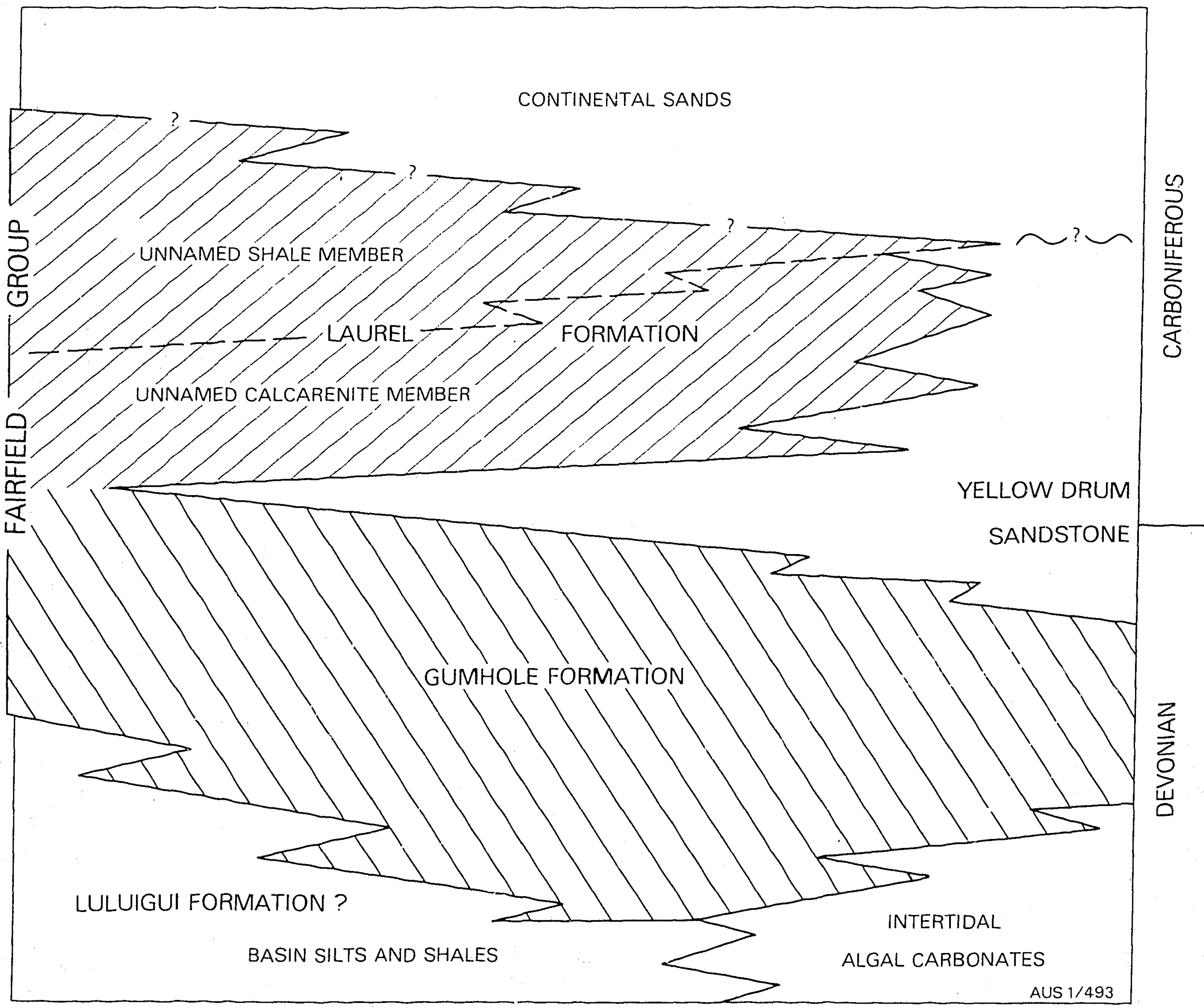

Fig 2. Stratigraphic relationships, Fairfield Group.

The Fairfield Group consists of three units: the Gumhole Formation (interbedded limestone and calcareous siltstone), the Yellow Drum Sandstone (sandstone and dolomite), and the Laurel Formation (interbedded limestone and calcareous siltstone). The latter consists of a relatively thick calcarenite member, and an overlying shale member; general relationships are shown in Figure 2. These names are formally erected and the stratigraphy discussed in detail in Druce & Radke (in prep.).

In the Horseshoe and Burramundi Ranges, and at Red Bluffs (Figure 1), the Gumhole Formation overlies, and probably interfingers with, a late Famennian birdseye limestone considered to be the youngest lagoonal facies of the reef-complex (Playford & Lowry, 1966; Roberts et al., 1972). Basinward it overlies, and probably interfingers with the Luluigui Formation (Druce & Radke, in prep.).

The Laurel Formation is overlain unconformably by the Upper Carboniferous-Lower Permian Grant Formation over most of its outcrop. However in the area of Station Creek (Fig. 1) and in Grant Range No. 1 Well ($18^{o}41'30''$S $125^{o}8'11''$E) it is overlain, apparently conformably, by the Anderson Formation.

The Fairfield sequence is poorly exposed and consequently has received little geological attention. Previous work has led to differing stratigraphic interpretations resulting in confusion and, in some cases, conflicting nomenclature.

In order to resolve this problem, and to gather further information relevant to hydrocarbon and base metal exploration in the basin, outcrops from the Fairfield Group were sampled for geochemical, petrological and palaeontological analyses. The samples were augmented by core from three continuously cored drill holes (Druce & Radke, 1973).

Samples were also collected from the Burt Range Formation, Bonaparte Gulf Basin, which is of similar age and lithology to the Fairfield Group (Veevers & Roberts, 1968). These samples provided a direct geochemical comparison with those of the Fairfield Group, and also supplied information additional to that contained in Veevers (1969) - because of the slightly different analytical techniques used. No detailed discussion of the geochemistry of the Burt Range Formation is included in this paper but the analyses are included in Appendix III.

Trough samples were collected every 1.5 m from the 47 measured sections for palaeontological determination, and from within each 1.5 m interval a representative limestone sample was taken for petrological examination and geochemical analysis. Additional samples were taken from the 3 drill holes, BMR Noonkanbah No. 4, and BMR Lennard River Nos 1 & 2, at an average interval of 2 m, with a sampling bias toward calcareous rocks. In all cases the geochemical sample consisted of several chips from different parts of the petrological sample, and had an average weight of 70 g. Five hundred and sixty-one samples were analysed.

(ii) Analytical methods

The analysis involved the determination of the amounts of eleven elements (Ca, Mg, Fe, Mn, Sr, Ba, Cu, Pb, Zn, Cd, P) and the insoluble residue: these were determined in two groups; 1) insoluble matter, Fe, Mn, Mg, Ca, and Sr; and 2) Cu, Pb, Zn, Cd, P, and Ba.

The first group was determined after digesting a 0.5 g sample with 25.0 ml of 10 percent hydrochloric acid for 5 minutes at 60-70°C, and then cooling in water. This treatment allowed separate determinations for the soluble, carbonate fraction and the insoluble, iron-bearing non-carbonate fraction. Insoluble residue was filtered off, washed, ignited and weighed. Elements were determined by atomic absorption spectrometry after suitable dilutions had been made.

The second group was determined by atomic absorption spectrometry on a solution prepared by refluxing 1 g of sample with perchloric acid for 15 to 20 minutes; final dilution was made to 40 ml. This treatment dissolved all carbonate, sulphide and iron minerals, leaving only a siliceous residue. Phosphorus was determined by spectrophotometry, after developing the molybdenum blue colour by the addition of an acidified solution of ammonium molybdate containing ascorbic acid and a small amount of antimony.

Two ratios Ca/Mg and Sr/Ca were calculated; the Ca/Mg ratio highlights variations due to the presence of dolomite, and the Sr/Ca ratio indicates variations in the Sr content of limestones. The analyses were made by the Australian Mineral Development Laboratories under the supervision of A.B. Timms.

TABLE 1. GENERAL GEOCHEMICAL STATISTICS FOR ALL UNITS IN THE FAIRFIELD GROUP

		Gumhole Formation 228 samples			Yellow Drum Sandstone 105 samples		
Elements		Range	Mean	Standard Deviation	Range	Mean	Standard Deviation
Insoluble		1.2-88.2	13.30	14.97	9.1-97.4	24.61	12.30
%	Fe	0.021-0.46	0.14	0.07	0.048-0.55	0.21	0.10
	Mn	0.008-0.48	0.14	0.08	0.001-0.078	0.04	0.013
	Sr	0.001-0.092	0.02	0.01	0.001-0.076	0.018	0.013
	Mg	0.022-0.42*	0.17	0.31	0.056-9.75	5.93	2.91
	Ca	10.7-39.9	34.68	6.10	0.20-34.1	22.12	6.09
ppm	Cu	2-55	5.40	4.35	2-35	7.16	8.36
	Pb	5-670	35.91	77.68	5-130	12.56	30.16
	Zn	2-260	25.29	30.50	5-120	33.71	27.50
	Cd	0-2	0.05	0.27	not detected		
	P	20-1070	281.83	197.64	28-640	90.12	67.01
	Ba	10-1120	138.46	173.58	10-215	31.87	72.94
Ca/Mg		2.79-492	182.49	101.57	1.15-71.13	2.60	15.7
Sr/Ca		$(0.4-10.7) \times 10^{-4}$	3×10^{-4}	2×10^{-4}	$(0.3-2.8) \times 10^{-3}$		1×10^{-3}

* Single anomalous sample gave value of 4.68

TABLE 1. (Continued)

		Laurel Formation (outcrop) 228 samples			Laurel Formation (core samples) 26 samples		
Elements		Range	Mean	Standard Deviation	Range	Mean	Standard Deviation
Insoluble		1.6-57.4	12.76	11.50	3.1-80.2	27.82	22.86
%	Fe	0.007-0.67	0.06	0.07	0.017-0.31	0.09	0.08
	Mn	0.005-0.54	0.04	0.07	0.007-0.12	0.022	0.023
	Sr	0.009-0.105	0.03	0.02	0.008-0.068	0.037	0.018
	Mg	0.056-4.35	0.53	1.42	0.07-1.5	0.59	0.94
	Ca	17.9-39.8	34.45	5.08	2.9-38.4	27.79	9.71
ppm	Cu	2-75	5.17	6.1	2-35	4.83	6.32
	Pb	5-55	9.55	15.57	5-8	1.59	3.02
	Zn	5-42	11.10	6.63	5-150	21.17	33.05
	Cd	1	0.0041	0.064	0-1		
	P	20-4500	352.28	527.35	32-1260	371.48	315.82
	Ba	10-1460	89.52	215.38	10-185	25.35	45.20
Ca/Mg		1.12-402.9	117.18	67.80	1.17-187.5	72.36	52.00
Sr/Ca		$(0.3\text{-}12.8) \times 10^{-4}$	4×10^{-4}	2×10^{-4}	$(1.3\text{-}28) \times 10^{-4}$	6×10^{-4}	2×10^{-4}

No standard control samples were available for the major elements and Sr, so precision control was obtained for each sample by summing on the basis of calculating Fe to Fe_2O_3, Mn to MnO, Sr to $SrCO_3$, Ca to $CaCO_3$ and Mg to $MgCO_3$. A total of 100 $\pm$ 3 percent for these values was considered to be satisfactory. Determinations that were outside these limits were repeated. For determinations made from samples digested in perchloric acid, control was achieved by using a standard control sample and a replica[illegible] very 20 samples. Appendix 1 shows the statistical evaluation of the precision.

(iii) Acknowledgements

We are extremely grateful for the help provided by Drs A.R. Jensen and P.J. Cook, and Messrs, A.D. Haldane, W.M.B. Roberts and J. Draper during discussions on the geological implications of the data. Mr. W. Mayo advised on statistical techniques and interpretation.

III GEOCHEMISTRY OF STRATIGRAPHIC UNITS

(i) Gumhole Formation

The Gumhole Formation consists of about 70 m of interbedded limestone, siltstone, and sandstone, although only the limestone beds are well exposed.

The geochemical results are based on 228 samples, most of which were taken from the limestone beds which constitute the greater part of the sequence and nearly all the outcrop (Table 1). Some of these samples were extremely pure limestones with a $CaCO_3$ content of up to 99.5 percent. The values obtained are compared to average limestone values determined from world-wide occurrences, and these are discussed in detail later and presented in Table 3.

Of the other major elements Fe and Sr have average values (see Table 1) but Mn is anomalously high and readily distinguishes the unit; Mg values are low.

The Mn is mainly contained in the calcite cement (Druce & Radke, in prep.); the anomalously high values could be due to either concentration by subsequent ground water movement, or concentration in the original water body.

The considerably lower concentrations of Mn in contiguous units of similar lithology suggests that the enrichment is not due to groundwater movement subsequent to deposition. Concentration in the original water body could be caused either by relatively high values of Mn supplied from the source area, particularly if the hinterland had undergone deep chemical weathering over a period of time and had suffered little previous mechanical erosion; or evaporitic concentration in near-shore areas during a warm arid period. Both these methods of Mn concentration require a warm climate and evidence for this is provided by the presence of a reef complex through much of the Late Devonian, and colonial corals in the early Carboniferous Laurel Formation.

The evidence for a wet climate producing deep chemical weathering in the hinterland, or a dry climate with consequent evaporitic concentration is equivocal. The presence of a virtually unbreached barrier reef (Playford, 1970) with associated lagoonal sediments which are relatively pure carbonates, especially in the late Devonian, suggests that runoff was minimal. This does not however necessarily indicate arid conditions but could reflect either a relatively small catchment area or a low-lying hinterland. Some inconclusive evidence is provided by the geographic variations in Mn values; the area near the Horseshoe Range, which is presumed to have been an embayment into which a river discharged, has significantly higher Mn values than other areas. These relatively high values do not, however, support either method of concentration at the expense of the other. If runoff was low then evaporitic concentration could occur whereas heavy runoff, whilst diluting evaporitic concentration, would provide transport for weathering concentrations from the hinterland.

The Gumhole Formation has considerable siliciclastic content, which is coarser toward the basin margin, suggesting reasonably active drainage. Fe values are also higher; the available evidence points to the transportion of Mn, Fe and silica from a deeply weathered hinterland, a process espoused by Button (1974) for Fe and Mn-rich sediments in South Africa. Ronov and Ermishkina (1959) demonstrated that the highest Mn values are found in marine sediments which formed in a coastal environment during a humid period, a conclusion that is consistent with our information.

Geographic distribution of chemical values (Table 2). The Gumhole Formation is the only unit which crops out over an area sufficiently large for comparisons of geochemical data between locations to be meaningful. The outcrop of the Gumhole Formation is a linear belt about 5 km wide, extending for 300 km parallel to the probable basin margin, and reflect changing conditions along it (Fig. 3).

The linear outcrop belt was divided into five areas from Station Creek in the northwest to Red Bluffs in the southeast (Fig. 1). Mean values for each element in each area were calculated, and then compared using the Student "t" test; statistically significant differences are present between the mean values for all the major elements and in the amount of insoluble material. The variations in minor element geochemistry, although numerically large, are not statistically significant - apart from Cu, which is higher in the Red Bluffs area. The significant variations can be divided into two groups: those which vary systematically, and which are probably controlled by gross basin morphology; and those which vary sporadically owing to possible local palaeophysiography.

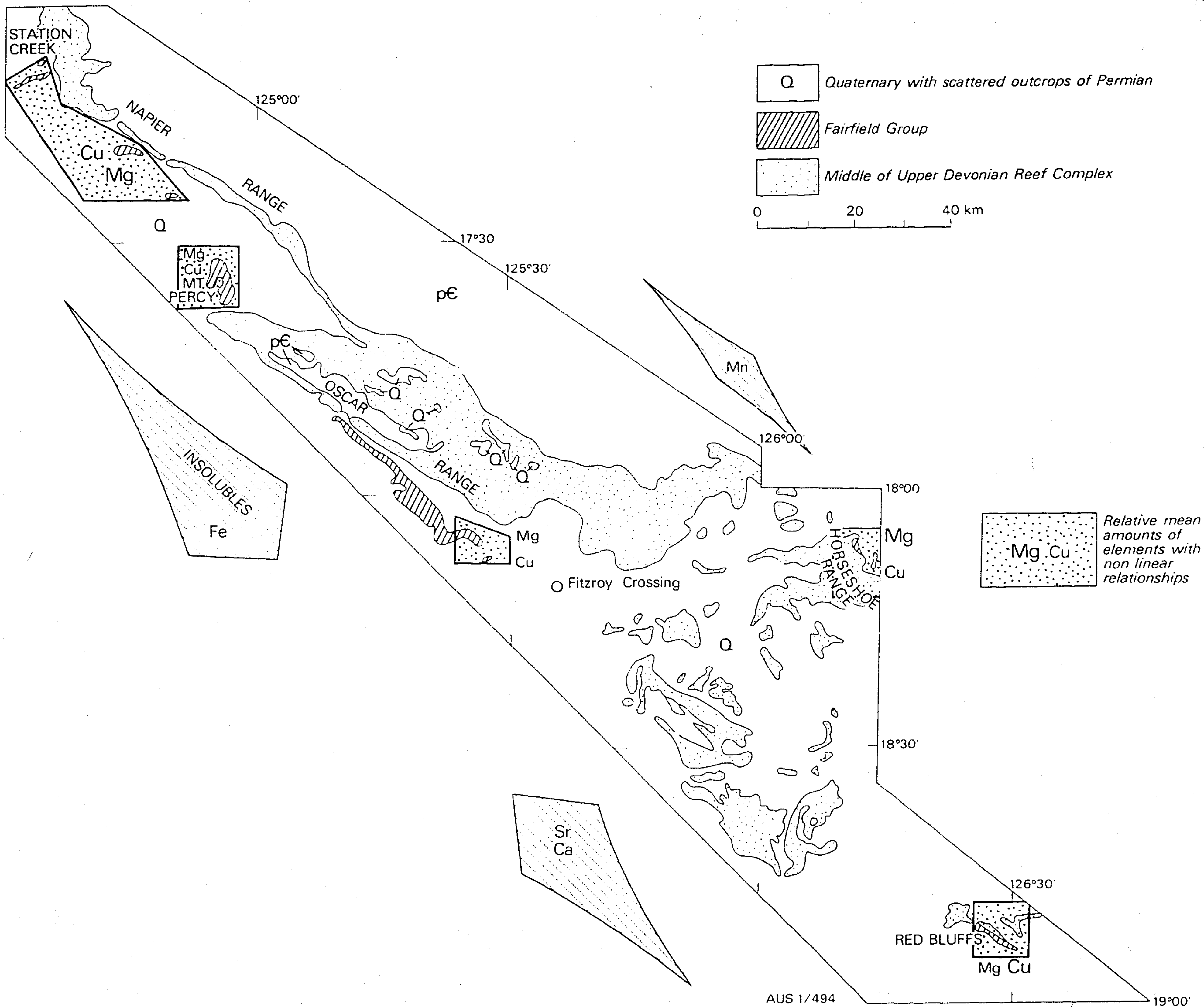

Fig 3. Geographic variations of elements in the Gumhole Formation.

TABLE 2. GEOGRAPHIC VARIATION OF ELEMENT MEAN CONCENTRATIONS IN THE GUMHOLE FORMATION

Elements	percent						ppm					
Localities*	Insol-ubles	Fe	Mn	Sr	Mg	Ca	Cu	Pb	Zn	P	Cd	Ba
STATION CREEK	12.8	0.1	0.1	0.03	0.2	35.0	6.2	40.7	30.4	165.9	0	133.7
MOUNT PERCY	11.0	0.1	0.1	0.02	0.1	35.6	2.8	31.0	23.9	408.3	0.1	118.9
OSCAR HILL	13.9	0.1	0.2	0.02	0.1	34.5	6.4	30.7	20.4	314.7	0.03	123.6
HORSESHOE RANGE	16.5	0.2	0.2	0.02	0.3	33.1	5.2	69.1	23.2	186.4	0	231.8
RED BLUFFS	19.2	0.2	0.1	0.02	0.2	32.1	10.7	16.3	42.3	142.5	0.08	22.9

* See Figure 1

Systematic variations are shown by Sr, Ca, Insolubles and Fe; Sr and Ca are highest in the northwest, decreasing to the southeast, whereas Fe and Insolubles show an inverse distribution. The variations reflect a greater influx of terrigenous material in the southeast. Thus the changes in the major element geochemistry, determined from 0.5 gram samples, are consistent with changes in carbonate-siliciclastic ratios calculated for lithological sequence in the Gumhole Formation (Druce & Radke, in prep.).

Of the other major elements only Mn shows any systematic variation. The concentration is higher in the central part of the outcrop area, and decreases significantly both northwest and southeast.

These variations are probably related to the contemporary drainage system and suggest that major river systems entered the basin in the Horseshoe Range and Red Bluffs areas. In the Station Creek area the Group is very thick (700 m) in Napier No. 1 well (Druce & Radke, in prep.), indicating a relatively abundant source of terrigenous material; this is reflected by increase in insolubles, and decrease in Ca, compared with the Mount Percy area 50 km to the southeast.

Sporadic variations are shown by Mg and Cu; higher Mg values are present in the Station Creek and Horseshoe Range areas and reflect the presence of dolomite.

(ii) Yellow Drum Sandstone

The Yellow Drum Sandstone consists of about 70 m of friable sandstone, silty dolomite, dolomitic siltstone, limestone, and shale. Surface exposure is poor and nearly all the geochemical samples are from two core holes, BMR Noonkanbah No. 4 and BMR Lennard River No. 1 (Druce & Radke, 1973). The 105 samples analysed consisted of carbonate beds (63%), with some siltstone (12%) and sandstone (25%) samples.

The inclusion of some dominantly clastic samples in the statistical analysis, together with the higher clastic content of the carbonates is responsible for the relatively high mean of 24.6 percent for the insoluble fraction, and low Ca (22.12%) and Sr (0.018%) values (Table 1).

Of the minor elements Zn is the only element which has an above average mean value (33.7 ppm). Cd was not detected.

(iii) Laurel Formation

In general, the Laurel Formation limestones are closely comparable geochemically to other limestones; major and minor element concentrations vary little from the average means of other carbonates (see Table 3). A total of 228 samples were analysed (Table 1).

Lithologically the Laurel Formation is similar to the Gumhole Formation, and consists of about 450 m of grey sandy skeletal limestone, shale, siltstone, and minor dolomite. Drill-hole samples (Table 1; Figs. 4 & 10) are from the uppermost 50 m of the Laurel Formation and constitute a representative selection of limestone (88%), sandstone (8%), and shale (4%).

The limestones are relatively pure with a mean value for Ca of 34.5 percent, which gives an average $CaCO_3$ content of 86 percent; consequently both the insoluble fraction and Mg have low values; the Fe concentration is noticeably low. Minor element concentrations are average, apart from Zn and Ba, both of which are low.

Samples from surface exposures and from core are tabulated separately. The core samples are from a restricted stratigraphic interval and so are not directly comparable. However Table 1 shows that the core samples are less pure carbonates, with higher Fe and lower Mn values; Pb is much lower, whereas Zn is nearly twice as abundant in the core material. The Sr/Ca ratio shows Sr to be depleted in the calcite lattice, suggesting some leaching of Sr in the weathering process.

(iv) Relationship between units

Carbonate rocks in the Gumhole and Laurel Formations are dominantly limestone, whereas those of the intervening Yellow Drum Sandstone are dolomites. The relative abundance of dolomite in the Yellow Drum Sandstone is demonstrated by the histogram of the relative distribution of Mg and Ca (Fig. 5). Sr is low, relative to concentrations in the other two formations, owing to the decrease in calcite - in which lattice Sr readily substitutes.

The high levels of insoluble fraction in the Yellow Drum Sandstone (Fig. 5) reflect the presence of terrigenous sand, while the higher Fe values result from the presence of ferroan dolomite rather than an association with the terrigenous sediments (Druce & Radke, in press).

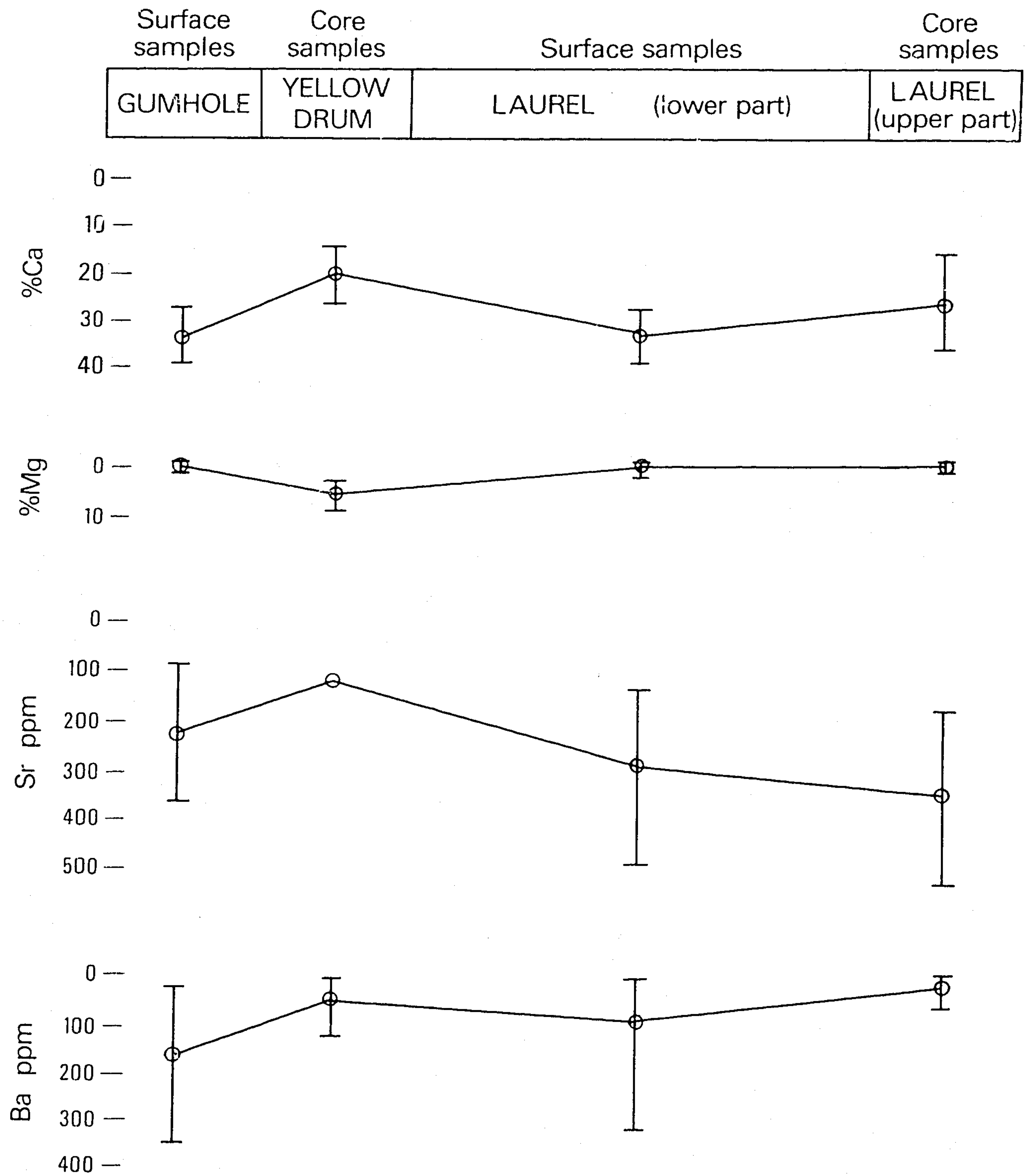

FIG. 4:– Relative changes in means and variabilities (±1σ) of elements

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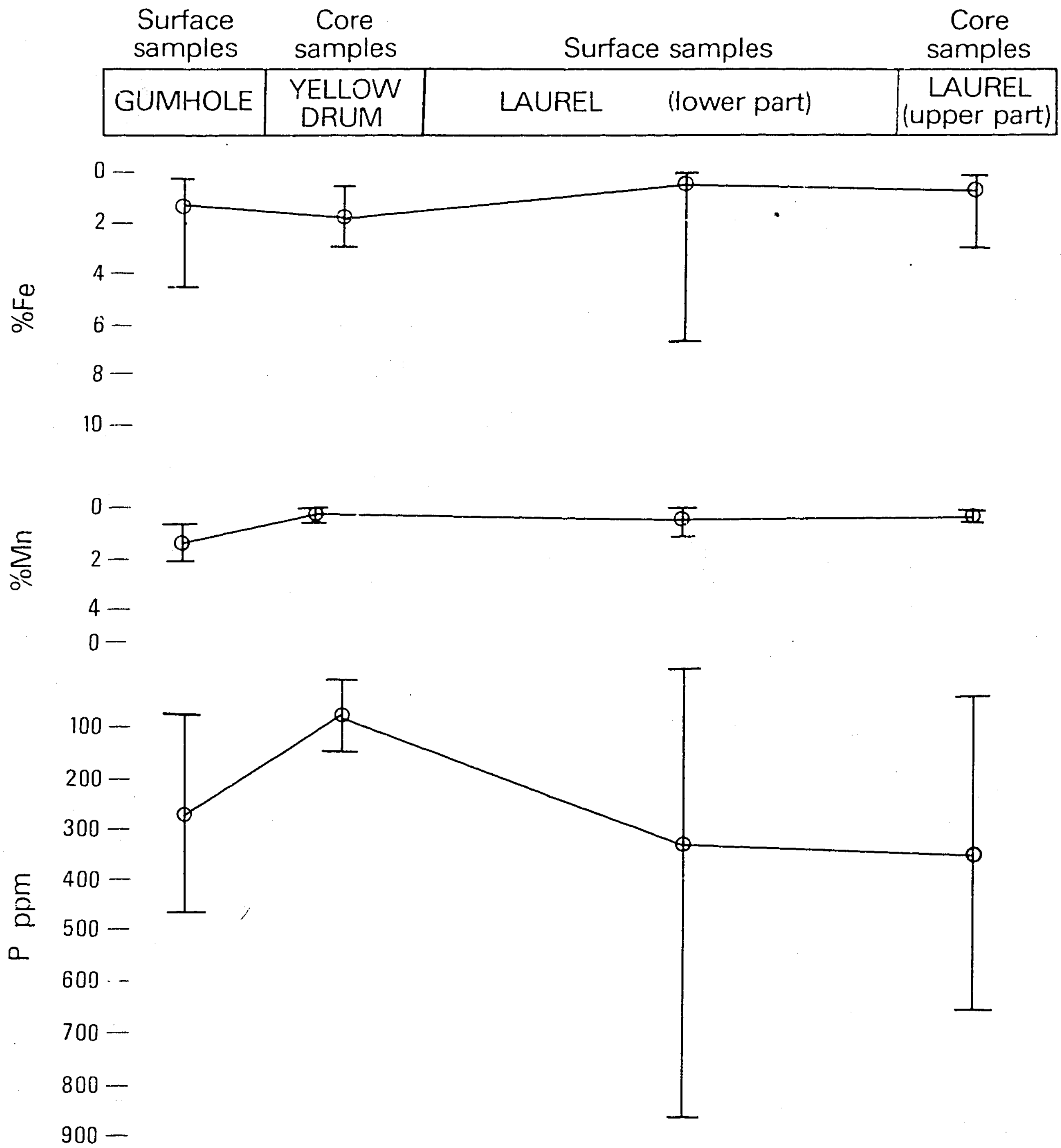

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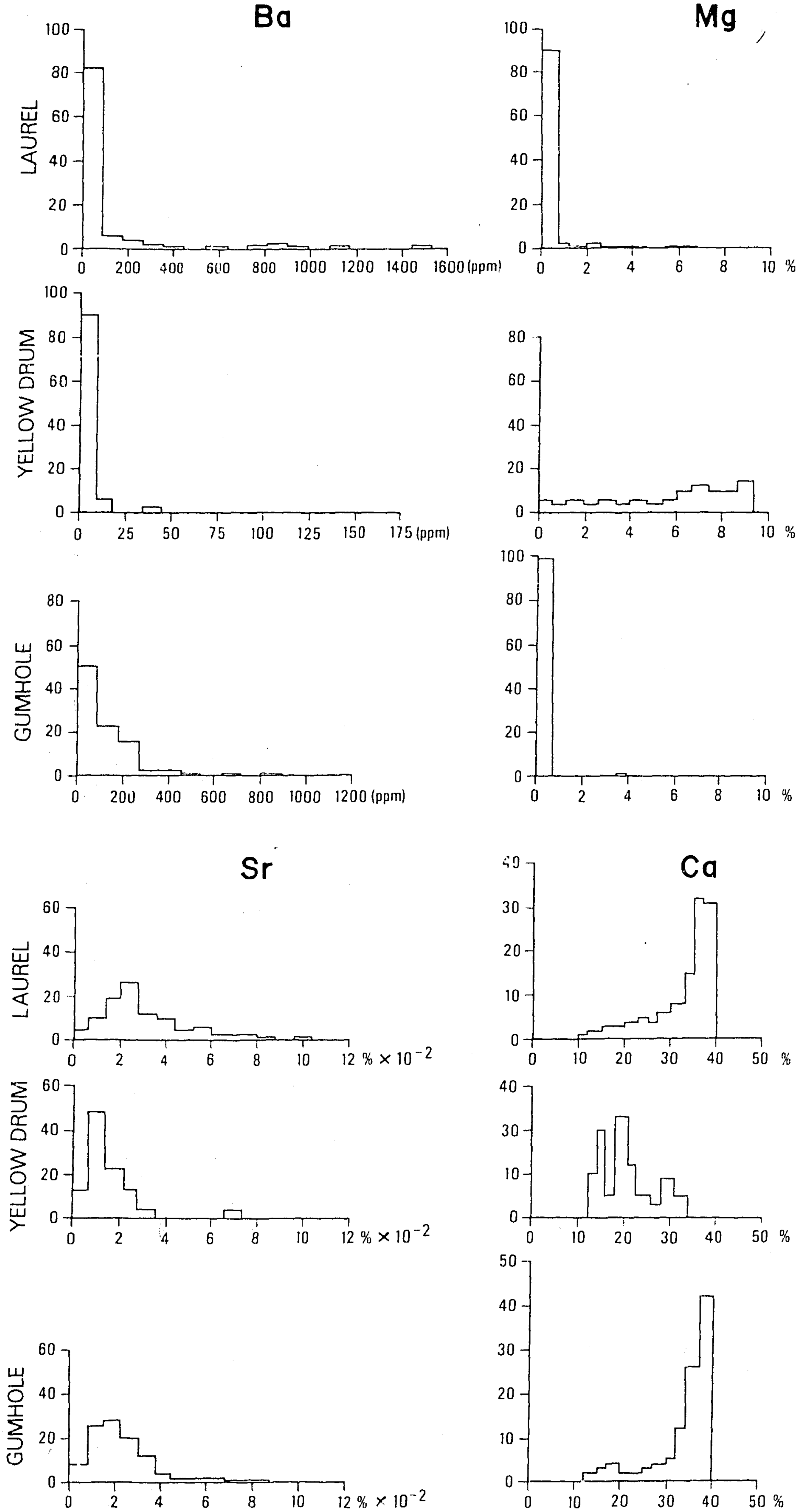

Fig 5. Comparative element frequency distribution plots for formations in the Fairfield Group.

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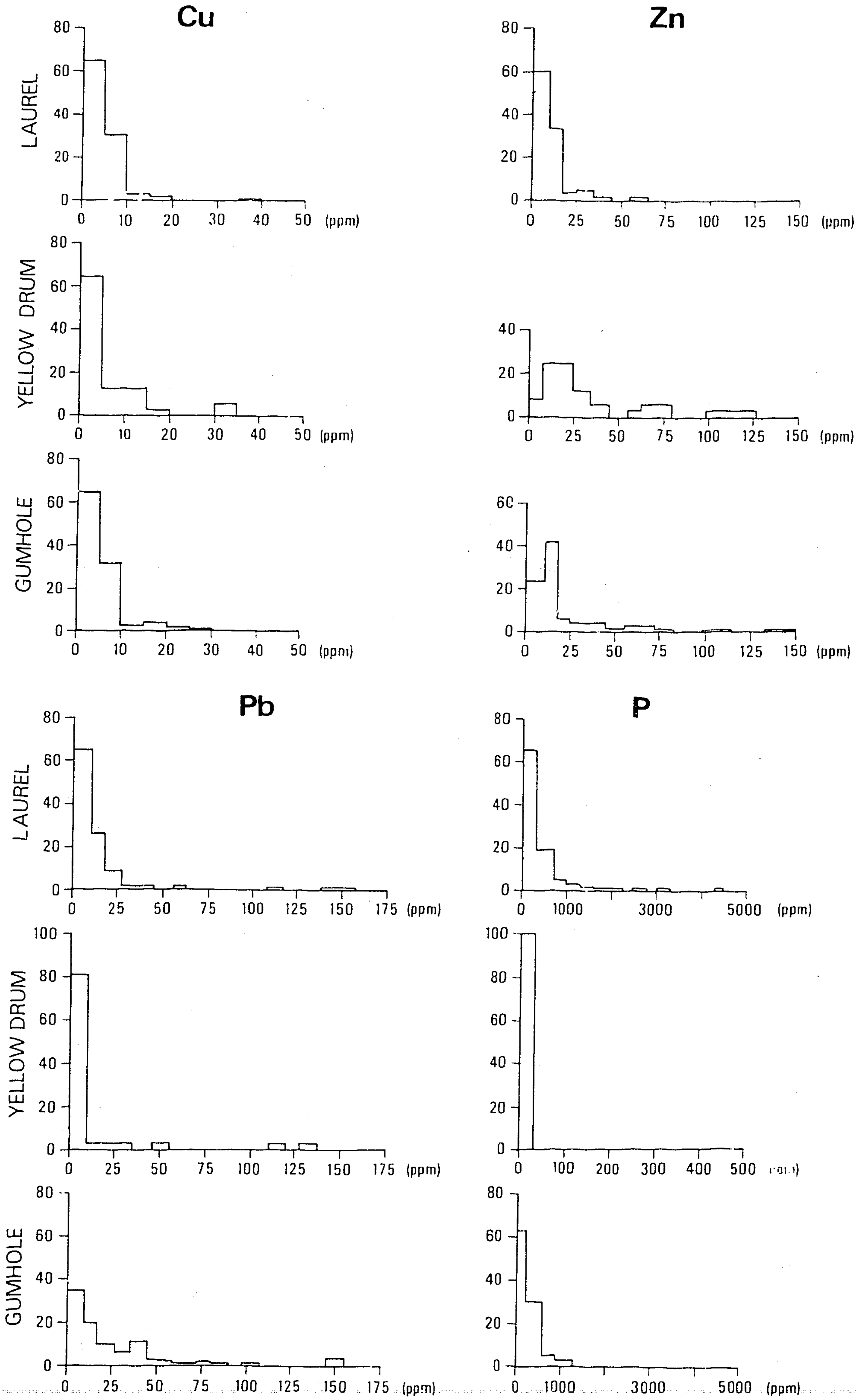

Fig 5. (part of)

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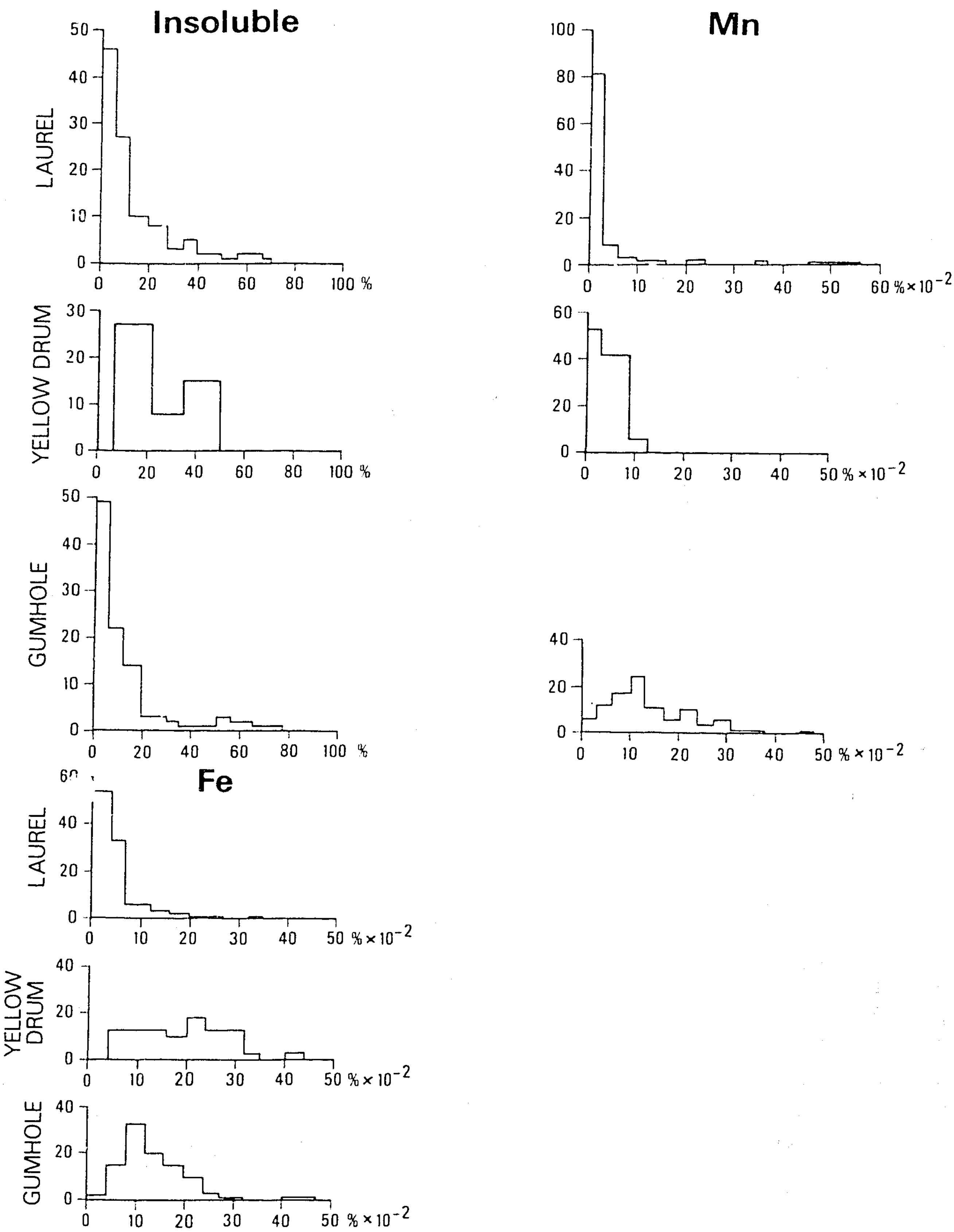

Fig 5. (part of)

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The mean value for Zn is higher in the Yellow Drum Sandstone than in either of the dominantly limestone units; the distribution histogram is similar to that for samples from the Gumhole Formation and at least two populations are apparent (Figs 5 and 11). In such cases it is assumed that the lower population was present at the time of formation and that the higher population has been introduced subsequently. The initial Zn population in the Yellow Drum Sandstone is represented by greater values than the equivalent population in the Gumhole Formation.

The P content is lower in the Yellow Drum Sandstone than in other units of the Fairfield Group, reflecting the virtual absence of fish fragments, which are abundant in the Gumhole and Laurel Formations. The other elements, Mn, Cu, Pb, and Ba, have distribution histograms similar to those derived for samples from the Laurel Formation.

The Gumhole and Laurel Formations contain similar limestones, and this is highlighted by the major element geochemistry in which the distribution histograms for insolubles, Mg and Ca are all virtually identical (Fig. 5). However, the distribution histograms for Fe and Mn show higher values in the Gumhole Formation due to their presence in the calcite cement (Druce & Radke, in prep.). This results in the characteristic rusty yellow colour of the weathered rock - in contrast to the characteristically grey limestones of Laurel Formation. Strontium values are consistently higher in the Laurel Formation than in the Gumhole Formation.

The distribution histograms for Cu, P and Ba are similar, although both Pb and Zn are most abundant in the Gumhole Formation, and the distribution curve for Pb (Fig. 5) is distinctively higher than that for the Laurel Formation.

IV STATISTICAL ANALYSIS OF GEOCHEMICAL DATA

Two separate statistical methods were used to divide the samples into geochemically similar groups. Firstly a Q-mode factor analysis was made of the 456 samples from the Gumhole and Laurel Formations, using the strategy described by Klovan & Imbrie (1971). Secondly, a hierarchical polythetic agglomerative program (MULCLAS), supplemented by an ordination program (GOWER) (Lance & Williams 1967a & b) which executes a principle co-ordinate (Q-factor) analysis, was used. All programs were run on a Cyber 76 computer.

Finally a statistical program, GESTAT, was used to compute inter-element correlation coefficients for each stratigraphic unit; the same program produces mean, standard deviation and variance figures for each variable (Garrett, 1967).

(i) Q-mode factor analysis

The Q-mode factor analysis proved extremely useful in distinguishing the Gumhole and Laurel Formations on geochemical criteria.

The analysis is based on a matrix of the proportional similarity coefficients (cosine theta) between pairs of samples (Klovan & Imbrie, 1971). It was found that 91.4 percent of the variability of the matrix was accounted for by three factors: Ca and Sr (Factor 1), Insolubles (Factor 2), and Fe and Mn (Factor 3). Samples from the Gumhole and Laurel Formations are effectively separated by Factor 3, and plot into two distinct fields. Although there is about a 10 percent overlap in the fields the high density areas are well separated and the spacial distributions are different (Fig. 6).

(ii) Cluster analysis

Because of the previous debate on the validity and delineation of units within the Fairfield Group (see Druce & Radke, in prep.) a preliminary statistical test was applied using petrographic variables (including skeletal grain types) determined from hand specimens and thin sections (Radke, 1976); subsequently, the geochemical data for the same samples were analysed using similar programs. Two sets of samples each comprising some one hundred samples were selected so that each set would be representative of both the

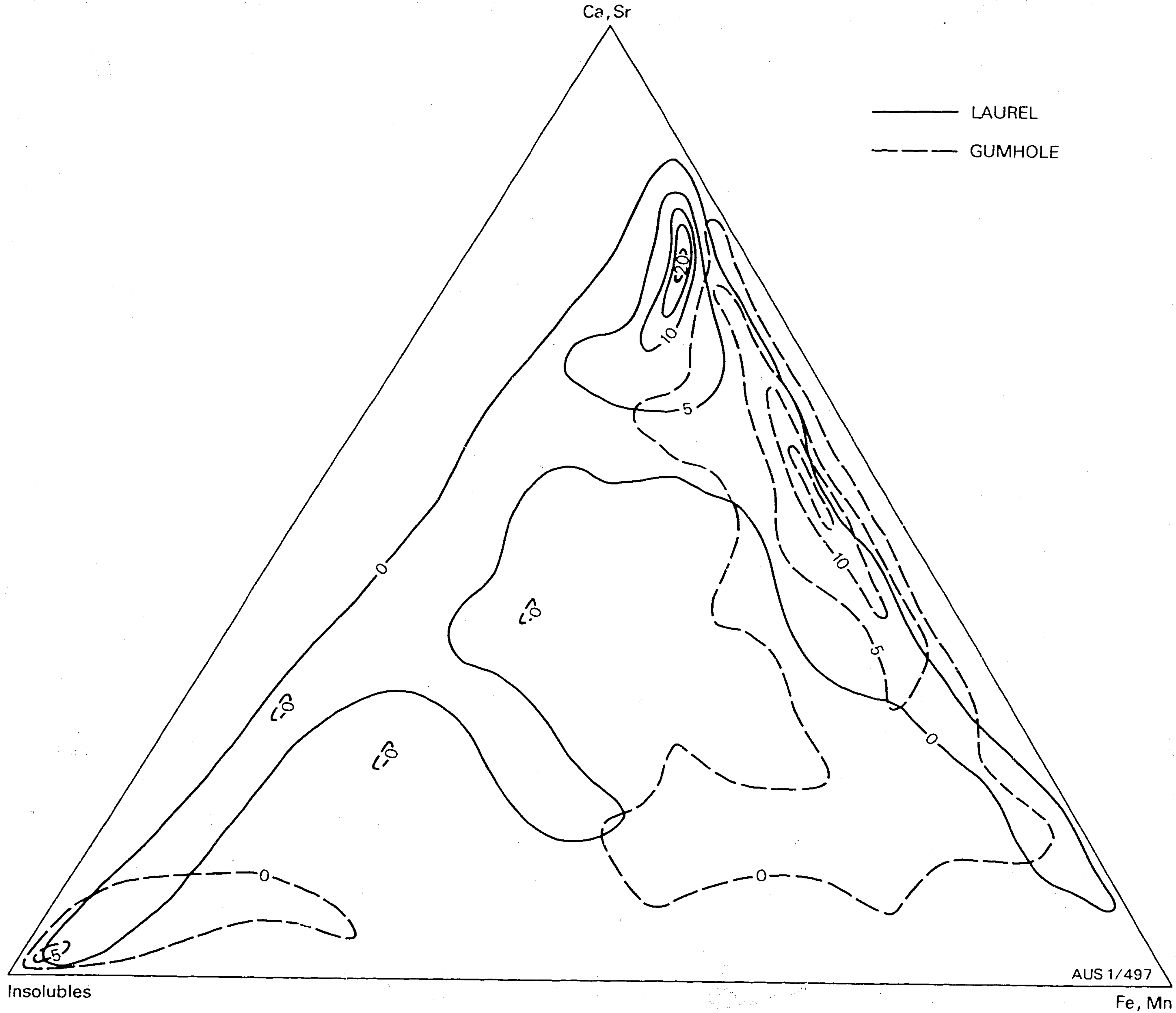


Fig 6. Contoured sample distribution plot from the Gumhole and Laurel Formations

stratigraphic and areal extent of the unit. No samples were common to both sets.

Lance & Williams (1967a) concluded that the polythetic agglomerative method was the most meaningful for a hierarchial classification; we have used such a program (MULCLAS) originally devised for ecological analysis (Lambert & Williams, 1966). The program uses a combinatorial fusion strategy (Lance & Williams, 1967b), and offers a choice of similarity measures and sorting strategies that can be used in different combinations. The program used incorporated a Euclidean metric measure (Burr, 1967), and a sorting strategy which minimized the incremental sum of squares.

The geochemical data were analysed using the MULCLAS program for quantitative data (Radke, 1976), and the resultant dendrograms are shown in Figures 7 & 8. The uppermost branch in each dendrogram separates the Laurel and Gumhole samples effectively. Misclassification, according to our stratigraphic model, is less than 10 percent.

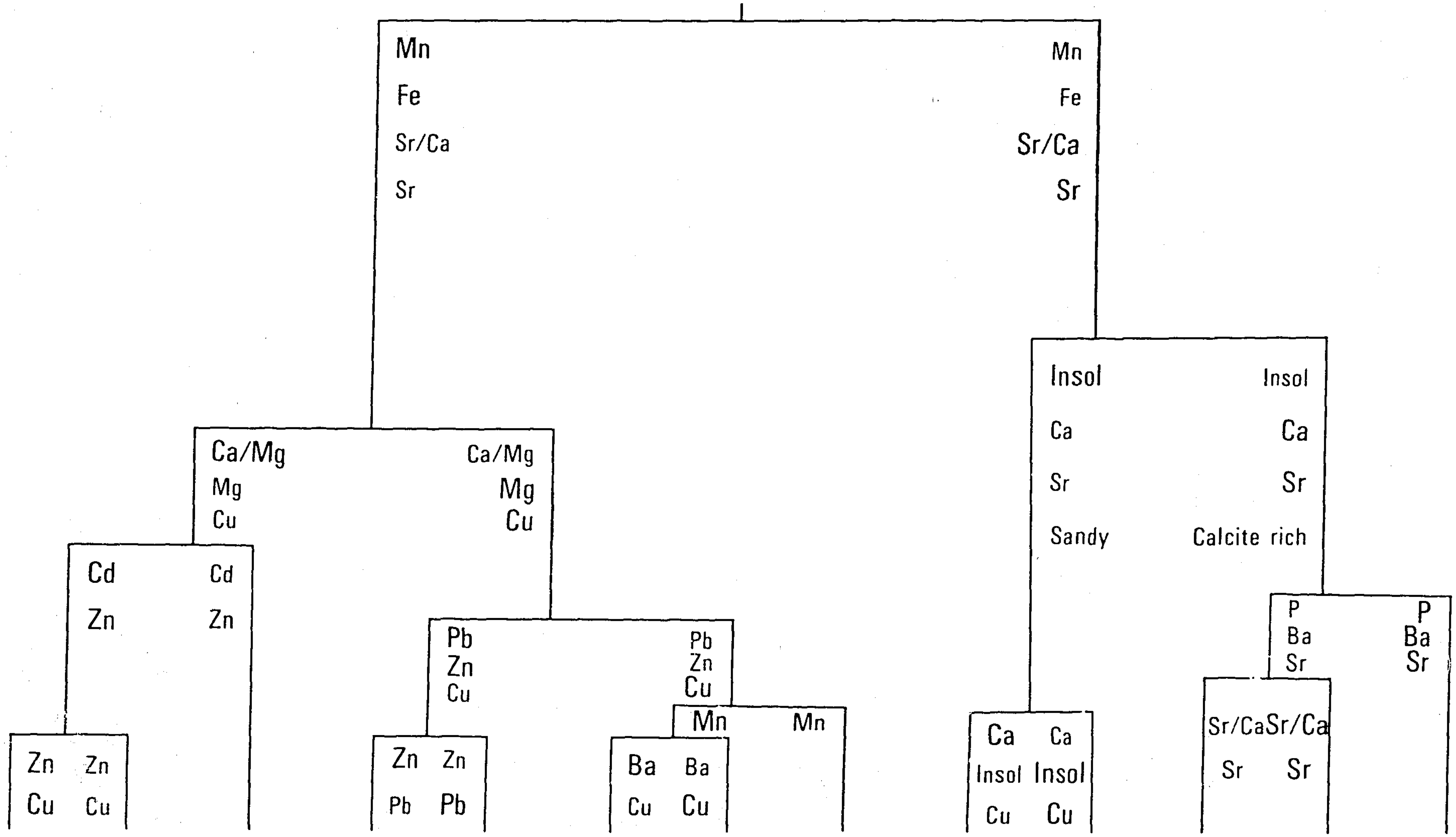
A supplementary program, GROUPER, was used to determine the significance of each attribute in each fusion in the dendrogram.

A final fusion in each analysis joins agglomerative clusters of samples which have different attribute values. In analysis one, the two clusters (representing the formations) which finally fuse have remained distinct owing to differences between their Mn, Fe, Ca/Mg, Pb and Mg values. In analysis two, the final fusion is between two clusters whose Mn, Fe, Sr/Ca, and Ca values are significantly different. However, it can be seen that the elements which controlled the separation of the formations in the Q-mode analysis are the principle attributes which keep the two main sample clusters apart until the final fusion (Figs 7 & 8).

Both dendrograms are "good", in that they are composed of groups which are of similar size and which unite at about the same total information gain (Druce <u>et al</u>., 1972) and suggests that the original data was sufficiently consistant to justify the use of the program.

(iii) Correlation coefficients

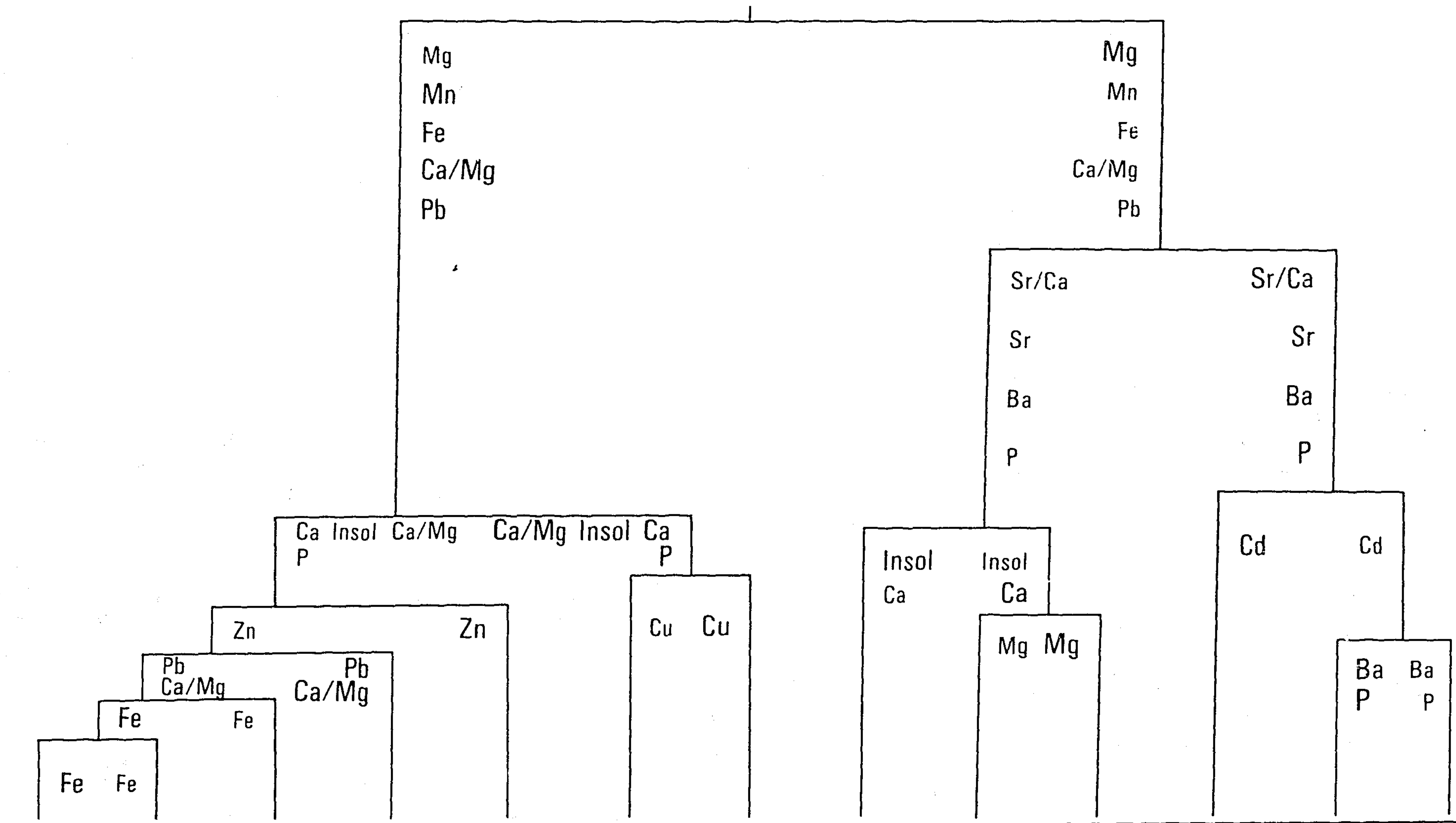
Significant positive correlations and inverse relationships between elements for each formation are illustrated graphically in Figure 9. All



100	100	92	100	100	100	100	100	0	67	16	0	0	% of samples from Gumhole Formation
1	3	24	1	4	5	7	11	11	3	25	18	5	No of samples
GUMHOLE FORMATION								LAUREL FORMATION					Stratigraphic interpretation

AUS 1/499

Fig 7. Dendrogram showing agglomerative relationships using MULCLAS program on first set of samples.



% of samples from Gumhole Formation	100	100	100	100	100	100	0	0	25	0	0	0	13
No of samples	3	11	21	1	4	10	1	21	36	1	1	5	6
Stratigraphic interpretation	GUMHOLE FORMATION						?	LAUREL FORMATION					

Aus 1/498

Fig 8. Dendrogram showing relationships using MULCLAS program on second set of samples

these relationships are signifiant at the 95 percent confidence level (taking = 0.4 in the case of the Gumhole and Laurel Formations, and 0.5 in the case of the Yellow Drum Sandstone).

Several relationships can be attributed to methods of sampling or analysis, rather than to any geologically significant association of elements. Thus, a positive correlation exists between Ca and Mg in the Yellow Drum Sandstone (unlike the situation in the Laurel and Gumhole Formations) due to the sampling of siliciclastic as well as carbonate beds in the Yellow Drum Sandstone. Again, inverse relationships between the elements Ca, Mg, Fe and insoluble components merely reflect the analysis which involved determination of these elements in the soluble fraction.

Some positive correlations reflect atomic substitution within the mineral lattice of the carbonates: examples of this are Sr, Zn, and Fe for Ca; Mn for Fe; Cd for Zn; and Sr for Ba.

Of greater geological significance are the correlations reflecting diagenetic modification. Dolomitization in the Yellow Drum Sandstone is probably responsible for:

(a) the positive correlation of Fe and Mn with Mg.

(b) inverse relationship of Zn with Ca and Ca/Mg, the Zn presumably being more abundant in dolomitic beds; and

(c) the inverse relationship of Ca and Sr/Ca, which is probably caused by the leaching of Sr from the porous dolomitic limestones and its retention in more clayey varieties.

In the Gumhole Formation, Cu and Ca/Mg are inversely related which suggests that Cu is directly related to Mg content; however there is no significant relationship between Cu and either Ca or Mg so the relationship appears fortuitous.

Positive correlation of P with Mn in the Gumhole Formation, and P with Mn and Fe in the Laurel Formation, could reflect the presence of the diagenetic mineral vivianite, although this has not been substantiated. Most of the correlations involving P in the Fairfield Group do not reflect diagenesis but rather the presence of fossil fish fragments, seen in hand

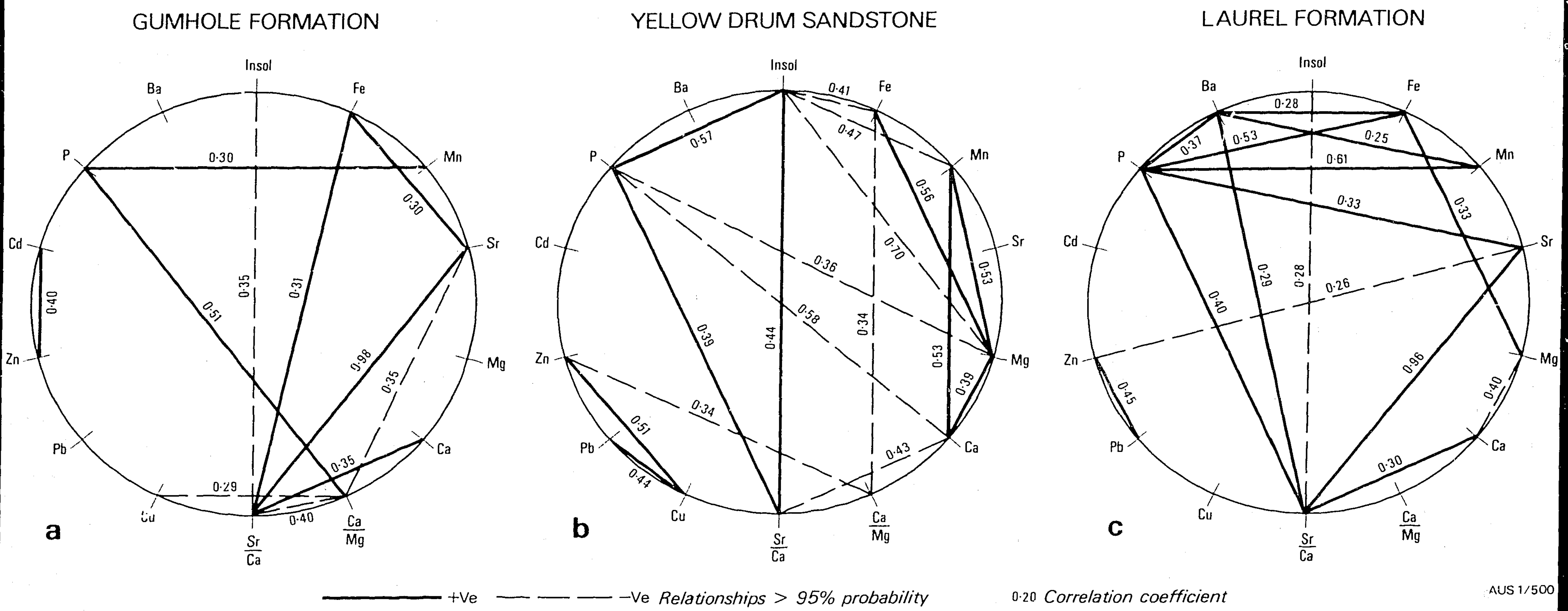


Fig 9. Statistically significant inter-element relationships in formations of the Fairfield Group.

specimen and acid residues, especially in the clastic beds of the Yellow Drum Sandstone.

Finally, secondary introduction of base metals is thought to be responsible for a positive correlation of Cu and Zn in the Yellow Drum Sandstone and a positive correlation of Pb and Zn in the Laurel Formation.

V ENRICHMENT OF BASE METALS

Within the Canning Basin sulphide mineralization is known in the Upper Devonian reef complex at Narlarla (Fig. 1). The deposit consisted of two orebodies, the lower of which yielded about 11 000 tons of lead-zinc ore. The deposit was examined in detail by Gellatly (1970) who concluded that it was of 'Mississippi Valley type', similar to the lead-zinc deposits of Pine Point (Canada), Tynagh (Ireland) and the Tri-State area of the Mississippi Valley. Other minor mineral occurrences from the Canning Basin Devonian reefs are tabulated by Gellatly (op. cit.).

The oldest part of the Fairfield Group overlies, and probably interfingers with, the reef-complex and, being calcareous, might have added as a host rock for later mineralization. One of the objectives of the geochemical analysis was to determine the role that the Fairfield Group played, either as host or conduit, in the mineralization of the reef complex. The ranges of values and means for Pb, Zn, and Cu are presented in Figure 10 Cumulative frequency curves were used to determine the number of populations present.

(i) Lead

The cumulative frequency curves for Pb in each formation (Fig. 11) are complex, but all show more than one population. The Laurel Formation, and the Yellow Drum Sandstone, show the presence of two populations; the Gumhole curve is more complicated, with a peculiar stepped distribution of points, rather than distinct lines of different gradients. This results from greater than normal increases in the amount of Pb in groups of samples. Assuming that a single population is present at the time of deposition in this open system, and that that population is the lowest, then further populations are due to subsequent enrichment, possibly as a result of the introduction of metal-rich fluids.

The Gumhole Formation has the highest concentrations of Pb with a mean of 36 ppm, and a maximum of 670 ppm (Fig. 10). In one numerical analysis, using the MULCLAS program, Pb was one of the significant factors in keeping the Gumhole Formation samples apart from those of the Laurel Formation.

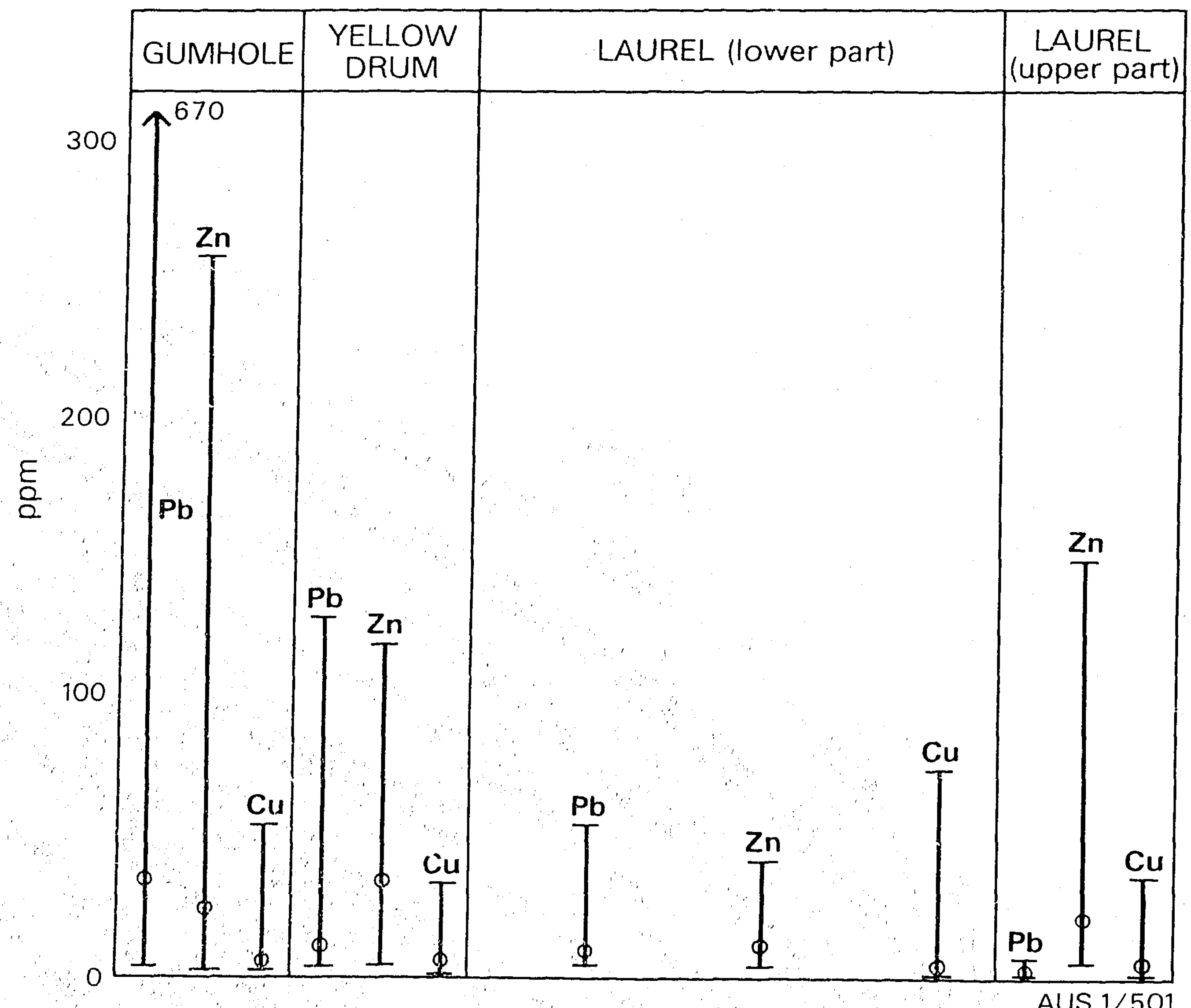


Fig 10. Means and ranges of Cu, Pb and Zn in the Fairfield Group.

The means and maximum values of Pb decrease upward through the sequence, the lowest values are in the upper part of the limestone member of the Laurel Formation with a mean of 2 ppm and maximum value of 8 ppm. The Yellow Drum Sandstone has a mean of 13 ppm, and a maximum of 130 ppm.

Geographic variations of Pb in the Gumhole Formation, show no significant trends (Table 2).

Three samples yielded anomalously high Pb values (Appendix II). Samples WCB010/8 and WCB219/12 are skeletal grainstones, sample WCB001/8 is an ooid packstone. The three samples all exhibit the following properties: (i) moderate to very good original porosity and permeability, (ii) early cementation, initially ferroan calcite, (iii) later solution, which increased porosity, and (iv) minor disseminated replacement of grains and cement by opaque grains, possibly sulphides. Most significant are the initial and secondary porosities, which are suitable for the migration of possible lead-enriched solutions. For this reason the oolitic rocks generally contain higher Pb and Zn (Table 7).

(ii) Zinc

The Zn cumulative-frequency curves (Fig. 11) are similar to the Pb curves, and show mixed populations for all units. There are possibly two populations in the Yellow Drum Sandstone and the Gumhole Formation.

The Yellow Drum Sandstone has the highest mean (34 ppm), but the highest individual value (260 ppm) is from the Gumhole Formation (Fig. 10). The Laurel Formation has a low mean (11 ppm), although in BMR Lennard River No. 2 the upper part of the unit has a mean of 21 ppm and a highest value of 150 ppm. The relatively higher geochemical values in the boreholes (which include 77% of the Yellow Drum Sandstone samples) suggest considerable leaching of Zn from the outcrop. Thus the mean value of 25 ppm for Zn in the surface samples of the Gumhole Formation may belie a higher value in the subsurface.

No population differences or patterns were apparent in the values for the five outcrop areas of the Gumhole Formation. The lowest mean, 20 ppm, was in the Oscar Hill area, the highest, 41 ppm was in the Red Bluffs area.

Five samples have anomalous values of Zn (Appendix II); one (WCB222/2) is a pelletal grainstone, whereas all others are skeletal limestones, usually with a mud matrix. All samples have had good porosity, either initially in the case of the grainstone, or later due to significant solution of matrix and cement. Other diagenetic features such as late-stage micritization, occurrence of minor disseminated sulphides, and late compaction effects are present in some, but not all, samples. Porosity is the only feature common to the samples and may be the prime factor involved in the occurrence of anomalously high Zn values.

Zn values are generally highest in the oolitic and sandy dolomitic rocks of the Fairfield Group (Table 4), supporting the idea of porosity, both primary and secondary, being the major factor leading to the concentration of zinc.

(iii) Copper

Copper values are generally less than 10 ppm and the cumulative frequency curves (Fig. 11) show no obvious change in gradient for the Gumhole and Yellow Drum Sandstone; however, the points representing the Laurel Formation do not lie on a line suggesting that values are too low to make the cumulative frequency curves meaningful. Even so there are anomalous values of Cu present in samples from all units, and perhaps some minor Cu enrichment may have taken place.

The highest Cu value, 75 ppm, is from the Laurel Formation, but the highest mean (7 ppm) is from the Yellow Drum Sandstone. Means for the other units are 4-5 ppm.

There are significant geographical variations of Cu in the Gumhole Formation; the mean of 11 ppm at Red Bluffs is double the means for other areas of outcrop and could be related to a greater supply of Cu from the Precambrian provenance in that area.

Five samples have anomalously high Cu values, but they lack common petrographic features (Appendix II). Sample WCB10/29 is a diagenetic micrite of uniform fabric with finely scattered opaque minerals, probably sulphides; no original fabric is preserved. Sample WCB019/2 is an altered skeletal wackestone, and is partly micritized and compacted, with the development of stylolites. Samples WCB015/1, WCB213/2, WCB214/1 are grainstones with good

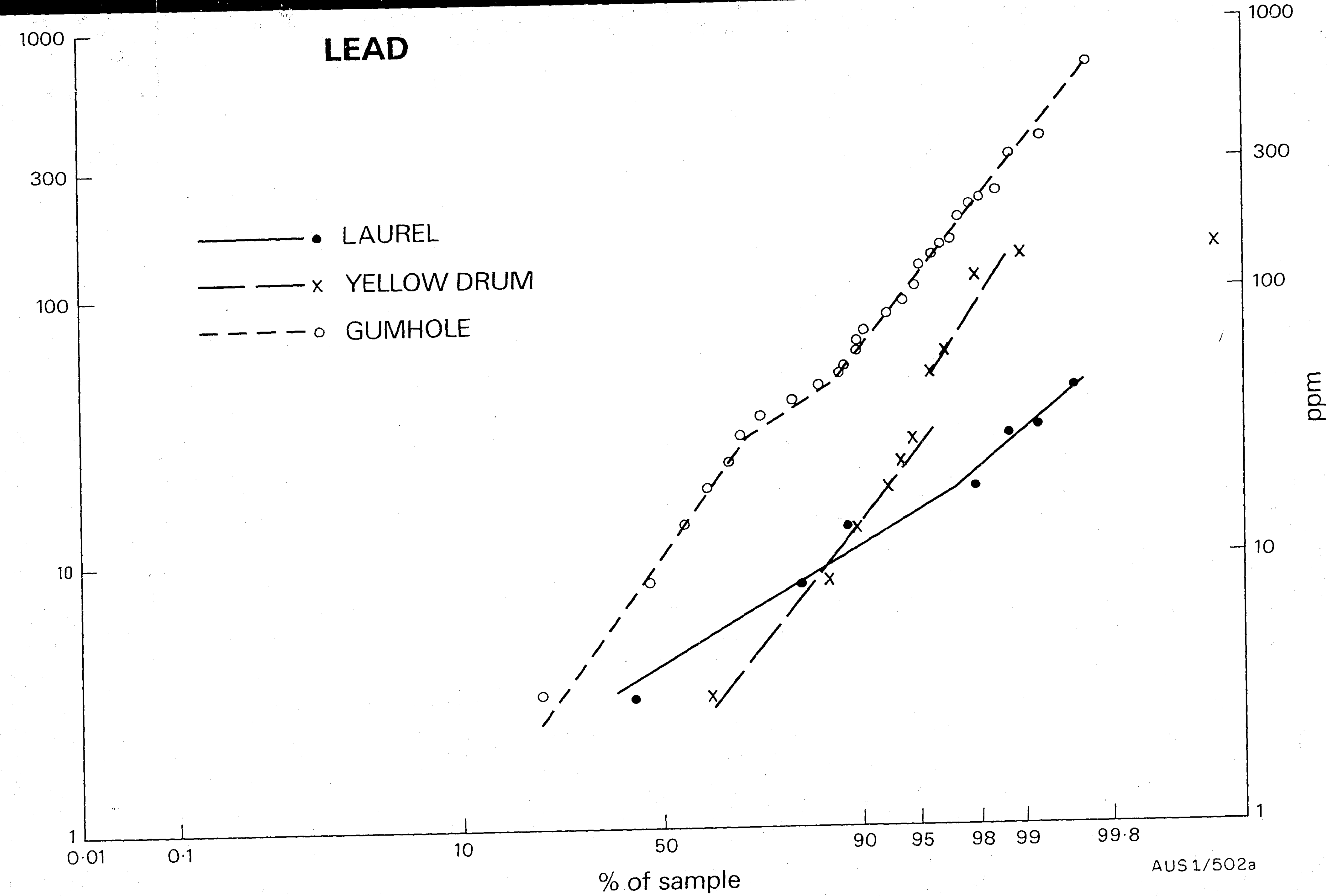
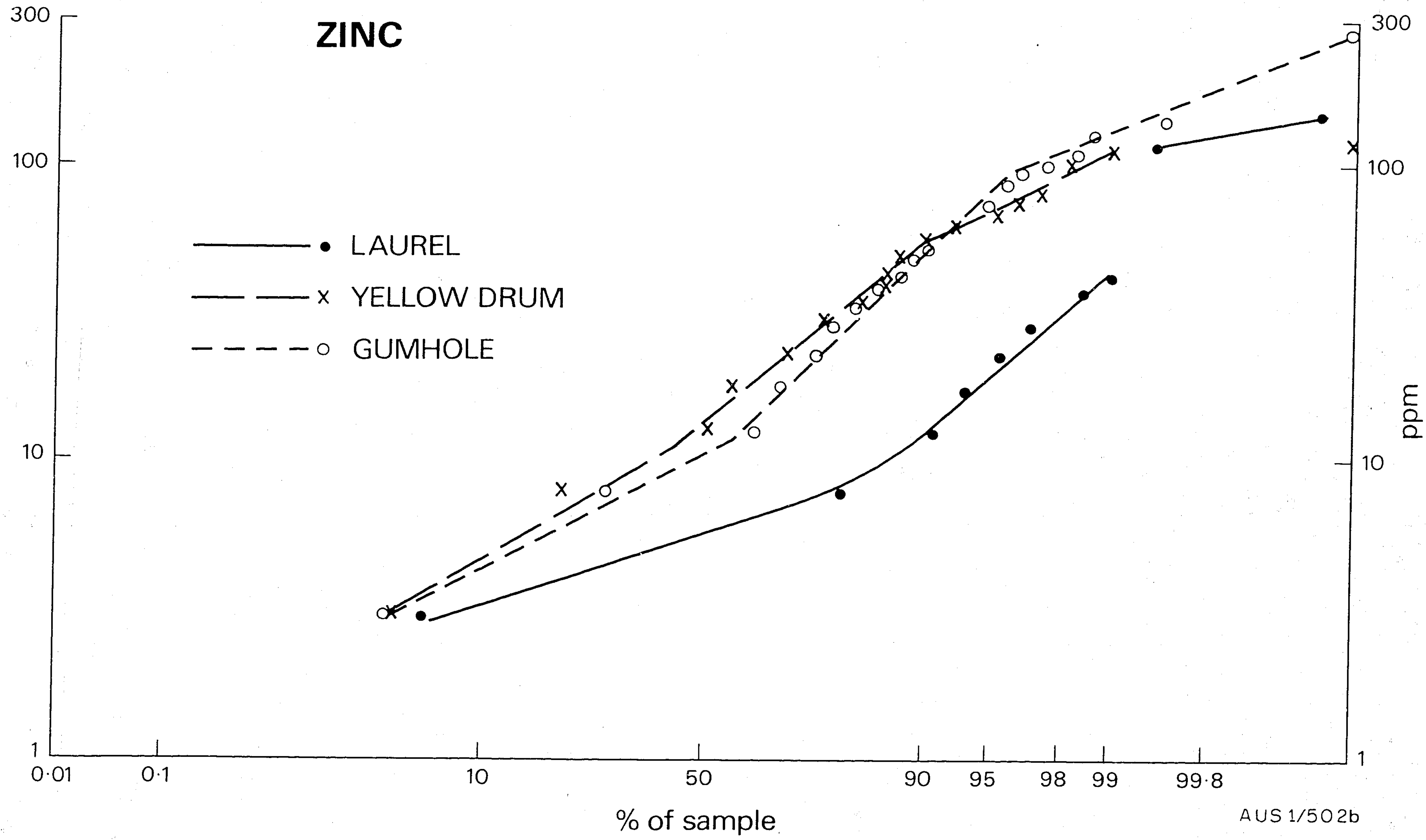


Fig 11. Cumulative frequency plots in the Fairfield Group (a) Pb



ZINC
LAUREL
YELLOW DRUM
GUMHOLE
300
100
10
1
300
100
10
1
ppm
0·01
0·1
10
50
90
95
98
99
99·8
% of sample
AUS 1/502b

FIG. 11(b) Zn

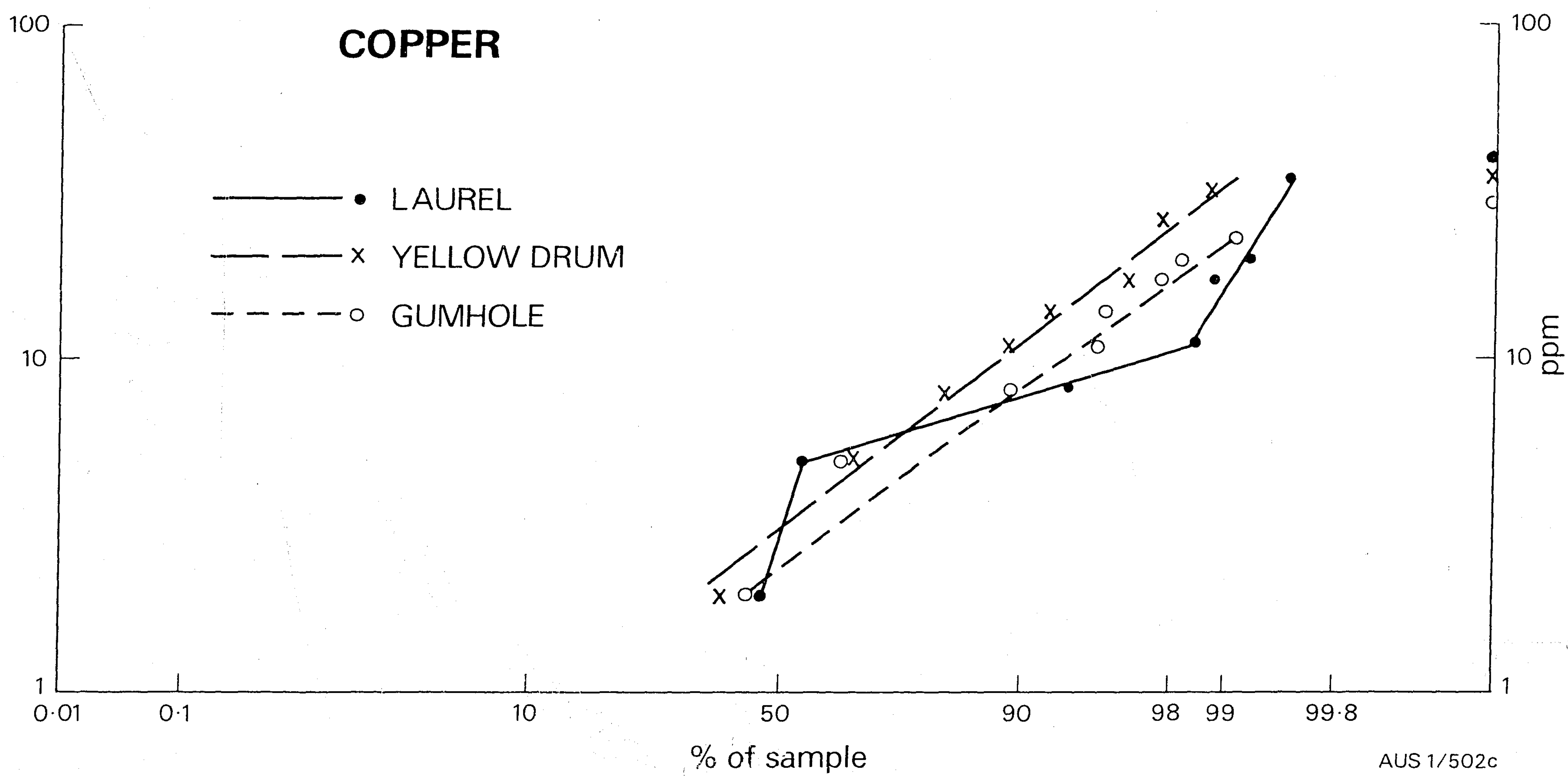

COPPER
LAUREL
YELLOW DRUM
GUMHOLE
100
10
1
ppm
0·01
0·1
10
50
90
98
99
99·8
% of sample
AUS 1/502c

FIG. 11(c) Cu.

initial porosity which may account for copper enrichment by suitable migrating solutions. A general explanation for the anomalous copper values is not evident.

(iv) Remarks

The cumulative frequency curves suggest that mixed populations for copper, lead and zinc are present; this may be due to post-depositional enrichment. It is, however, based on the assumption that the population with lowest values is the population at the time of deposition, and higher value populations are due to enrichment; the converse could arise where the low value population is due to leaching of the original (and thus high value) population.

In general the number of populations, their means and highest values all decrease in each successive stratigraphic unit. Pb and Zn are significant in the Gumhole Formation and Yellow Drum Sandstone, whereas Cu becomes significant in the Laurel Formation.

On the assumption that the populations represent enrichment from fluids, several phases may have affected the Gumhole Formation, whereas only one phase is apparent in the Laurel Formation and the Yellow Drum Sandstone.

If the Gumhole Formation and Yellow Drum Sandstone acted as conduits for mineralizing fluids then significant mineralization could be expected at the interfingering contact with the Late Famennian birdseye limestone. This would occur in all areas except where there are normal faults to the southwest of the ranges forming the Late Devonian reef-complex such as in the Oscar Range area, where the Gumhole Formation and Yellow Drum Sandstone are faulted against the "Luluigui Formation equivalent", a grey-green impervious shale. Significant mineralization could occur along this fault line where large carbonate bodies are in contact with this shale, or where Fairfield Group sediments are brought into contact with the underlying reef complex.

The regional geology suggests that the areas most likely to have significant mineralization are the Napier Range, the northern edge of the Oscar Range, the Horseshoe Range, and the Red Bluffs. The variations in amounts of base metals in the Gumhole Formation show that Pb is relatively more abundant in the Horseshoe Range, and Cu and Zn are significantly higher in the Red Bluffs area. Zn is also relatively abundant in the Station Creek area (Napier Range), where it is significantly higher than in all other areas except Red Bluffs.

VI COMPARATIVE GEOCHEMISTRY

Comparisons are made with three major works: a tabulation of nearly 100 analyses of carbonate sediments and rocks by Graf (1960), a comprehensive study of Russian Platform carbonate geochemistry by Vinogradov & Ronov (1960), and an analysis of chemical attributes of rocks of similar lithology and ages preserved in a similar tectonic setting from the Bonaparte Gulf Basin of Australia (Veevers, 1969). This is summarized in Table 3.

(i) Comparison with analyses quoted by Graf

Some difficulty is encountered in comparing our results with those of Graf (1960). The major element determinations (expressed as oxides) in each table are often made from a single sample and thus are not readily comparable with our figures which are means from a total of 561 samples. Minor element geochemistry is presented in Graf, but determinations are from different samples for which no major element geochemistry is reported. However, these figures, expressed in terms of elements, are for numbers of samples and Graf has calculated means from all available data.

Graf's figures suggest that chemically precipitated rocks, particularly oolites, are relatively pure, with an average Ca value of about 39 percent, whereas in skeletal and arenaceous limestones the value is about 33 percent. Our samples are broadly similar to the latter group and have Ca values of similar magnitude (34.7 percent for the Gumhole, 34.5 percent for the Laurel). Ca values are lower in the Yellow Drum Sandstone, reflecting the increased presence of clastic sediments and dolomite.

Values for Mn in the Fairfield Group are generally high, although those from the Yellow Drum Sandstone and Laurel Formation are of the same order; Gumhole values are conspicuously higher, and of the same order as values from lake and deep ocean sediments (cf. Graf, 1960, analyses 17, 21, 28).

Minor element concentrations are generally within the averages quoted by Graf (1960, Table 38), apart from Pb in the Gumhole Formation which is conspicuously high; Zn in the Yellow Drum Sandstone, which is slightly higher than average; and conspicuously low Ba in the Yellow Drum Sandstone and the Laurel Formation.

TABLE 3. COMPARISON OF MEANS OF ELEMENTS FOR CARBONATE ROCKS, AUSTRALIA, USSR, AND NORTH AMERICA

		This paper			Veevers (1969)	Vinogradov & Ronov (1956) USSR		Graf (1960)	
NO OF ANALYSES		Gumhole Formation 228	Yellow Drum Sandstone 105	Laurel Formation 228	Bonaparte Gulf Basin 103	U. Devonian 68	L. Carboniferous 26	L. Carboniferous oolite Illinois (38)	L. Carboniferous skeletal Lst., Illinois (51)
	INSOLUBLE	13.3	24.6	12.76	NA	11.05	4.83	NA	NA
	Fe	0.14	0.21	0.06	.115	1.48*	1.08*	0.22*	0.30*
	Mn	0.14	0.04	0.04	.035	.041ø		.015*	0.015*
%	Sr	0.02	.018	0.03	0.03	0.045	0.04	NA	NA
	Mg	0.17	5.9	0.53	0.9	4.46*	6.3*	0.31*	0.65*
	Ca	34.7	22.2	34.5	31.7	26	29	39.3*	33.4*
	P	282	90	352	200	392*	130*	87*	742*
								(Table 38)	
	Cu	5.4	7.2	5.2	10	NA	NA	14 ± 9	
ppm	Pb	35.9	12.6	9.6	10	NA	NA	8 ± 4	
	Zn	25.3	33.7	11.1	2.5 (12+)+	NA	NA	26 ± 5	
	Cd	.05	-	.004	NA	NA	NA	0.1 - 0.2 ?	
	Ba	138.5	31.9	89.5	52	44	5	150 ± 10	

ø Average figure for carbonates of all ages, Russian Platform (only figure available)

* Figures converted from oxides

\+ Figure in brackets from samples collected by us in 1972

NA Not available.

(ii) Bonaparte Gulf Basin

The geochemical study by Veevers (1969) on carbonates from the Bonaparte Gulf Basin provides useful comparative information; the analyses are elemental determinations and means were calculated for each element for the whole study, as well as for different carbonate lithologies. The multivariate statistical methods employed by Veevers were used by us; Veevers used a Control Data 3600 Computer. Veevers utilized attributes which included skeletal and non-skeletal grain types, terrigenous grain types, matrix, cement, and diagenetic minerals. He selected two different levels of information gain to determine meaningful groups; the higher information-gain level resulted in 20 groups which correspond to carbonate rock types: these are compared to similar groups from the Canning Basin.

A comparison between our means for each formation and the means for all Bonaparte Gulf Basin samples shows they are generally similar. Exceptions are high Mn, Ba, and Pb in the Gumhole Formation, and high Zn in the Gumhole and Yellow Drum Sandstone. P is relatively low in the Yellow Drum Sandstone.

The comparison between Veevers' major groups and similar lithological groups from the Fairfield Group are presented in Table 4. It should be noted that Veevers' samples were digested using acetic acid whereas we used dilute hydrochloric acid and concentrated perchloric acid. This probably accounts, in part, for the relatively higher values for insoluble residues from the Bonaparte Gulf Basin. However this difference in technique would increase Mg values for the Canning Basin relative to the Bonaparte Gulf Basin and thus the lower Mg values in the Canning Basin are real. For both basins the minor element values are similar for each carbonate lithology, although Pb and Zn are higher in the Canning Basin. Phosphate shows some relationship to lithology in both basins, being twice as high in skeletal and oolitic limestones as in the sparry lump (pellet) limestones; this is probably due to the presence of phosphatic skeletal fragments of fish, particularly in the skeletal limestones.

TABLE 4. COMPARATIVE GEOCHEMISTRY OF SIMILAR LIMESTONE TYPES FOR THE CANNING AND BONAPARTE GULF BASINS.

		LIMESTONE TYPES											
Statistically determined petrological groups of Veevers (V) and statistically determined groups of Radke (R)		sparry skeletal (V & R)		skeletal silty (R)	sandy lump sparry skeletal (V)	sandy oolitic (R)	oolitic skeletal (R)	oolitic skeletal algal micrite lump (V)	oolitic skeletal lump (R)	skeletal lump sparry (V & R)		sandy sparry dolomite (V & R)	
ATTRIBUTES	LOCATION OF GROUPS	Bonaparte Gulf Basin	Canning Basin (Gumhole)	Canning Basin (Laurel)	Bonaparte Gulf Basin	Canning Basin (Gumhole)	Canning Basin (Gumhole)	Bonaparte Gulf Basin	Canning Basin (Laurel)	Canning Basin (Laurel)	Bonaparte Gulf Basin	Yellow Drum Sst	Bonaparte Gulf Basin
	Insolubles	20.0	5.47	8.3	23.2	8.85	11.7	5.1	7.4	10.85	14.3	24.61	42.4
	Fe	0.2	0.137	0.07	0.15	0.136	0.14	.06	.025	.04	.15	0.21	
%	Mn	.067	0.153	.025	.042	0.182	.176	.02	.016	.02	0.026	0.04	.068
	Ca	30.9	37.84	33.8	29.9	36.4	35.2	37.1	37.3	35.9	33.8	22.1	15.1
	Mg	0.4	0.18	0.21	0.3	0.2	0.21	0.5	0.22	0.23	0.41	5.9	4.6
	Sr	.034	.026	.036	.04	.024	.024	.04	.029	0.27	.054	.018	.008
	Ba	84	73	13	96	215	271	21	10	12.3	77	32	47
	P	300	187	242	200	292	200	100	67	105	100	90	100
ppm	Cu		4.8	3.9		5	6.6		3.9	4		7.2	
	Pb	7.7	14.6	7.6	6.9	48	48	11.5	11.3	8.7	10	12.6	10.5
	Zn	1.4	10.5	8.0	1.5	13.7	29.4	2.5	8	11.6	1	33.7	5.4

(iii) Russian Platform

The geochemical data for carbonate rocks from the Russian Platform is extensive with over 7600 published analyses (Vinogradov & Ronov, 1960); additionally Vinogradov & Ronov report on averages from previously published analyses. In some cases the figures for the oxides vary considerably, even for rocks of the same age. Analyses of Lower Carboniferous samples show that MgO content varies between a mean of 10.52 percent for samples analysed by Vinogradov & Ronov, to 4.83 percent for previously published analyses.

However, in comparing the Russian Platform and Canning Basin data it is apparent that the Gumhole Formation contains abnormally high Mn and low Mg; Mg is also low in the Laurel Formation. In all the Fairfield Group units Fe and Sr are relatively low.

The distribution of Mn in the carbonate rocks of the Russian Platform was investigated by Ronov & Ermishkina (1959), who found that Mn values varied with respect to both the climatic conditions at the time of deposition and the relative distance of deposition from the shoreline. Highest values of Mn, of the order of 0.1 percent, are found in carbonates formed in coastal areas during periods of humid climatic conditions.

Druce & Radke (in press) conclude from the petrography of the Gumhole Formation that it was deposited in a coastal environment, thus supporting the environmental inference obtained from the geochemistry.

VII CONCLUSIONS

Stratigraphic units within the Fairfield Group can be differentiated using minor element geochemistry. The Gumhole and Laurel Formations are readily recognized by differences in their Fe and Mn concentration and these are manifest in the colour of the weathered rock. The higher Fe-Mn content of the cements in the Gumhole Formation impart a characteristic yellow brown colour to the weathered rock, whereas limestones from the Laurel Formation, with lower Fe-Mn concentrations, are typically grey to white.

Cumulative frequency diagrams for Pb, Zn and Cu indicate that all units of the Fairfield Group contain mixed populations of these elements, which could result from the passage of mineral-rich fluids through the sequence.

Furthermore the geochemical information, particularly the high Mn values, is pertinent to the interpretation of the environment of deposition. Carbonate geochemistry can be used successfully, as an adjunct to petrology and palaeontology, in interpreting the geological history of a carbonate sequence.

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APPENDIX 1. STATISTICAL EVALUATION OF THE PRECISION OF THE GEOCHEMICAL ANALYSES: FAIRFIELD GROUP, CANNING BASIN

Elements determined		Element concentrations of the Standard	determined value (mean)	One Standard deviation	Number of determinations n	Precision (1 SD expressed) as % of mean)
GROUP 1	Total summation		100.81%	1.11%	180	1.10
		ppm	ppm	ppm		
GROUP 2	Cu	430	433	± 4.5	50	1.0
	Pb	45	49	± 2	50	4.0
	Zn	320	321	± 3	50	0.9
	Cd	1	1	-	-	-
	Ba	200 ± 10	202	± 7	50	3.5
P (3 standards)		390	378	± 23	8	6.0
		85	74	± 3	8	4.0
		300	304	± 11.5	33	3.8

APPENDIX II

LOCATION OF SAMPLES WITH ANOMALOUS VALUES OF BASE METALS

Anomalous samples referred to in the test have values of more than two standard deviations above the mean of the element in question. Listed below are the anomalous samples and localities. Section localities are available in Druce & Radke (in prep.).

001/8	(Pb)	Gumhole type section, Gumhole Bore
010/8	(Pb)	Gumhole Formation, Station Creek
010/29	(Cu)	Gumhole Formation, Station Creek
015/1	(Cu)	Gumhole Formation, Red Bluffs
019/1	(Zn)	Gumhole Formation, Lennard River west of Winjana Gorge
019/2	(Cu)	Gumhole Formation, Lennard River west of Winjana Gorge
019/3	(Zn)	Gumhole Formation, Lennard River west of Winjana Gorge
201/6	(Zn)	Gumhole Formation, Gumhole Bore
213/2	(Cu)	Gumhole Formation, Oscar Hill
214/1	(Cu)	Gumhole Formation, Oscar Hill
218/3	(Zn)	Gumhole Formation, North of Horseshoe Range
219/12	(Pb)	Gumhole Formation, East of Horseshoe Range
222/2	(Zn)	Gumhole Formation, central Horseshoe Range

APPENDIX III

GEOCHEMICAL SAMPLE DATA

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960001	001/1	Gumhole	Sandstone	56.1	.074	.086	17.2	.12	.007	240	220	8	<5	12	90.7	.19
002	2	"	Sandstone	57.5	.066	.105	17.1	.08	.007	25	560	5	<5	12	134.7	.19
003	3	"	Sandstone	53.4	.060	.097	18.6	.07	.007	35	230	8	10	18	154.6	.17
004	4	"	ooid grainstone	18.9	.120	.280	31.8	.18	.014	700	380	8	35	10	110.2	.20
005	5	"	calcareous sandstone	48.6	.057	.085	19.9	.08	.005	45	160	8	10	12	154.8	.11
006	6	"	calcareous sandstone	53.0	.068	.096	18.2	.08	.005	40	350	5	5	22	141.5	.13
007	7	"	sandy ooid grainstone	26.4	.110	.250	29.6	.09	.014	235	320	8	90	12	193.1	.22
008	8	"	packstone	3.5	.145	.220	38.6	.13	.020	75	100	5	310	10	187.3	.24
009	9	"	brachiopod-crinoid grainstone	11.5	.155	.360	35.9	.16	.020	600	280	5	5	12	136.1	.25
010	10	"	sandy ooid brachiopod grainstone	14.4	.094	.220	34.3	.10	.014	420	290	5	210	12	208.1	.19
011	11	"	sandy skeletal grainstone	16.5	.170	.340	32.1	.08	.020	140	330	8	25	8	252.9	.29
012	13	"	sandy skeletal grainstone	31.9	.110	.250	26.6	.08	.010	120	350	10	60	8	199.2	.17
013	14	"	sandy ooid grainstone	25.9	.165	.260	30.3	.09	.015	115	360	10	45	15	197.6	.23
014	15A	"	ooid grainstone	15.5	.175	.300	33.8	.12	.015	210	280	10	45	22	170.9	.20
015	15B	"	bioclastic pelletal packstone	3.9	.065	.053	36.4	.40	.084	105	160	8	15	12	58.2	1.0
016	16	"	skeletal grainstone	2.7	.260	.135	38.9	.20	.039	45	150	2	40	38	118.0	.46
017	17	"	skeletal grainstone	5.8	.260	.230	37.9	.19	.038	95	230	2	<5	12	124.3	.46
018	002/1	"	ooid grainstone	8.8	.200	.260	37.0	.16	.022	240	180	2	10	22	140.3	.27

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960019	002/2	Gumhole	ooid grainstone	14.8	.155	.270	33.9	.12	.018	75	240	8	25	40	171.4	.24
020	3	"	ooid grainstone	15.3	.125	.210	34.4	.15	.016	75	210	12	35	32	139.1	.21
021	4	"	sandy ooid grainstone	10.9	.115	.195	35.3	.11	.015	35	210	8	45	60	203.9	.19
022	5	"	skeletal grainstone	5.2	.087	.220	38.4	.12	.017	40	320	8	35	12	194.1	.20
023	6	"	sandy skeletal grainstone	16.1	.120	.240	33.4	.13	.017	410	260	5	25	12	155.9	.23
024	7	"	skeletal grainstone	9.4	.089	.165	35.0	.32	.014	800	330	5	60	12	66.4	.18
025	9	"	skeletal biosparite grainstone	14.8	.100	.150	34.1	.10	.012	220	600	12	45	32	211.1	.16
026	10	"	oolitic skeletal grainstone	6.0	.100	.170	37.1	.11	.016	155	260	8	35	12	214.3	.20
027	11	"	skeletal packstone	1.8	.096	.079	39.1	.20	.025	125	110	5	12	12	121.6	.29
028	12	"	skeletal grainstone	1.8	.105	.077	39.0	.13	.027	60	210	2	8	12	182.0	.32
029	13	"	intraclastic crinoidal grainstone	1.7	.071	.066	39.5	.15	.023	<10	110	2	< 5	18	159.7	.27
030	003/1	"	oolite	24.2	.155	.310	30.1	.14	.021	20	490	12	80	55	130.4	.32
031	2	"	calcarenite	5.1	.125	.135	37.8	.21	.019	120	200	2	15	12	109.2	.23
032	3	"	calcarenite	5.0	.120	.165	37.7	.17	.028	70	450	2	15	8	134.5	.34
033	4	Yellow Drum	dolomite	15.3	.220	.030	24.7	6.75	.010	20	120	5	< 5	12	2.2	.19
034	5	"	dolomite	8.1	.260	.034	21.2	11.50	.007	10	30	5	< 5	12	1.1	.15
035	004/1	"	dolomitic calcrete	7.5	.200	.032	21.2	11.50	.007	<10	40	5	5	8	1.1	.15
036	2	"	sandstone	21.4	.180	.023	18.1	9.50	.005	20	70	2	<5	8	1.2	.13

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960037	004/3	Yellow Drum	silty limestone	9.2	.180	.039	33.0	3.15	0.14	40	40	5	10	22	6.4	.19
038	4	"	micrite	12.0	.057	.027	34.7	0.43	0.24	<10	100	5	<5	12	49.0	.32
039	5	"	intraclastic grainstone?	9.7	.059	.023	35.6	0.28	0.20	20	100	5	10	12	77.1	.26
040	6	"	micrite	15.7	.076	.024	32.5	1.05	.002	25	120	8	8	15	18.8	.03
041	7	"	micrite	13.6	.097	.028	34.6	0.48	.017	75	70	8	8	30	43.7	.22
042	8	"	limestone	4.7	.115	.031	38.4	0.34	.027	<10	70	12	10	30	68.5	.32
043	9	"	micrite	10.3	.076	.025	35.1	0.39	.025	25	60	5	<5	12	54.6	.33
044	10	"	micrite	11.3	.074	.024	34.9	0.25	.014	65	50	8	<5	12	84.7	.18
045	11	"	intraclastic grainstone	30.0	.064	.019	28.3	0.14	.013	10	120	5	<5	8	122.6	.21
046	005/1	"	calcilutite	18.8	.061	.029	33.0	0.16	.019	25	80	5	8	18	125.1	.26
047	2	"	calcilutite (caliche)	15.0	.043	.010	33.9	0.68	.026	90	50	8	10	12	30.2	.35
048	3	"	coquinite	4.0	.175	.150	38.5	0.22	.032	195	140	10	140	60	106.2	.38
049	4	"	calcarenite	23.0	.230	.100	22.3	6.20	.021	890	1550	8	12	12	2.2	.43
050	5	Gumhole	limestone conglomerate	16.2	.036	.010	33.3	0.38	.019	70	90	8	<5	12	53.2	.26
051	6	"	sandstone	47.4	.200	.096	15.4	3.75	.043	1100	1550	5	130	18	2.5	1.28
052	7	"	coquinite	9.3	.340	.220	34.5	1.80	.034	90	460	5	45	15	11.6	.45
053	006/1	Laurel	biosparite	3.0	.020	.015	39.5	0.20	.038	<10	230	5	20	25	119.8	.44
054	2	"	calcarenite	23.4	.038	.017	30.3	0.23	.041	10	250	5	15	8	79.9	.62

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960055	006/9	Laurel	calcarenite	5.4	.033	.018	37.8	.40	.064	45	370	2	10	8	57.3	.77
056	11	"	calcarenite	5.3	.030	.012	37.6	.20	.064	20	280	2	10	8	117.1	.78
057	13	"	calcarenite	4.4	.130	.025	37.9	.20	.062	430	1040	2	10	8	117.9	.75
058	15	"	coquinite	11.6	.145	.115	36.2	.10	.029	280	760	2	8	12	224.1	.37
059	007/1	"	sandstone	30.8	.056	.038	27.2	.14	.018	140	200	2	8	12	117.8	.30
060	3	"	calcarenite	15.8	.043	.020	33.9	.21	.027	45	210	8	8	8	97.9	.36
061	4	"	calcilutite	25.1	.054	.019	29.5	.14	.020	150	310	12	8	10	127.8	.31
062	5	"	calcilutite	40.2	.048	.014	24.2	.14	.017	15	230	10	8	10	104.8	.32
063	6	"	biosparite	10.3	.033	.012	36.0	.24	.031	15	170	2	<5	8	100.0	.39
064	7	"	calcarenite	11.6	.035	.016	35.8	.22	.033	60	320	2	<5	8	98.7	.42
065	8	"	calcarenite	32.2	.039	.020	26.3	.14	.017	40	230	2	8	8	113.9	.30
066	9	"	calcarenite	20.9	.027	.015	31.9	.18	.028	165	200	2	<5	8	107.5	.40
067	10	"	calcarenite	10.7	.024	.013	35.9	.21	.035	15	150	2	10	8	103.7	.45
068	11	"	calcarenite	22.7	.033	.020	31.1	.19	.025	40	180	2	<5	8	99.3	.37
069	12	"	calcarenite	22.7	.029	.013	31.7	.22	.027	25	260	5	8	8	87.4	.39
070	13	"	calcarenite	22.2	.029	.014	31.2	.20	.028	15	170	5	<5	8	94.6	.41
071	14	"	calcarenite	11.3	.026	.010	35.1	.23	.031	20	230	2	<5	5	92.6	.40
072	15	"	calcarenite	5.3	.028	.010	38.3	.23	.038	25	200	2	<5	5	101.0	.45

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca \times 10^{-3}$
72960073	007/16	Laurel	calcarenite	7.1	.031	.011	37.7	.24	.043	10	130	2	8	8	95.3	.52
074	17	"	biosparite	5.1	.023	.010	37.3	.29	.053	10	330	2	8	8	78.0	.65
075	18	"	coquinite	6.2	.014	.011	37.5	.32	.052	10	360	2	8	8	71.1	.63
076	19	"	calcarenite	11.2	.030	.013	35.9	.21	.052	10	330	2	10	8	103.7	.66
077	20	"	coquinite	13.5	.038	.012	34.7	.20	.041	10	520	2	<5	8	105.2	.54
078	21	"	coquinite	6.0	.036	.015	37.1	.24	.045	10	390	2	8	8	93.8	.55
079	22	"	calcarenite	6.4	.030	.010	37.3	.24	.051	10	320	2	8	10	94.3	.63
080	23	"	calcarenite	4.2	.027	.012	38.0	.30	.075	10	330	2	<5	8	76.8	.90
081	26	"	calcarenite	6.8	.033	.012	36.1	.24	.052	10	660	2	<5	8	91.2	.66
082	27	"	calcarenite	13.1	.031	.017	35.0	.21	.060	10	430	2	<5	8	101.1	.78
083	28	"	calcarenite	21.8	.036	.020	31.6	.18	.030	20	650	2	<5	8	106.5	.43
084	29	"	calcarenite	5.9	.047	.022	37.0	.20	.047	30	590	2	8	8	115.1	.58
085	30	"	calcarenite	7.4	.065	.010	36.1	.15	.051	10	590	2	<5	8	146.0	.65
086	31	"	calcarenite	9.2	.047	.016	34.9	.36	.042	10	600	2	8	8	58.8	.55
087	32	"	calcarenite	7.5	.040	.018	37.0	.18	.050	50	870	2	<5	8	124.7	.62
088	33	"	calcarenite	6.5	.040	.013	37.5	.20	.057	870	760	2	<5	8	113.7	.70
089	34	"	biosparite	4.0	.038	.011	39.1	.19	.062	45	500	2	<5	8	124.8	.73
090	35	"	calcarenite	5.2	.040	.015	37.8	.20	.068	10	260	2	<5	8	114.6	.82

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960091	007/36	Laurel	Biosparite	3.6	.043	.017	38.2	.19	.059	30	360	2	10	12	122.0	.71
092	37	"	biosparite	3.1	.044	.023	38.4	.19	.070	10	1350	5	10	12	122.6	.83
093	38	"	calcarenite	3.5	.041	.019	37.9	.25	.081	15	1350	2	8	10	91.9	.98
094	39	"	calcarenite	8.7	.019	.018	37.2	.06	.016	170	890	8	10	12	402.9	.20
095	40	"	calcarenite	7.4	.036	.038	36.9	.16	.044	110	500	8	10	10	139.9	.55
096	41	"	calcarenite	7.5	.039	.082	37.1	.34	.074	15	150	2	<5	10	66.2	.91
097	45	"	biosparite	7.0	.061	.024	37.6	.13	.058	30	460	2	<5	10	182.5	.71
098	46	"	biosparite	6.8	.075	.043	37.8	.09	.053	250	1950	8	<5	12	246.5	.64
099	008/1	Yellow Drum?	calcarenite	3.2	.017	.019	39.5	.18	.029	<10	130	2	<5	12	133.1	.34
100	2	"	calcarenite	4.3	.019	.018	38.9	.18	.026	<10	130	2	8	12	131.1	.31
101	3	"	limestone	22.0	.068	.052	31.9	.19	.018	65	50	5	8	15	101.8	.26
102	4	"	coquinite	12.7	.035	.030	34.8	.28	.036	105	190	8	<5	12	75.4	.47
103	5	"	dolomite	41.0	.030	.024	23.8	.07	.014	35	130	2	5	8	203.3	.27
104	6	"	biosparite	20.8	.029	.017	31.4	.14	.023	15	100	2	8	12	141.1	.34
105	7	"	sandstone	26.4	.051	.033	28.6	.09	.022	20	1000	2	<5	8	184.6	.35
106	8	"	micrite	12.7	.053	.040	35.4	.28	.010	80	90	2	10	22	76.7	.13
107	010/1	Gumhole	limestone	26.6	.099	.180	29.2	.13	.025	840	500	10	65	30	136.2	.39
108	2	"	biosparite	7.7	.220	.280	36.3	.14	.033	280	120	2	140	45	157.3	.42

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960109	010/3	Gumhole	biosparite	5.2	.170	.170	38.3	.17	.026	230	350	8	60	30	140.8	.31
110	4	"	biosparite	11.9	.210	.190	35.8	.16	.033	225	280	8	180	75	140.1	.42
111	5	"	biosparite	4.2	.210	.220	38.7	.17	.026	260	290	8	80	12	138.1	.31
112	6	"	biosparite	4.4	.135	.094	38.9	.12	.024	190	140	2	150	60	205.2	.28
113	7	"	oosparite	4.9	.165	.105	38.6	.13	.035	135	160	18	35	65	180.1	.41
114	8	"	biosparite	5.0	.200	.175	38.1	.17	.028	155	90	8	360	65	135.9	.34
115	9	"	biosparite	23.2	.195	.125	31.1	.17	.038	50	140	8	25	12	114.3	.56
116	10	"	biosparite	3.4	.140	.063	39.1	.26	.053	<10	180	2	15	10	91.2	.62
117	11	"	biosparite	2.8	.135	.059	39.2	.29	.041	10	90	2	15	12	82.0	.48
118	12	"	biocalcarenite	5.1	.115	.044	38.1	.27	.042	20	30	2	8	12	85.6	.50
119	13	"	micrite	5.4	.066	.020	37.8	.27	.038	15	70	8	25	65	84.9	.46
120	14	"	calcarenite	5.5	.100	.059	37.8	.27	.080	15	680	2	10	12	84.9	.97
121	15	"	calcarenite	2.2	.115	.065	38.3	.28	.069	55	160	8	15	12	82.9	.82
122	16	"	limestone	2.0	.100	.063	39.4	.26	.092	10	210	2	15	18	91.9	1.07
123	17	"	limestone	2.1	.093	.049	39.4	.26	.064	<10	130	8	25	12	91.9	.74
124	18	"	micrite	16.6	.055	.021	33.1	.33	.023	130	130	8	15	65	60.8	.32
125	19	"	micrite	9.6	.056	.026	36.2	.37	.007	90	90	8	8	18	59.4	.09
126	20	"	biosparite	10.4	.105	.086	36.3	.27	.037	155	100	8	15	12	81.6	.47

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960127	010/21	Gumhole	biosparite	1.6	.095	.041	39.3	.22	.068	10	140	2	5	12	110.9	.79
128	22	"	biosparite	11.0	.105	.074	36.3	.20	.032	155	80	2	10	12	112.9	.40
129	23	"	biosparite	3.1	.089	.071	38.6	.28	.062	65	130	2	20	8	83.6	.73
130	24	"	biosparite	3.3	.087	.061	38.6	.30	.037	10	150	2	15	12	78.1	.44
131	25	"	biosparite	2.9	.110	.074	39.0	.31	.041	45	190	2	15	8	76.3	.48
132	26	"	biosparite	1.3	.110	.067	39.5	.24	.040	110	130	2	10	12	99.8	.46
133	27	"	oolite	4.7	.099	.067	38.4	.20	.019	130	120	5	<5	12	116.5	.23
134	28	"	biosparite	5.3	.078	.075	37.2	.30	.011	285	60	10	15	50	75.2	.14
135	29	"	limestone	11.3	.052	.033	35.4	.54	.003	100	90	28	10	38	39.8	.04
136	30	"	biosparite	61.9	.039	.028	15.2	.11	.003	100	40	2	18	8	87.8	.09
137	31	"	micritic limestone	27.1	.035	.024	29.6	.19	.003	385	400	2	8	12	97.1	.05
138	32	"	sandstone	62.4	.042	.021	14.2	.06	.005	35	50	2	<5	8	136.7	.16
139	33	"	sandstone	54.7	.061	.024	18.1	.11	.006	35	40	2	10	8	104.6	.15
140	34	Yellow Drum	sandstone	60.5	.064	.049	15.1	.10	.003	145	100	2	<5	8	93.5	.09
141	35	"	sandstone	46.7	.059	.034	21.4	.14	.002	80	90	8	10	12	92.7	.04
142	36	"	limestone	33.5	.040	.026	26.6	.17	.004	310	150	8	5	12	94.9	.07
143	37	"	biosparite	20.5	.078	.042	30.8	.13	.023	40	90	2	8	8	149.5	.34
144	38	"	coquinite	13.4	.081	.047	35.5	.17	.028	30	120	2	10	5	130.5	.36

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960145	010/39	Yellow Drum	biosparite	18.6	.059	.061	31.3	.12	.022	100	160	2	8	8	165.1	.32
146	40	"	biosparite	1.7	.047	.105	39.4	.25	.027	150	70	2	10	8	95.6	.31
147	41	Laurel	micrite	5.6	.062	.043	37.6	.17	.026	25	50	2	8	12	134.2	.32
148	42	"	micrite	3.3	.050	.038	39.0	.28	.058	20	60	2	8	12	84.5	.68
149	011/1	"	calcilutite	8.1	.053	.067	37.1	.21	.022	195	160	8	35	28	107.2	.27
150	2	"	limestone	9.2	.043	.027	36.7	.21	.024	<10	70	2	8	12	106.0	.30
151	3	"	limestone	[illegible] 2	.039	.024	24.8	.11	.015	40	220	2	8	12	143.3	.28
152	012/1	Gumhole	biosparite	1.	.105	.105	39.4	.19	.039	10	40	2	35	55	129.2	.45
153	2	Laurel?	biosparite	1.6	.038	.018	39.4	.25	.031	25	20	2	8	10	95.6	.36
154	3	Laurel	biosparite	16.2	.043	.032	33.8	.11	.018	55	90	18	100	12	195.3	.24
155	013/1	"	biosparite	28.5	.041	.016	28.6	.09	.016	10	120	2	<5	8	197.1	.26
156	2	"	biointraclastic limestone	10.1	.043	.030	36.3	.19	.026	20	100	2	8	12	115.9	.33
157	6	"	sandstone	43.1	.064	.036	23.2	.08	.011	10	90	2	10	8	187.	.22
158	10	"	sandstone	37.0	.062	.030	25.3	.10	.012	175	90	8	10	8	156.6	.22
159	20	"	biosparite	31.5	.054	.029	28.0	.11	.019	10	240	2	<5	12	161.8	.31
160	30	"	biosparite	13.6	.035	.024	34.0	.17	.023	<10	80	<2	<5	8	121.3	.31
161	32	"	biomicrite	17.6	.059	.043	32.4	.18	.021	35	100	2	<5	12	109.2	.30
162	33	"	biospar-micrite	17.5	.043	.033	32.8	.12	.017	10	320	2	<5	12	165.8	.24

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960163	013/36	Laurel	biosparpelite	8.6	.033	.028	36.3	.19	.044	<10	210	12	8	8	115.9	.55
164	39	"	biosparite	16.2	.065	.038	33.5	.15	.024	<10	90	12	8	40	135.5	.33
165	46	"	biopelsparite	5.0	.041	.026	37.6	.27	.030	<10	360	2	8	12	84.5	.36
166	48	"	dolomite	27.8	.043	.023	29.1	.20	.024	<10	220	2	8	12	88.3	.41
167	49	"	limestone	7.0	.031	.029	37.6	.17	.030	<10	40	2	8	12	134.2	.36
168	51	"	biosparite	10.5	.032	.017	36.1	.13	.026	<10	370	75	30	12	175.2	.33
169	52	"	biosparite	22.3	.043	.017	31.6	.17	.024	<10	480	8	<5	12	116.2	.35
170	58	"	limestone	15.2	.027	.017	33.6	.13	.016	<10	160	8	<5	12	163.0	.22
171	62	"	sandstone	47.0	.059	.015	21.3	.09	.011	<10	130	8	<5	12	143.6	.24
172	64	"	limestone	14.5	.036	.020	33.3	.20	.027	<10	120	8	<5	12	101.0	.37
173	014/1	Gumhole	biopelite	16.8	.210	.079	32.5	.27	.019	40	130	8	<5	32	73.0	.27
174	2	"	polsparite	20.8	.210	.080	31.5	.25	.018	115	150	8	8	38	76.4	.26
175	3	"	ooid intraclast grainstone	19.7	.210	.115	31.7	.24	.024	25	150	18	10	45	80.1	.35
176	4	"	ooid skeletal grainstone	20.0	.230	.145	31.9	.17	.023	<10	170	8	8	28	117.3	.33
177	5	"	ooid skeletal grainstone	8.9	.170	.155	36.8	.15	.019	<10	110	10	20	28	153.9	.24
178	6	"	biosparite	11.5	.210	.155	34.3	.19	.024	10	150	8	25	38	112.5	.32
179	7	"	limestone	48.8	.135	.064	19.9	.09	.010	35	250	8	<5	32	134.1	.23
180	10	"	biosparite	40.0	.120	.060	23.8	.12	.014	15	210	15	<5	25	125.5	.27

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960181	014/12	Gumhole	Micrite	15.8	.103	.055	33.7	.26	.018	<10	65	10	50	32	78.6	.24
182	14	"	Birdseye Limestone	10.2	.073	.038	36.2	.25	.021	<10	35	8	15	45	87.8	.27
183	15	"	biopelsparite	3.6	.055	.030	38.7	.33	.038	<10	<20	8	10	70	71.1	.45
184	015/1	"	oolite	14.9	.143	.107	34.3	.20	.017	35	290	20	50	95	104.0	.23
185	2	Famennian Birds Eye Lst	biopelsparite	10.9	.080	.058	36.0	.24	.019	<10	165	8	10	28	100.0	.24
186	3	"	biopelsparite	9.3	.040	.020	36.2	.43	.028	<10	80	8	10	20	51.1	.35
187	016/3	"	limestone	8.0	.024	.057	36.6	.29	.015	<10	120	8	<5	22	76.6	.19
188	5	"	intraclastic limestone	14.1	.028	.080	35.0	.27	.012	35	35	8	<5	25	78.6	.16
189	6	"	intraclastic limestone	15.2	.026	.050	34.6	.33	.009	215	60	8	<5	32	63.6	.12
190	7	"	limestone	12.1	.031	.024	35.6	.31	.020	<10	65	8	50	18	69.7	.26
191	8	"	Birdseye Limestone	14.1	.024	.022	34.0	.32	.019	10	70	8	15	18	64.4	.26
192	017/1	Laurel	sandstone	22.0	.041	.021	31.4	.16	.020	<10	65	2	<5	8	119.0	.29
193	2	"	biosparmicrite	4.6	.019	.013	38.9	.19	.037	<10	260	2	5	5	124.2	.44
194	4	"	sandstone	22.0	.041	.015	31.8	.17	.028	<10	185	2	8	8	113.5	.40
195	5	"	micrite	7.0	.045	.020	37.6	.31	.033	15	210	2	<5	8	73.6	.40
196	12	"	limestone	11.4	.026	.021	35.9	.11	.018	<10	115	8	<5	10	198.0	.23
197	16	"	limestone	17.3	.041	.027	33.8	.20	.025	<10	150	8	<5	10	102.5	.34
198	17	"	sandstone	23.8	.057	.022	31.4	.18	.018	<10	115	8	10	5	105.8	.26

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960199	017/20	Laurel	biosparite	3.0	.036	.020	39.3	.26	.031	<10	190	2	<5	8	91.7	.36
200	23	"	coquinite	5.3	.019	.024	38.3	.15	.030	<10	60	2	<5	8	154.9	.36
201	27	"	limestone	17.3	.028	.021	33.7	.12	.019	<10	180	5	10	8	177.8	.26
202	32	"	sandy micrite	12.0	.029	.012	35.5	.29	.035	<10	170	8	<5	10	74.3	.45
203	34	"	biopelsparite	11.7	.031	.016	36.2	.20	.028	10	260	6	<5	8	109.8	.35
204	35	"	biosparite	8.9	.033	.015	37.5	.19	.035	20	630	2	<5	8	119.7	.43
205	42	"	biosparite	6.0	.031	.011	38.8	.29	.048	950	1050	8	5	8	81.2	.57
206	44	"	biosparite	3.9	.038	.014	38.6	.45	.094	1110	490	8	10	8	52.0	1.11
207	46	"	biosparite	5.4	.048	.013	37.5	.30	.073	30	210	8	<5	6	75.8	.89
208	49	"	limestone	5.5	.035	.009	37.6	.36	.082	<10	230	8	8	8	63.4	1.00
209	50	"	limestone	5.8	.035	.019	37.9	.28	.082	50	440	8	20	8	82.1	.99
210	51	"	biosparite	6.4	.062	.019	37.3	.21	.067	900	530	8	20	8	107.7	.82
211	53	"	biosparite	6.5	.046	.019	37.2	.30	.058	50	420	8	15	8	75.2	.71
212	56	"	biosparite	12.9	.050	.019	35.3	.15	.044	20	240	8	12	8	142.7	.57
213	62	"	biosparite	2.9	.081	.015	38.8	.32	.105	235	270	8	12	8	73.6	1.24
214	67	"	biomicrite	6.9	.092	.020	38.0	.17	.059	565	1050	8	12	12	135.6	.71
215	69	"	coquinite	5.0	.110	.036	38.3	.21	.063	1110	590	8	<5	10	110.6	.75
216	72	"	biosparite	4.6	.140	.135	38.5	.19	.036	1460	930	8	5	12	126.2	.31

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960217	017/75	Laurel	dolomite	57.4	.105	.049	17.9	.05	.011	95	540	2	8	12	204.9	.28
218	019/1	Gumhole	limestone	6.7	.080	.054	37.7	.17	.015	95	80	8	20	140	138.6	.18
219	2	"	limestone	6.1	.105	.061	38.3	.27	.023	85	80	22	80	42	86.1	.27
220	3	"	limestone (biosparite)	7.1	.071	.051	37.1	.18	.019	340	60	6	90	140	125.0	.23
221	101/18	Laurel	skeletal pellet grainstone	4.3	.069	.033	34.0	3.65	.028	<10	40	2	30	22	5.7	.38
222	3	"	micrite	9.2	.260	.510	36.0	.15	.044	275	2600	10	8	8	145.6	.56
223	5	"	limestone	9.6	.038	.013	33.8	2.35	.008	<10	80	10	20	28	8.7	.11
224	6	"	micrite	5.9	.036	.027	36.5	1.35	.022	<10	40	2	<5	12	16.4	.28
225	7	"	silty calcrete	10.0	.031	.023	35.3	.35	.015	15	30	12	10	22	61.2	.19
226	8	"	micrite	8.2	.036	.010	34.4	2.30	.011	40	90	8	20	18	9.1	.15
227	9	"	ooid grainstone	9.1	.047	.022	34.2	2.20	.022	15	50	5	10	8	9.4	.29
228	10	"	sandy ooid grainstone	12.9	.023	.019	35.5	.28	.017	15	80	8	<5	8	76.9	.22
229	11	"	dolomitic sand-stone-grainstone	36.0	.047	.017	24.6	1.00	.011	20	40	8	<5	8	14.9	.20
230	12	"	ooid - pellet grainstone	9.7	.031	.019	36.3	.47	.021	10	30	10	10	8	46.9	.26
231	14	"	intraclastic grainstone	1.6	.021	.017	39.8	.21	.033	<10	20	8	5	8	117.8	.38
232	15	"	micrite	13.2	.061	.011	30.8	2.85	.015	40	110	12	<5	18	6.6	.22

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960233	101/16	Laurel	pelletal algal grainstone	4.0	.028	.016	39.0	.21	.030	15	20	2	10	12	115.4	.35
234	17	"	dolomite float	18.3	.050	.013	30.1	2.15	.009	20	80	8	45	32	8.5	.14
235	18	"	skeletal (mollusc) grainstone	4.9	.033	.016	37.8	.51	.025	<10	30	8	<5	15	44.9	.30
236	19	"	(pelletal) skeletal grainstone	8.8	.035	.018	37.0	.30	.025	<10	30	38	<5	12	74.8	.31
237	20	"	pelletal skeletal grainstone	5.2	.022	.012	38.4	.25	.035	<10	30	8	<5	8	93.2	.42
238	21	"	skeletal pellet grainstone	3.6	.024	.011	38.4	.26	.032	10	40	10	<5	8	89.6	.38
239	22	"	pelletal intraclastic grainstone	5.2	0.026	0.012	37.7	.20	.031	<10	20	2	<5	8	114.3	.38
240	23	"	skeletal pelletal grainstone	5.0	.026	.017	37.9	.33	.034	<10	50	8	<5	8	69.7	.41
241	24	"	skeletal pellet grainstone	5.8	0.021	.018	37.3	.28	.032	<10	60	2	<5	8	80.8	.39
242	25	"	skeletal pellet grainstone	4.4	.027	.015	37.8	.32	.035	<10	40	2	8	8	71.7	.42
243	28	"	sandy pelord grainstone	23.4	.031	.012	30.7	.15	.021	<10	60	2	<5	8	124.2	.31
244	29	"	skeletal pellet grainstone	3.6	0.024	0.016	39.3	.27	.032	<10	20	5	8	8	88.3	.37
245	30	"	sandy intraclastic grainstone	29.0	.033	.017	28.5	.13	.018	<10	60	2	<5	42	133.0	.29
246	33	"	skeletal grainstone	7.3	.017	.011	36.8	.36	.069	<10	230	8	<5	8	62.0	.86
247	44	"	crinoidal grainstone	1.6	.035	.012	39.6	.14	.045	<10	180	2	<5	8	171.6	.52
248	50	"	skeletal grainstone	4.4	.015	.011	37.5	.34	.052	<10	300	8	5	8	66.9	.63
249	51	"	limestone	12.0	.047	.014	35.0	.26	.066	<10	680	8	5	8	83.3	.86
250	53	"	skeletal grainstone	7.7	.068	.015	37.3	.22	.076	10	750	5	<5	8	102.8	.93

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960251	101/54	Laurel	skeletal grainstone	9.3	.101	.023	36.2	.22	.082	620	620	8	<5	8	102.1	1.04
252	59	"	skeletal grainstone	11.6	.325	.185	34.7	.21	.058	870	2250	10	<5	8	102.7	.76
253	70	"	calcareous sandstone	35.8	.130	.067	25.4	.10	.029	185	920	10	8	12	154.1	.52
254	78	"	skeletal grainstone	5.0	.076	.087	38.3	.09	.022	730	350	2	10	8	267.0	.26
255	88	"	skeletal grainstone	6.4	.069	.155	37.5	.07	.026	225	2100	2	8	3	339.5	.32
256	102/2	"	skeletal grainstone	1.6	.620	.370	38.3	.30	.086	70	4500	5	10	8	77.4	1.03
257	3	"	skeletal grainstone	12.3	.225	.480	34.5	.13	.040	265	2450	8	15	8	161.0	.53
258	4	"	calcareous sandstone	38.9	.105	.230	24.5	.08	.026	400	1500	8	<5	22	195.5	.49
259	5	"	skeletal packstone/ grainstone	7.3	.140	.380	36.5	.20	.031	170	950	10	20	22	113.5	.39
260	6	"	bioclastic packstone	35.9	.115	.165	25.0	.10	.023	280	1400	10	8	18	163.1	.42
261	7	"	skeletal grainstone	2.1	.670	.540	38.6	.24	.048	20	510	2	<5	8	97.6	.57
262	8	"	limestone	5.4	.125	.230	37.5	.14	.037	200	870	8	<5	15	162.5	.45
263	9	"	v. sandy skeletal grain-stone	39.4	.105	.100	24.0	.90	.028	95	3200	18	55	28	15.2	.53
264	10	"	dolomite	7.9	.150	.130	36.1	.12	.025	435	290	8	10	12	190.4	.32
266	12	"	limestone	16.4	.064	.064	32.9	.10	.035	485	140	8	<5	18	203.6	.49
267	13	"	limestone	9.5	.037	.029	35.4	.13	.031	30	130	8	<5	8	162.7	.40

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca.x10^{-3}$
72960268	103/1	Laurel	skeletal limestone	7.6	.099	.085	36.9	.08	.023	360	320	2	10	8	287.0	.29
269	22	"	biocalcarenite	11.1	.054	.050	34.7	.27	.036	85	290	8	10	8	77.9	.47
270	23	"	limestone	8.9	.110	.088	36.5	.08	.032	290	300	2	12	8	263.6	.40
271	27	"	sandy pisolitic calcrete	10.2	.021	.007	36.5	.08	.012	30	90	2	8	8	292.1	.15
272	28	"	limestone	8.7	.024	.011	36.9	.07	.011	30	140	2	10	8	334.1	.14
273	31	"	micrite	7.0	.036	.029	36.5	.18	.042	15	210	8	10	8	123.0	.53
274	32	"	limestone	9.5	.016	.005	35.6	.07	.012	30	280	8	10	8	322.3	.15
275	35	"	skeletal grainstone	5.5	.036	.010	37.0	.18	.060	<10	280	8	10	8	124.7	.74
276	42	"	calcarenite	7.1	.022	.012	36.5	.06	.021	20	590	8	10	8	357.1	.26
277	43	"	sandy skeletal grainstone	9.4	.019	.010	35.8	.06	.019	15	300	2	8	5	368.1	.24
278	44	"	sandy skeletal grainstone	3.0	.062	.031	37.8	.16	.035	60	920	2	10	8	143.3	.42
279	45	"	calcarenite	10.1	.016	.012	35.7	.06	.022	15	360	2	8	8	338.4	.28
280	49	"	sandy intra-skeletal grain-stone	9.1	.017	.014	35.9	.15	.037	<10	200	20	10	8	145.2	.47
281	51	"	skeletal grainstone	17.8	.016	.013	32.0	.12	.034	<10	590	2	12	12	161.8	.49
282	53	"	sandy skeletal grainstone	9.4	.007	.012	35.7	.13	.030	<10	220	2	10	8	173.2	.38
283	54	"	v. sandy skeletal grainstone	27.1	.017	.012	28.8	.08	.031	<10	240	2	8	8	215.7	.49
284	55	"	sandy intra skeletal grain-stone	5.5	.043	.018	37.1	.12	.040	<10	650	2	15	8	195.7	.49
285	56	"	sandy skeletal grainstone	14.7	.028	.021	34.1	.12	.025	20	1070	2	8	8	172.4	.34

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca \times 10^{-3}$
72960286	103/57	Laurel	sandy skeletal grainstone	18.5	.024	.026	32.0	.12	.027	10	540	2	10	8	164.8	.38
287	58	"	skeletal grainstone/packstone	6.6	.017	.017	37.2	.15	.033	15	390	2	20	8	150.4	.41
288	59	"	skeletal grainstone	6.2	.016	.014	37.2	.15	.038	<10	465	2	20	8	150.4	.47
289	60	"	sandy mollusc grainstone	17.4	.014	.017	32.5	.15	.044	20	365	2	8	8	131.4	.62
290	61	"	calcarenite	4.1	.041	.019	37.8	.15	.053	25	160	2	20	8	152.9	.64
291	62	"	skeletal grainstone	4.5	.052	.013	37.4	.13	.045	15	175	2	20	8	181.5	.55
292	63	"	skeletal grainstone	6.0	.028	.021	36.9	.13	.042	20	255	8	15	8	172.2	.52
293	65	"	skeletal grainstone	8.2	.021	.012	36.5	.14	.045	10	125	2	20	8	158.1	.56
294	66	"	skeletal grainstone	6.0	.021	.011	37.4	.18	.049	10	195	2	18	8	126.0	.60
295	67	"	skeletal grainstone	5.2	.028	.015	38.5	.11	.041	<10	330	2	10	8	222.4	.49
296	68	"	skeletal grainstone	4.8	.022	.010	37.8	.12	.035	10	310	2	15	5	191.1	.42
297	69	"	limestone	4.3	.029	.015	37.9	.12	.034	20	300	2	15	8	191.6	.41
298	70	"	skeletal grainstone	4.0	.031	.010	38.3	.17	.028	10	185	2	20	8	136.7	.33
299	72	"	skeletal packstone	6.9	.047	.013	37.3	.18	.031	15	555	2	15	8	125.7	.30
300	73	"	skeletal grainstone, packstone	8.2	.029	.016	36.4	.13	.025	25	415	2	20	8	171.6	.31
301	76	"	skeletal grainstone	7.5	.035	.012	36.2	.11	.019	25	180	2	15	8	209.1	.24
302	87	"	skeletal grainstone	2.7	.050	.024	38.5	.13	.030	25	865	2	15	8	179.6	.33
303	104/1	"	calcarenite	13.0	.024	.017	34.6	.25	.029	<10	100	2	20	8	83.9	.38

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960304	104/ 3	Laurel	biopelsparite	3.4	.029	.012	39.1	.36	.041	<10	<20	2	10	8	65.9	.46
305	4	"	biopalsparite	2.1	.035	.012	39.8	.32	.035	<10	20	2	15	8	75.4	.40
306	12	"	limestone	14.5	.057	.017	33.4	1.09	.006	10	125	8	20	10	18.6	.08
307	13	"	biomicrite	7.8	.035	.013	37.1	.24	.023	15	35	5	<5	8	93.8	.28
308	15	"	biopelsparite	8.8	.033	.026	36.8	.20	.024	<10	50	2	8	8	111.6	.30
309	16	"	biopelsparite	5.3	.022	.009	38.1	.35	.031	<10	20	2	5	8	60.0	.37
310	17	"	biomicrite	2.3	.021	.014	39.4	.23	.027	<10	25	2	20	18	103.9	.31
311	18	"	biopelsparite	1.7	.014	.012	39.4	.22	.028	<10	20	2	20	12	108.6	.33
312	19	"	biopelsparite	5.5	.022	.012	38.1	.25	.030	<10	35	2	10	8	92.4	.36
313	21	"	biopelsparite	8.8	.024	.012	37.3	.22	.028	<10	35	2	15	8	102.8	.34
314	23	"	biosparite	4.2	.019	.012	36.6	.20	.026	<10	<20	5	10	8	117.1	.31
315	25	"	biosparite	3.5	.022	.017	38.8	.27	.038	<10	30	2	20	8	87.2	.45
316	29	"	sandstone	30.3	.031	.015	28.6	.11	.017	<10	55	5	8	5	165.2	.27
317	30	"	biopalsparite	2.5	.031	.025	38.8	.22	.029	<10	45	5	20	18	107.0	.34
318	32	"	"	7.1	.026	.012	37.9	.24	.025	<10	35	2	8	8	95.8	.30
319	34	"	"	2.6	.036	.030	39.4	.23	.028	<10	45	2	10	8	103.9	.33
320	37	"	micrite	4.6	.043	.020	38.1	.27	.035	<10	95	2	8	8	85.6	.42
321	38	"	biosparite	2.6	.039	.026	39.2	.27	.039	10	30	2	8	8	88.1	.46

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960322	104/39	Laurel	biosparite	3.7	.024	.017	38.9	.32	.031	15	<20	2	10	8	73.7	.36
323	41	"	biomicrite	7.8	.064	.027	37.3	.24	.030	15	50	2	8	15	94.3	.37
324	42	"	micrite	12.9	.076	.012	29.4	4.35	.030	65	50	2	8	15	4.1	.47
325	44	"	biosparite	4.9	.027	.022	38.4	.17	.024	<10	35	2	8	8	137.0	.29
326	45	"	limestone	4.9	.024	.016	37.7	.18	.024	10	25	2	8	8	127.1	.29
327	201 /1	Sumhole	sandstone	31.6	.092	.210	27.8	.05	.006	75	390	8	8	15	337.3	.10
328	2	"	sandstone	17.5	.140	.300	32.8	.07	.011	190	315	8	15	10	284.2	.15
329	3	"	oolite	28.5	.071	.170	28.7	.05	.011	210	480	8	8	6	348.2	.18
330	4	"	oolite	29.3	.155	.300	28.9	.06	.012	70	310	8	< 5	8	282.8	.19
331	5	"	oosparite	18.1	.175	.300	32.5	.08	.014	25	255	8	15	8	234.7	.20
332	6	"	biosparite	2.9	.210	.170	38.5	.18	.027	20	185	2	40	260	129.7	.32
333	7	"	biomicrite	4.1	.105	.125	38.5	.21	.021	<10	140	2	8	8	111.2	.25
334	8	"	coquinite	2.2	.135	.120	39.7	.21	.027	40	150	2	8	8	114.7	.31
335	9	"	micrite	6.1	.061	.080	38.1	.25	.018	15	170	8	10	12	92.4	.22
336	10	"	biocalcarenite	2.9	.087	.125	39.5	.22	.024	15	95	8	8	50	106.9	.28
337	11	"	siltstone	4.5	.080	.110	37.8	.25	.024	15	155	8	8	12	91.72	.29
338	12	"	coquinite	3.4	.088	.098	38.9	.34	.026	<10	170	10	10	8	69.4	.31
339	202/ 1	"	skeletal wackestone	2.6	.175	.195	38.9	.15	.035	195	165	8	30	12	157.3	.41

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca.x10^{-3}$
72960340	202/ 3	Gumhole	skeletal grainstone	5.5	.230	.280	37.8	.16	.035	150	300	2	5	8	146.7	.43
341	5	"	skeletal wackestone	2.9	.100	.100	39.2	.19	.024	55	155	2	8	22	121.9	.28
342	6	"	skeletal grainstone	3.9	.240	.170	38.8	.23	.049	75	155	2	40	18	102.3	.58
343	7	"	skeletal packstone	3.9	.250	.185	38.7	.24	.045	75	150	2	10	8	97.8	.53
344	9	"	coral boundstone	6.4	.100	.175	38.0	.15	.016	250	170	8	8	8	153.7	.19
345	10	"	boundstone	5.5	.100	.120	38.1	.15	.018	40	200	12	15	10	154.1	.22
346	12	"	skeletal wackestone and packstone	6.0	.115	.064	38.4	.20	.026	20	175	2	15	8	116.5	.31
347	13	"	skeletal packstone	2.6	.125	.100	39.1	.21	.025	15	130	2	8	8	112.9	.29
348	14	"	skeletal packstone - wackestone	4.1	.100	.091	38.4	.29	.027	10	210	2	8	8	80.3	.32
349	15	"	skeletal pellet packstone	3.6	.210	.210	38.5	.15	.034	110	130	2	8	8	155.7	.40
350	16	"	skeletal grainstone	6.9	.160	.270	37.4	.09	.025	65	500	8	40	12	236.8	.31
351	17	"	sandy skeletal grainstone	19.7	.120	.240	32.6	.09	.016	230	940	8	35	8	227.3	.22
352	18	"	skeletal grainstone	18.7	.110	.210	32.5	.08	.016	200	450	10	8	12	243.4	.23
353	19	"	skeletal grainstone	20.5	.130	.195	31.2	.08	.019	<10	1070	10	55	38	233.6	.28
354	20	"	skeletal grainstone	17.5	.150	.220	32.6	.09	.022	10	920	8	40	18	219.7	.31
355	21	"	skeletal grainstone	8.0	.260	.310	37.0	.13	.031	<10	620	8	30	22	179.6	.38
356	22	"	skeletal grainstone	13.9	.135	.210	34.7	.08	.024	90	765	8	20	18	250.6	.32
357	23	"	skeletal grainstone	5.5	.230	.310	37.9	.13	.044	30	365	8	40	18	183.9	.53

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960358	202/24	Gumhole	coquinite	13.2	.240	.320	34.1	.14	.033	10	710	5	50	25	147.8	.44
359	25	"	limestone	1.5	.195	.105	39.9	.26	.046	20	145	2	5	8	93.1	.53
360	26	"	coquinite	5.9	.170	.130	38.3	.22	.043	25	120	2	5	8	105.6	.51
361	27	"	oncolite skeletal packstone	3.2	.105	.073	39.5	.17	.036	30	140	2	40	55	140.9	.42
362	28	"	skeletal packstone	3.3	.165	.098	39.2	.18	.038	15	140	<2	<5	8	132.1	.44
363	29	"	skeletal grainstone	8.4	.210	.270	37.3	.12	.036	<10	520	2	20	22	188.6	.44
364	30	"	brachiopod oolitic grain-stone	8.5	.230	.300	37.1	.13	.038	25	800	2	30	32	180.0	.47
365	203/ 1	"	limestone	50.4	.074	.110	19.6	.12	.011	540	535	<2	100	42	99.1	.26
366	204/ 1	"	caliche	3.4	.021	.008	38.9	.22	.016	85	185	<2	5	110	107.3	.19
367	2	"	micrite	3.25	.031	.012	38.9	.08	.006	140	35	2	5	12	291.3	.07
368	3	"	biosparite	36.3	.059	.145	26.3	.04	.009	1120	355	2	8	6	443.1	.16
369	205/1	"	siltstone	72.6	.110	.013	10.7	.18	.005	70	305	16	<5	55	370.9	.21
370	2	"	oosparite	4.4	.190	.165	38.2	.11	.016	40	150	5	220	18	210.6	.19
371	3	"	oosparite	6.6	.140	.145	38.3	.10	.014	20	150	2	100	65	237.1	.17
372	4	"	oosparite	6.1	.145	.155	38.0	.09	.013	20	155	2	80	45	255.0	.16
373	206/0	"	biosparite	8.9	.165	.155	36.1	.10	.021	110	425	2	<5	5	223.4	.27
374	1	"	biosparite	5.0	.125	.135	38.4	.09	.018	195	205	2	<5	10	267.7	.21
375	2	"	biosparite	13.2	.087	.082	35.3	.07	.013	95	415	2	60	12	305.9	.17

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960376	206/3	Gumhole	biosparite	9.1	.062	.068	37.3	.05	.011	260	230	5	70	12	426.9	.13
377	4	"	biosparite	8.4	.088	.090	36.7	.06	.013	175	445	5	45	12	377.3	.16
378	5	"	biosparite	7.2	.110	.115	37.3	.06	.014	175	340	5	45	10	364.9	.17
379	6	"	biosparite	9.1	.125	.120	35.7	.06	.020	65	230	2	10	10	338.4	.26
381	8	"		5.1	.145	.140	38.9	.08	.023	85	370	2	30	8	291.3	.27
382	9	"		8.6	.073	.078	37.2	.06	.016	260	265	2	25	12	402.9	.20
383	10	"		10.3	.076	.079	36.1	.05	.012	200	370	5	25	10	456.2	.15
384	11	"		7.5	.080	.085	37.2	.06	.018	200	420	2	10	8	402.9	.22
385	12	"		10.4	.083	.091	36.5	.06	.014	195	420	2	<5	8	395.4	.18
386	13	"		4.8	.092	.100	38.8	.06	.017	190	110	2	5	5	367.7	.20
387	14	"		3.4	.120	.120	38.9	.06	.024	140	170	2	<5	8	368.7	.28
388	15	"		5.9	.135	.135	37.8	.08	.023	180	290	2	<5	12	294.0	.28
389	16	"		4.2	.105	.115	38.0	.07	.023	145	215	2	<5	8	344.0	.28
390	17	"		8.1	.125	.115	36.0	.07	.023	145	260	2	8	8	312.0	.29
391	18	"		7.3	.145	.145	38.0	.08	.028	55	320	2	<5	8	274.4	.34
392	19	"		4.8	.150	.130	38.3	.09	.027	65	310	2	<5	8	267.0	.32
393	20	"		3.4	.155	.130	38.7	.08	.027	<10	230	2	<5	8	279.5	.32

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960394	206/21	Gumhole		5.7	.130	.130	36.9	.08	.020	60	685	5	10	15	294.5	.25
395	22	"		6.6	.200	.125	37.7	.10	.035	<10	265	2	20	18	240.7	.42
396	23	"		3.4	.195	.130	38.7	.10	.037	<10	280	2	40	15	234.7	.44
397	24	"		8.2	.180	.130	37.2	.09	.028	<10	475	2	40	38	250.7	.34
398	25	"		2.5	.155	.120	39.8	.08	.026	30	195	2	50	25	309.5	.30
399	26	"		4.3	.175	.140	38.9	.09	.027	<10	370	2	80	35	262.2	.32
400	27	"		4.9	.145	.130	38.5	.07	.027	<10	335	2	45	35	333.6	.32
401	28	"		10.3	.165	.120	35.7	.08	.027	<10	430	2	40	110	277.6	.35
402	207/0	"	biosparite	11.8	.087	.100	35.4	.06	.015	40	595	5	20	12	346.3	.19
403	1	"	biosparite	6.9	.085	.110	37.2	.07	.015	140	355	2	5	8	336.8	.18
404	2	"	biosparite	14.0	.150	.155	34.7	.08	.021	20	350	2	8	8	269.8	.28
405	3	"	oosparite	6.6	.220	.175	36.7	.17	.030	15	460	2	20	10	131.0	.37
406	8	"	biosparite	9.0	.150	.240	36.5	.11	.028	185	230	2	8	12	210.9	.35
407	9	"	sandstone	35.0	.125	.170	25.5	.05	.010	110	495	2	8	10	322.2	.18
408	11	"	sandstone	51.4	.087	.110	19.2	.04	.007	65	420	2	10	8	277.3	.17
409	12	"	sandstone	49.7	.059	.098	20.5	.05	.004	180	405	2	<5	15	259.1	.09
410	13	"	biosparite	9.9	.081	.120	35.9	.06	.014	180	635	2	35	90	369.1	.18
411	14	"	biosparite	20.2	.083	.115	31.9	.05	.012	50	710	2	45	75	365.1	.17

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960412	207/15	Gumhole	limestone	11.7	.096	.135	34.7	.06	.012	105	590	5	10	65	339.5	.16
413	16	"	oosparite	10.8	.097	.125	36.0	.06	.012	95	655	5	200	100	352.2	.15
414	17	"	biosparite	13.3	.081	.096	35.0	.05	.010	50	970	5	40	32	400.6	.13
415	18	"	biosparite	15.7	.083	.105	33.9	.06	.012	100	665	5	20	18	367.2	.16
416	19	"	biosparite	7.5	.096	.105	36.6	.06	.013	220	510	2	30	40	346.9	.16
417	20	"	biosparite	6.6	.100	.130	36.9	.07	.016	220	460	2	10	25	334.1	.20
418	25	"	biosparite	14.9	.088	.105	33.9	.06	.013	280	595	2	30	30	331.7	.18
419	36	"	biosparite	9.6	.155	.220	35.7	.09	.025	215	600	2	15	12	232.9	.32
420	44	"	biosparite	8.8	.074	.120	36.5	.05	.010	215	505	2	5	8	492.0	.13
421	46	"	biosparite	4.8	.087	.110	38.7	.05	.012	130	665	2	45	12	442.9	.14
422	50	"	biosparite	14.1	.083	.115	34.[illegible]	.05	.012	95	780	2	20	12	394.8	.16
423	51	"	biosparite	8.3	.100	.150	35.9	.06	.015	205	580	2	25	30	388.9	.19
424	52	"	oosparite	8.1	.140	.072	35.7	.12	.014	100	400	2	40	42	180.5	.18
425	54	"	biosparite	6.8	.088	.120	37.0	.07	.015	240	580	2	10	15	320.6	.19
426	56	"	biosparite	7.8	.083	.088	36.2	.08	.016	230	535	<2	10	25	261.4	.20
427	57	"	oosparite	7.9	.125	.105	36.4	.08	.018	160	415	<2	10	15	272.6	.23
428	58	"	oosparite	5.6	.115	.094	37.2	.09	.018	200	400	5	<5	15	242.6	.22
429	65	"	oosparite	2.8	.150	.085	38.8	.11	.016	115	105	2	120	32	224.1	.19

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960430	208/1	Famennian Birdseye Lst.	oosparite	4.7	.019	.017	38.5	.18	.014	<10	200	2	<5	8	129.7	.17
431	2	Windjana	limestone	1.4	.024	.007	39.4	.13	.013	<10	20	5	<5	8	183.8	.15
432	3	"	micrite	2.9	.017	.008	39.0	.16	.014	<10	45	5	<5	10	147.9	.16
433	4	"	micrite	0.7	.014	.008	40.0	.13	.012	<10	<20	2	<5	8	186.6	.14
434	5	"	micrite	2.0	.014	.007	39.1	.17	.012	<10	30	2	<5	8	139.5	.14
435	6	Famennian Birdseye Lst.	oosparite	2.5	.021	.012	39.0	.15	.018	<10	40	8	<5	8	157.7	.21
436	7	"	oosparite	3.2	.016	.012	38.8	.15	.016	<10	50	5	10	8	156.9	.19
437	8	"	micrite	2.5	.026	.017	39.1	.12	.012	<10	60	2	10	15	197.6	.14
438	209/0	"	limestone	5.0	.017	.009	38.5	.18	.014	<10	30	2	10	8	129.7	.17
439	1	"	micrite	3.3	.019	.012	38.7	.18	.016	<10	30	12	<5	8	130.4	.19
440	2	"	oosparite	1.2	.014	.012	39.4	.13	.012	<10	<20	10	<5	8	183.8	.14
441	3	"	limestone	1.8	.012	.008	39.7	.19	.016	<10	<20	8	5	5	126.7	.18
442	4	"	onco-sparite	2.4	.021	.010	39.0	.23	.018	<10	20	5	5	8	102.9	.21
443	5	"	micrite	2.3	.014	.008	39.2	.22	.017	<10	25	32	<5	18	108.1	.20
444	6	"	oosparite	2.9	.021	.009	39.0	.15	.014	<10	25	8	<5	8	157.7	.16
445	7	"	oosparite	1.6	.017	.010	39.8	.17	.014	<10	<20	8	<5	8	142.0	.16
446	8	"	oosparite	1.1	.016	.007	39.8	.17	.014	<10	<20	5	5	8	142.0	.16
447	9	"	oosparite	1.1	.016	.011	39.9	.15	.013	<10	<20	2	5	8	161.3	.15

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960448	209/10	Famennian Birdseye Lst.	micrite	1.6	.014	.012	38.9	.18	.015	<10	30	5	<5	8	131.1	.18
449	210/1	Noonkanbah	coquinite	14.9	.094	.130	33.0	.22	.036	900	305	15	<5	32	100.0	.50
450	211/5	Yellow Drum	sandstone	52.5	.080	.032	18.9	.21	.011	50	50	2	<5	22	55.9	.27
451	6	"	sandstone	63.8	.099	.030	13.5	.84	.007	45	65	2	<5	30	9.8	.24
452	212/0A	Gumhole	coquinite	5.6	.220	.105	36.2	.22	.028	1030	200	8	<5	12	99.8	.35
453	08	"	oosparite	1.3	.165	.155	39.9	.12	.033	<10	50	5	<5	8	201.7	.38
454	1	"	coquinite	1.9	.120	.060	39.5	.24	.027	<10	110	8	30	100	102.0	.31
455	6	Yellow Drum	micrite	7.6	.080	.074	32.0	3.57	.008	260	530	18	<5	30	5.4	.11
456	8	"	micrite	25.3	.050	.073	29.9	.34	.007	105	290	5	60	35	53.3	.11
457	11	"	intrasparite	6.8	.031	.023	37.0	.19	.025	<10	25	5	20	12	120.7	.30
458	13	"	intrapelsparite	4.0	.029	.023	38.4	.15	.022	<10	30	8	25	10	155.3	.26
459	58	"	biosparite	9.1	.045	.024	36.8	.16	.028	<10	280	10	<5	8	139.5	.35
460	59	"	dolomite	34.7	.035	.017	26.8	.14	.016	<10	120	2	<5	8	116.1	.27
461	213/1	Gumhole	calcarenite	18.0	.165	.240	32.0	.14	.022	180	325	18	50	22	143.0	.30
462	2	"	calcarenite	16.2	.165	.220	33.6	.12	.020	95	280	20	20	15	169.8	.27
463	3	"	calcarenite	18.8	.160	.220	33.0	.14	.023	225	310	8	40	22	148.3	.32
464	4	"	calcarenite	9.6	.120	.205	36.8	.12	.019	330	355	8	45	12	186.0	.24
465	5	"	fossils carbonate	5.5	.300	.240	38.4	.16	.034	<10	205	2	<5	8	150.3	.41

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960466	214/1	Gumhole	calcarenite	12.4	.165	.480	35.4	.13	.026	15	320	22	50	22	165.2	.34
467	218/1	Famennian Birdseye Lst.	calcarenite	7.4	.054	.017	37.0	.51	.049	<10	35	5	<5	10	44.0	.61
468	2	"	calcarenite	8.5	.088	.025	37.0	.39	.031	<10	50	8	<5	8	57.5	.38
469	3	Gumhole	coquinite	3.8	.135	.074	38.4	.11	.025	70	7	5	8	140	221.8	.30
470	4	"	biosparite	1.2	.230	.077	39.0	.14	.031	10	115	2	<5	8	175.2	.36
471	5	"	biosparite	4.6	.370	.115	38.4	.19	.024	520	150	5	<5	8	122.6	.29
472	6	"	biosparite	1.7	.460	.105	39.5	.25	.031	<10	135	5	<5	5	95.8	.36
473	7	"	calcarenite	10.1	.170	.085	34.9	.13	.017	185	220	8	8	75	162.9	.22
474	10	"	biosparite	3.2	.420	.125	38.4	.22	.023	875	135	5	<5	5	108.3	.27
475	11	"	biosparite	17.1	.300	.240	33.0	.34	.032	275	285	5	130	12	58.9	.44
476	219/1	Famennian Birdseye Lst.	micrite	6.5	.092	.032	37.8	.23	.015	<10	60	2	<5	5	99.7	.18
477	4	"	intrasparite	3.9	.155	.059	39.0	.29	.020	40	35	5	8	5	81.6	.23
478	5	Gumhole	intrasparite	6.8	.200	.080	37.8	.32	.022	25	100	5	15	12	71.7	.27
479	7	"	calcarenite	5.7	.160	.175	37.8	.13	.011	310	150	5	8	5	183.4	.13
480	12	"	coquinite	19.6	.240	.240	32.4	.23	.023	230	230	5	720	12	87.4	.32
481	14	"	limonitic coquinite	30.5	.170	.125	21.5	4.68	.014	660	330	8	<5	15	2.8	.30
482	18	"	sandstone	63.3	.080	.040	14.8	.12	.003	165	210	5	5	25	74.8	.09
483	26	"	sandstone	41.0	.043	.010	24.2	.08	.004	40	50	2	8	2	181.2	.08

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960484	219/31	Gumhole	sandstone	88.2	.045	.011	4.9	.02	.001	50	105	5	35	2	135.1	.09
485	220/2	"	limonitic limestone	25.7	.190	.210	28.6	.28	.016	410	230	5	50	12	61.9	.26
486	3	"	limestone	29.7	.250	.260	27.3	.22	.019	120	240	5	670	15	75.3	.32
487	6	"	limonitic limestone	5.7	.440	.340	37.7	.22	.031	145	180	5	35	12	103.9	.38
488	7	"	limestone	8.6	.210	.185	36.0	.26	.028	390	225	5	15	12	84.0	.36
489	8	"	limestone	5.8	.420	.370	37.7	.25	.040	430	135	8	25	12	91.5	.49
490	221/1	"	limonitic coquinite	5.7	.280	.140	37.2	.20	.032	60	135	5	8	20	112.8	.39
491	222/1	Famennian Birdseye Lst.	pelletal grainstone	4.6	.130	.070	38.5	.31	.029	35	30	8	<5	5	75.3	.34
492	2	Gumhole	pelletal grainstone	4.6	.160	.130	38.4	.24	.017	175	70	5	40	150	97.1	.20
493	3	"	skeletal grainstone	17.0	.215	.185	33.0	.17	.021	235	210	8	18	15	117.7	.29
494	8	"	brachiopod ostracod grainstone	11.9	.260	.145	35.5	.15	.019	135	165	8	18	12	148.5	.24
495	9	"	skeletal grainstone	17.2	.230	.280	33.0	.17	.026	175	345	8	90	12	117.7	.36
496	10A	"	pelletoid intraclast grainstone	4.7	.057	.022	38.7	.15	.020	<10	50	2	8	8	161.9	.24
497	10B	"	skeletal grainstone	10.6	.290	.270	35.5	.21	.036	120	230	2	5	12	102.5	.46
498	11	"	brachiopod-ostracod grainstone	15.1	.195	.280	34.4	.16	.022	425	390	2	8	20	134.6	.29
499	12	"	skeletal grainstone	3.5	.165	.170	37.9	.30	.029	255	330	8	8	12	76.6	.35
500	223/2	"	sandstone	64.2	.069	.037	15.3	.06	.013	160	30	2	<5	5	145.0	.39
501	3	"	micrite	3.7	.120	.043	38.2	.42	.028	<10	90	5	<5	8	55.2	.34

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960502	223/4	Gumhole	biospelsparite	2.4	.105	.048	38.9	.39	.030	205	570	5	<5	10	60.5	.35
503	224/1	Napier	limestone	34.2	.050	.022	26.9	.13	.013	<10	75	32	85	32	125.5	.22
504	2	"	intrasparite	9.3	.081	.042	36.5	.19	.022	15	95	55	30	180	116.5	.28
505	3	"	biosparite	9.0	.105	.032	36.9	.08	.015	25	170	12	<5	5	279.8	.19
506	4	"	biocalcarenite	14.9	.165	.034	34.0	.15	.018	15	720	8	310	8	137.5	.24
507	5	"	biosparite	7.6	.115	.029	37.4	.11	.015	20	175	5	8	8	206.2	.18
508	6	"	calcarenite	9.2	.110	.033	36.5	.08	.013	25	235	2	8	8	276.8	.16
509	7	"	calcarenite	18.1	.175	.028	32.9	.20	.024	30	125	8	30	28	99.8	.33
510	8	"	sandstone	18.7	.078	.025	33.3	.20	.016	15	85	5	18	12	101.0	.22
511	215/1	Piker Hills	pelsparite	3.5	.034	.061	38.7	.29	.018	<10	50	32	<5	8	80.9	.21
512	2	"	pelsparite	9.7	.057	.034	36.4	.27	.018	<10	60	12	<5	8	81.8	.23
513	3	"	calcarenite	6.9	.062	.027	37.6	.32	.022	20	65	5	20	8	71.3	.27
514	4	"	intrasparite	13.6	.060	.029	34.7	.29	.017	<10	80	2	<5	8	72.6	.22
515	5	"	calcarenite	3.4	.085	.036	39.0	.28	.019	10	50	5	45	50	84.5	.22
516	6	"	calcrudite	2.2	.040	.016	39.4	.33	.022	<10	30	10	5	5	72.4	.26
517	7	"	calcrudite	8.5	.095	.022	36.4	.31	.022	<10	85	8	70	15	71.2	.28
518	8	"	calcarenite	4.5	.085	.031	38.1	.34	.020	<10	90	12	<5	8	68.0	.24
519	9	"	calcarenite	9.3	.085	.024	36.7	.23	.016	<10	80	28	12	8	96.8	.20

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960520	215/10	Piker Hills	calcrudite	3.9	.064	.015	38.5	.31	.020	<10	50	25	<5	8	75.3	.24
521	11	"	calcarenite	4.2	.096	.035	37.5	.33	.019	<10	55	10	10	12	68.9	.23
522	12	"	calcarenite	6.1	.071	.020	36.6	.18	.015	<10	80	8	5	8	123.3	.19
523	13	"	calcrudite	2.0	.145	.024	39.5	.23	.016	<10	45	5	10	5	104.2	.19
524	216/1	"	calcrudite	4.3	.150	.017	38.1	.30	.021	<10	65	2	5	8	77.0	.25
525	2	"	calcrudite	3.2	.071	.017	38.5	.22	.015	<10	30	2	5	5	106.2	.18
526	3	"	calcrudite	7.4	.078	.022	37.3	.26	.018	<10	75	5	5	8	87.0	.22
527	4	"	calcrudite	14.7	.073	.020	33.1	.18	.015	10	125	5	20	15	111.5	.21
528	5	"	calcarenite	8.8	.115	.020	36.1	.23	.021	<10	135	5	20	38	95.2	.27
529	6	"	biosparite	6.9	.165	.022	37.1	.29	.020	<10	110	5	5	10	77.6	.25
530	7	"	calcrudite	5.3	.085	.019	37.6	.18	.017	<10	120	2	10	15	126.7	.21
531	8	"	calcarenite	6.5	.105	.020	37.3	.20	.015	<10	50	2	15	8	113.1	.18
532	217/18	"		4.2	.100	.027	38.1	.16	.011	10	160	2	15	8	144.4	.13
533	25	"		3.4	.062	.018	37.8	.23	.027	<10	75	5	10	32	99.7	.33
534	26	"		3.4	.082	.018	38.4	.29	.027	<10	85	5	5	15	80.3	.32
535	501/1	Sadler	biocalcarenite	6.9	.026	.052	36.9	.23	.013	15	145	5	<5	20	97.3	.16
536	2	"	biocalcarenite	8.7	.024	.042	36.1	.23	.013	15	150	8	25	18	95.2	.16
537	3	"	calcarenite	8.4	.026	.038	36.4	.26	.015	<10	155	5	<5	12	84.9	.19

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca.x10^{-3}$
72960538	501/4	Sadler	biomicrite	6.9	.026	.037	37.5	.25	.017	<10	110	5	<5	12	100.0	.21
539	5	"	biomicrite	9.5	.029	.044	36.4	.26	.014	<10	110	5	5	12	84.9	.18
540	6	"	calcarenite	6.8	.022	.052	37.0	.25	.014	<10	145	5	5	15	89.8	.17
541	7	"	biomicrite	8.8	.024	.042	35.9	.29	.016	<10	270	5	5	22	75.1	.20
542	8	"	calcarenite	8.3	.027	.046	36.5	.30	.018	<10	140	8	<5	22	73.8	.23
543	9	"	calcarenite	10.6	.026	.043	35.6	.32	.017	<10	1200	5	10	15	67.5	.22
544	10	"	calcarenite	6.6	.022	.038	37.3	.30	.017	<10	680	8	5	20	75.4	.21
545	11	"	biosparite	5.2	.029	.042	38.3	.21	.013	<10	95	5	5	15	110.6	.16
546	12	"	biosparite	6.3	.022	.027	37.4	.20	.014	<10	95	12	5	12	113.4	.17
547	13	"	biosparite	10.4	.036	.047	36.3	.25	.015	85	820	5	5	12	88.1	.19
548	14	"	biosparite	5.2	.022	.030	38.5	.23	.015	10	190	10	5	12	101.5	.18
549	15	"	biosparite	8.4	.019	.045	36.7	.16	.011	70	375	18	5	12	139.1	.14
550	502/12	Virgin Hills	calcarenite	36.5	.045	.008	25.4	.19	.009	<10	315	5	5	20	81.1	.16
551	503/2	Sadler	calcarenite	8.4	.033	.053	36.6	.20	.011	<10	140	5	10	12	111.0	.14
552	3	"	limestone	17.6	.033	.022	32.8	.33	.014	<10	205	5	5	15	60.3	.20
553	411/8	Gogo	limestone	2.15	.033	.021	39.2	.33	.021	<10	25	5	5	10	72.1	.25
554	38	"		10.4	.066	.125	35.7	.21	.015	<10	95	18	10	12	103.1	.19
555	40	"		7.4	.064	.100	37.5	.17	.014	20	70	8	10	12	133.3	.17

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960556	504/2	NAPIER		27.5	.125	.069	26.1	2.35	.006	10	240	5	<5	28	6.7	.11
557	3	"		24.0	.155	.065	28.7	1.10	.006	20	90	5	5	28	15.8	.10
558	4	"		24.1	.130	.072	26.4	3.00	.005	35	190	5	<5	32	5.3	.09
559	5	"		20.5	.140	.088	26.1	4.40	.007	15	145	5	10	28	3.6	.12
560	6	"		27.3	.140	.043	28.7	.26	.006	30	190	5	10	28	67.0	.10
561	7	"		30.8	.155	.044	23.2	3.15	.006	20	270	5	<5	28	4.5	.12
562	8	"		28.6	.120	.024	28.1	.25	.009	15	285	5	5	22	68.2	.15
563	9	"		19.4	.095	.021	32.2	.26	.011	<10	145	5	10	15	75.1	.16
564	10	"		10.8	.080	.020	35.8	.22	.014	<10	95	2	5	15	98.7	.18
565	11	"		29.4	.130	.049	25.8	1.85	.006	10	260	5	5	25	8.5	.11
566	12	"		41.4	.130	.054	23.2	.37	.002	55	320	5	8	35	38.0	.04
567	13	"		35.6	.130	.057	22.5	1.90	.003	50	280	5	8	35	7.2	.06
568	14	"		40.1	.200	.040	19.9	2.75	.004	35	285	5	8	32	4.4	.09
569	15	"		38.2	.115	.043	23.3	.43	.003	85	415	5	8	28	32.9	.06
570	16	"		36.7	.195	.043	24.6	.27	.001	70	255	5	5	40	55.3	.02
571	17	"		40.1	.165	.042	23.4	.26	.003	55	240	5	5	32	54.6	.06
572	18	"		34.1	.220	.055	23.0	2.20	.005	50	315	5	<5	35	6.3	.10
573	19	"		36.5	.380	.050	21.9	2.35	.004	55	240	8	<5	48	5.7	.08

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960574	504/20	NAPIER		30.8	.110	.042	26.5	1.15	.005	<10	270	5	5	28	14.0	.09
575	21	"		16.8	.074	.027	33.9	0.19	.010	<10	130	5	<5	18	108.2	.13
576	22	"		16.8	.090	.024	32.2	0.21	.010	<10	110	5	5	15	93.0	.14
577	23	"		22.8	.074	.044	30.6	0.77	.005	35	180	12	5	30	24.0	.07
578	24	"		14.8	.095	.043	30.1	3.00	.010	<10	205	5	5	28	6.1	.15
579	701/1	N'INGBING		2.1	.105	.070	25.5	10.10	.008	<10	245	2	10	22	1.5	.14
580	2	"		3.5	.110	.049	25.1	10.10	.008	<10	280	2	10	60	1.5	.15
581	3	"		3.0	.120	.043	25.7	9.70	.009	<10	260	2	10	40	1.6	.16
582	4	"		2.6	.125	.054	28.3	8.20	.010	<10	330	2	10	22	2.1	.16
583	5	"		3.9	.145	.051	29.6	6.65	.009	<10	280	2	10	20	2.7	.14
584	6	"		2.9	.225	.057	24.9	10.50	.011	10	680	2	<5	22	1.4	.20
585	7	"		3.9	.190	.065	27.5	8.30	.012	30	2300	2	<5	42	2.0	.20
586	8	"		6.4	.180	.053	25.4	8.95	.010	10	315	2	5	28	1.7	.18
587	9	"		4.2	.120	.046	28.7	7.00	.010	<10	275	5	5	22	2.5	.16
588	10	"		1.6	.019	.028	38.8	.60	.017	<10	30	2	<5	12	39.2	.20
589	11	"		2.7	.125	.047	25.4	10.00	.009	<10	240	<2	5	15	1.5	.16
590	702/1	"		5.3	.024	.009	37.3	.37	.014	10	310	<2	5	10	61.2	.17
591	2	"		2.4	.022	.026	35.6	2.50	.009	<10	65	2	<5	8	8.6	.12

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x10^-3
72960592	702/3	NINGBING		0.9	.050	.052	24.5	11.10	.004	<10	75	2	<5	50	1.3	.07
593	4	"		2.6	.034	.028	38.9	.30	.015	<10	650	2	5	20	78.7	.18
594	5	"		1.0	.017	.011	39.8	.46	.021	<10	190	2	<5	12	52.5	.24
595	6	"		2.6	.027	.018	39.0	.48	.015	<10	345	<2	5	12	49.3	.18
596	603/1	BURT RANGE	biocalcrudite	2.8	.045	.017	37.6	1.01	.076	85	190	<2	<5	8	22.6	.92
597	604/1	BUTTON BEDS	sandstone	45.2	.067	.030	22.6	.10	.006	<10	80	5	15	12	144.3	.12
598	2	BURT RANGE	biocalcarenite	12.7	.175	.046	34.8	.24	.024	10	80	5	10	120	88.0	.32
599	3	"	calcarenite	18.7	.100	.074	32.6	.23	.026	130	25	5	15	12	86.0	.36
600	4	"	"	16.4	.081	.037	33.0	.31	.031	<10	65	5	5	15	64.6	.43
601	5	"	biocalcarenite	9.1	.076	.028	36.5	.26	.035	<10	70	2	15	12	85.2	.44
602	6	"	calcarenite	4.8	.048	.027	37.7	.34	.054	960	<20	2	5	12	67.3	.66
603	7	"	"	10.8	.057	.013	35.6	.51	.051	<10	<20	50	20	12	42.3	.66
604	8	"	"	6.6	.053	.014	37.5	.34	.050	<10	<20	2	15	10	66.9	.61
605	9	"	"	22.3	.073	.017	31.1	.23	.048	10	30	2	5	30	82.0	.71
606	10	"	oosparite	5.1	.085	.041	37.5	.39	.070	<10	40	2	5	48	58.3	.85
607	11A	"	calcarenite	6.2	.029	.009	37.7	.42	.068	10	20	2	15	12	54.5	.83
608	11B	"	calcisiltite	6.2	.024	.012	37.3	.50	.086	<10	30	<2	5	12	45.3	1.05
609	12	"	bio-oosparite	.9	.059	.020	38.7	.41	.072	<10	80	2	5	12	58.7	.85

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960610	604/13A	BURT RANGE	Biosparite	17.7	.099	.041	33.4	.21	.040	<10	60	2	<5	15	96.5	.55
611	14	"	"	1.5	.057	.017	39.5	.37	.076	<10	100	2	<5	8	64.8	.88
612	15	"	Pelsparite	3.3	.060	.026	38.5	.37	.056	<10	<20	8	<5	8	63.1	.67
613	16	"	Calcarenite	6.8	.021	.010	37.4	.35	.057	10	<20	2	5	8	64.8	.70
614	17	"	"	10.3	.081	.033	36.0	.34	.058	<10	110	2	<5	8	64.2	.74
615	18	"	Calcisiltite	9.8	.062	.027	36.2	.27	.066	<10	45	2	<5	28	81.3	.83
616	20	"	Biocalcisiltite	12.4	.092	.036	34.8	.28	.042	<10	80	2	<5	12	75.4	.55
617	21	"	Biosparite	14.8	.073	.027	33.2	.37	.073	<10	110	2	<5	12	54.4	1.01
618	22	"	"	5.9	.097	.022	36.8	.43	.082	<10	115	2	<5	5	51.9	1.02
619	23	"	Calcarenite	4.2	.060	.019	37.7	.45	.076	835	140	2	<5	8	50.8	.92
620	605/1	BUTTON BEDS	Calc-sandstone	21.8	.090	.040	30.9	.24	.016	210	110	2	<5	18	78.1	.24
621	606/1	"	Sandy Dolomite	56.5	.060	.027	16.8	.52	.004	65	25	2	5	8	19.6	.11
622	2	"	Calc-sandstone	48.6	.071	.033	20.2	.32	.004	140	100	5	30	10	38.3	.09
623	5	"	Sandy limestone	27.2	.071	.035	28.3	.35	.004	140	125	5	5	180	49.1	.06
624	8	"	Dolomitic Sandy Limestone	69.9	.067	.040	12.2	.08	.003	215	100	2	5	20	94.9	.11
625	9	"	Calc-sandstone	68.9	.074	.031	12.4	.06	.004	50	170	2	<5	22	117.5	.15
626	11	"	Calc-sandstone	26.6	.083	.046	28.9	.16	.008	30	110	2	<5	5	113.1	.13

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca $\times 10^{-3}$
72960627	506/14	BUTTON BEDS	Calc-sandstone	68.0	.076	.032	12.9	.05	.003	40	50	5	<5	5	147.6	.11
628	16	"	"	46.6	.057	.032	22.1	.09	.007	20	65	5	<5	8	154.1	.14
629	17	"	Biocalcarenite	17.5	.090	.037	33.4	.26	.015	45	45	5	<5	18	77.9	.21
630	19	"	Sandstone	43.2	.074	.035	23.1	.13	.015	40	95	2	5	22	112.1	.30
631	21	"	Biocalcarenite	20.3	.110	.072	31.3	.17	.011	25	125	2	<5	10	111.7	.16
632	22	"	Calc-sandstone	63.3	.052	.027	15.1	.04	.004	50	75	<2	<5	5	218.1	.12
633	23	BURT RANGE	Biosparite	24.3	.064	.033	30.2	.14	.018	15	75	2	<5	22	130.9	.27
634	24	"	"	6.6	.100	.058	36.2	.25	.026	855	75	2	5	10	87.8	.33
635	25	"	"	6.0	.071	.027	36.9	.36	.044	70	60	<2	<5	10	62.2	.55
636	26A	"	"	6.4	.092	.031	35.8	.30	.041	<10	50	2	<5	25	72.4	.52
637	26B	"	Pelsparite	5.4	.062	.030	37.2	.36	.030	160	40	2	<5	8	62.7	.37
638	27	"	Calcarenite	3.7	.067	.026	37.3	.39	.036	165	20	5	<5	8	58.0	.44
639	28	"	"	8.6	.074	.030	36.0	.29	.031	<10	30	5	<5	8	75.3	.38
640	29	"	"	6.4	.059	.025	36.4	.39	.025	<10	30	2	<5	10	56.6	.31
641	607/1	"	Oosparite	9.5	.062	.029	35.5	.36	.028	<10	60	<2	<5	8	59.8	.37
642	2	"	"	11.0	.064	.027	34.7	.36	.028	<10	50	2	5	8	58.5	.36
643	3	"	"	3.6	.069	.024	37.7	.37	.035	<10	30	2	<5	8	61.8	.42
644	4	"	"	3.8	.059	.021	37.9	.36	.032	<10	<20	2	<5	5	63.9	.39

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x10^{-3}
72960645	607/5	BURT RANGE	Calcarenite	7.0	.057	.022	37.3	.41	.047	145	30	2	<5	12	55.2	.58
646	6	"	"	16.4	.057	.023	33.6	.35	.033	10	40	2	<5	8	58.2	.45
647	7	"	Oosparite	5.7	.052	.025	37.9	.41	.042	<10	30	2	<5	8	56.1	.51
648	10	"	Calcarenite	20.7	.100	.024	31.7	.29	.025	<10	45	2	5	35	66.3	.36
649	15	"	Dismicrite	15.6	.078	.016	33.7	.36	.026	<10	50	5	<5	8	56.8	.35
650	16	"	Calcarenite	6.3	.078	.017	37.8	.40	.039	<10	<20	2	<5	5	57.3	.47
651	18	"	Pisosparite	6.7	.057	.015	37.2	.48	.051	10	25	<2	<5	5	47.0	.63
652	21	"	Pelsparite	24.2	.088	.019	30.3	.24	.026	<10	35	2	<5	8	76.6	.39
653	25	"	Pisosparite	8.6	.095	.022	36.3	.25	.031	45	50	2	<5	8	88.1	.39
654	26	"	Calcarenite	8.4	.091	.015	36.9	.38	.041	<10	75	2	<5	8	58.9	.51
655	28	"	Oosparite	3.7	.099	.025	38.5	.37	.040	<10	35	2	<5	8	63.1	.48
656	30	"	Calcarenite	3.2	.105	.026	38.8	.39	.040	<10	40	2	<5	8	60.4	.47
657	31	"	"	34.4	.100	.018	36.6	.28	.034	<10	80	2	<5	8	57.6	.58
658	32	"	"	15.3	.052	.015	34.2	.40	.040	<10	65	<2	<5	8	51.9	.54
659	33	"	Oosparite	2.7	.110	.035	39.0	.40	.048	<10	45	<2	<5	5	59.1	.56
660	52	"	Calcarenite	9.5	.080	.027	36.2	.40	.032	<10	70	2	<5	12	54.9	.40
661	56	"	"	6.2	.055	.036	37.6	.54	.064	<10	150	2	<5	8	42.2	.78
662	58	"	"	22.9	.047	.019	31.1	.31	.032	<10	50	<2	<5	5	60.9	.47

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960663	607/60	BURT RANGE	Calcarenite	18.6	.048	.025	31.6	.37	.054	270	70	2	5	12	51.8	.78
664	63	"	"	21.0	.048	.025	31.4	.41	.049	10	95	2	5	12	46.5	.71
665	66	"	"	2.7	.036	.038	39.0	.46	.070	<10	90	5	10	5	51.4	.82
666	67	"	Biosparite	4.1	.036	.033	37.4	.42	.072	<10	80	2	5	5	54.0	.88
667	68	"	Calcarenite	24.1	.043	.020	30.8	.26	.055	<10	130	2	<5	5	71.9	.82
668	74	"	"	5.0	.052	.046	38.2	.36	.067	360	45	5	5	5	64.4	.80
669	82	"	Biosparite	2.7	.062	.032	38.9	.44	.075	960	20	5	5	5	53.6	.88
670	87	"	"	4.1	.040	.030	37.7	.35	.080	<10	30	2	5	5	65.3	.97
671	84	"	"	5.0	.045	.024	38.2	.43	.105	<10	60	2	<5	5	53.9	1.26
672	85	"	"	4.3	.038	.024	37.4	.40	.087	<10	45	5	<5	5	56.7	1.06
673	91	"	Calcarenite	18.1	.031	.014	32.6	.39	.094	<10	80	5	<5	3	50.7	1.32
674	94	"	"	8.1	.022	.012	36.1	.44	.105	<10	40	2	5	5	49.8	1.33
675	95	"	"	10.5	.041	.026	35.8	.45	.041	<10	45	5	<5	5	48.3	.52
676	97	"	Pelsparite	2.5	.092	.025	39.0	.36	.063	115	65	5	5	5	65.7	.74
677	98	"	Calcarenite	3.0	.092	.026	38.5	.35	.046	<10	65	2	5	5	66.7	.55
678	104	"	"	10.8	.115	.026	35.6	.29	.060	<10	100	5	5	12	74.5	.77
679	105	"	Biosparite	2.6	.145	.041	39.3	.35	.058	<10	80	2	5	5	68.1	.68
680	106	"	Calcarenite	2.1	.115	.032	39.0	.38	.071	20	75	5	15	5	62.3	.83

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960681	607/109	BURT RANGE	Pelsp arite	3.8	.047	.017	38.4	.41	.076	<10	50	2	5	8	56.8	.91
682	110	"	"	5.1	.067	.020	38.2	.41	.075	30	70	2	<5	35	56.5	.90
683	116	"	Calcarenite	25.7	.076	.029	29.7	.36	.047	<10	210	2	5	10	50.0	.72
684	120	"	"	20.8	.040	.018	31.9	.38	.062	<10	110	5	<5	8	50.9	.89
685	124	"	"	4.7	.048	.017	38.3	.42	.064	60	95	5	8	8	55.3	.76
686	125	"	Biosparite	2.6	.064	.015	38.6	.37	.057	<10	110	5	8	8	63.3	.68
687	126	"	Oosparite	4.2	.043	.012	38.4	.40	.058	<10	85	2	8	5	58.2	.69
688	127	"	"	4.3	.052	.012	38.7	.38	.049	<10	140	2	8	8	61.8	.58
689	128	"	Pelsparite	2.5	.037	.013	38.9	.40	.062	<10	95	5	<5	5	59.0	.73
690	129	"	coquinite	3.2	.037	.019	38.6	.34	.048	<10	100	5	<5	5	68.9	.57
691	130	"	Oolite	3.5	.043	.015	38.8	.40	.056	<10	75	2	5	5	58.8	.66
692	131	"	Biosparite	4.3	.038	.017	38.0	.37	.055	<10	75	2	<5	8	62.3	.66
693	132	"	Oosparite	3.0	.038	.016	38.8	.32	.052	<10	75	2	<5	5	73.6	.61
694	133	"	"	4.0	.036	.016	38.6	.34	.057	<10	110	2	<5	5	68.9	.68
695	134	"	Pelsparite	4.2	.071	.015	38.2	.24	.045	<10	200	5	<5	12	96.6	.54
696	135	"	"	3.7	.071	.015	38.4	.26	.046	<10	110	5	<5	12	89.6	.55
697	136	"	"	2.7	.155	.014	39.0	.29	.049	<10	110	2	<5	8	81.6	.57
698	137	"	Oosparite	1.9	.210	.012	39.4	.34	.067	<10	85	2	<5	8	70.3	.78

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960699	607/13C	BURT RANGE	Pelsparite	4.3	.185	.010	38.6	.31	.058	<10	105	5	<5	8	75.5	.69
700	139	"	Calcarenite	2.6	.097	.012	39.0	.36	.056	<10	80	5	<5	8	65.7	.66
701	140	"	"	2.2	.135	.014	39.1	.40	.079	20	100	5	<5	8	59.3	.92
702	141	"	"	1.8	.115	.017	39.5	.37	.071	<10	100	5	5	8	64.8	.82
703	142	"	"	5.2	.087	.022	38.1	.31	.072	10	125	2	5	8	74.6	.86
704	143	"	Biosparite	1.7	.055	.025	38.3	.42	.155	55	90	5	5	5	55.3	1.85
705	144	"	Pelsparite	5.6	.057	.023	37.9	.42	.125	20	105	5	<5	8	54.7	1.51
706	145	"	"	6.9	.052	.022	37.1	.50	.150	40	120	2	<5	8	45.0	1.85
707	148	"	Calcarenite	18.3	.115	.033	32.0	.32	.039	25	430	8	<5	15	60.7	.56
708	151	"	Pelsparite	4.5	.175	.023	38.2	.35	.115	<10	125	5	5	12	66.2	1.38
709	152	"	"	6.1	.097	.042	37.9	.33	.115	80	110	5	5	5	69.7	1.39
710	153	"	"	5.4	.067	.043	38.3	.24	.125	545	120	2	<5	15	96.8	1.49
711	154	"	"	6.5	.067	.024	37.7	.42	.115	50	150	2	<5	15	54.5	1.40
712	156	"	"	11.9	.088	.032	35.3	.47	.115	820	185	2	<5	15	45.6	1.49
713	161	"	Calcisiltite	10.9	.041	.015	34.9	.40	.155	<10	105	2	<5	15	52.9	2.03
714	162	"	Calcarenite	8.5	.043	.016	36.0	.37	.155	<10	105	2	5	8	59.0	1.97
715	163	"	"	14.3	.041	.016	34.5	.38	.120	<10	95	2	<5	10	55.1	1.59
716	164	"	"	5.3	.043	.015	37.2	.36	.160	<10	75	2	8	5	62.7	1.97

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca. x 10^{-3}
72960717	607/165	BURT RANGE	Calcarenite	3.4	.033	.015	39.1	.37	.160	<10	70	5	<5	8	64.1	1.87
718	166	"	"	3.6	.033	.015	38.7	.42	.150	<10	75	5	<5	5	55.9	1.77
719	167	"	"	2.7	.040	.015	38.9	.33	.150	20	70	5	5	5	71.5	1.76
720	168	"	"	2.8	.074	.015	39.1	.26	.105	<10	50	5	<5	8	91.2	1.23
721	169	"	Biosparite	3.3	.180	.017	38.3	.32	.115	765	75	5	<5	22	72.6	1.37
722	170	"	"	2.2	.165	.028	39.2	.26	.078	320	60	5	<5	8	91.5	.91
723	177	"	"	2.1	.048	.017	39.3	.36	.120	80	45	5	<5	5	66.2	1.40
724	187	"	"	4.4	.095	.026	38.8	.26	.115	<10	60	5	<5	5	90.5	1.36
725	188	"	"	4.0	.073	.019	38.4	.27	.160	<10	50	5	<5	10	86.3	1.91
726	189	"	"	3.4	.069	.020	38.6	.31	.125	<10	50	5	<5	5	75.5	1.48
727	193	"	Pelsparite	13.2	.074	.024	34.2	.17	.095	<10	90	5	<5	8	122.0	1.27
728	195	"	"	13.0	.083	.023	35.5	.18	.085	<10	75	5	<5	5	123.1	1.1
729	196	"	Biosparite	8.3	.073	.023	37.4	.21	.100	<10	60	5	<5	5	108.0	1.22
730	200	"	"	2.7	.069	.022	39.5	.28	.091	<10	35	2	<5	12	85.6	1.05
731	201	"	"	3.0	.067	.024	38.8	.36	.080	195	50	2	<5	5	65.4	.94
732	204	"	"	2.6	.081	.027	38.8	.27	.120	185	75	5	<5	5	87.2	1.41
733	205	"	Oosparite	5.5	.078	.027	38.0	.30	.170	655	75	5	5	8	76.8	2.05
734	206	"	Biosparite	4.8	.094	.024	38.2	.23	.160	<10	60	5	<5	8	100.8	1.92

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960735	607/222	Burt Range	calcarenite	35.9	.080	.027	25.5	.16	.053	<10	120	2	<5	8	96.7	.95
736	226	"	biosparite	10.0	.064	.037	35.7	.30	.066	20	45	2	<5	5	72.2	.85
737	230	"	calcarenite	27.7	.093	.034	28.0	.14	.065	<10	110	2	5	12	121.3	1.06
738	233	"	calcsandstone	48.9	.059	.026	20.6	.08	.024	<10	135	<2	<5	5	154.3	.53
739	234	"	calcsandstone	24.8	.062	.028	29.4	.16	.046	<10	80	<2	<5	5	111.5	.72
740	236	"	calcarenite	14.7	.080	.029	34.0	.31	.066	<10	60	2	<5	8	66.5	.89
741	238	"	calcarenite	26.2	.120	.037	29.1	.22	.058	10	90	2	<5	22	80.2	.91
742	245	"	calcarenite	2.6	.087	.054	38.5	.32	.070	30	60	2	<5	5	73.0	.83
743	247	"	calcarenite	51.1	.073	.043	19.6	.22	.010	35	105	2	<5	12	54.0	.23
744	249	"	dolomite	39.5	.064	.027	24.1	.11	.031	<10	75	2	<5	8	139.2	.59
745	259	"	calcarenite	47.3	.094	.029	19.9	.11	.019	15	190	2	<5	8	109.7	.44
746	269	"	biosparite	6.9	.073	.037	37.1	.21	.049	<10	75	2	<5	12	107.2	.60
747	275	"	oosparite	6.0	.069	.039	36.6	.21	.065	<10	50	2	8	20	105.7	.81
748	276	"	oosparite	5.0	.059	.032	37.0	.28	.076	<10	50	2	<5	8	80.2	.94
749	278	"	oosparite	5.7	.062	.030	36.9	.38	.072	<10	90	2	<5	20	58.9	.89
750	279	"	calcarenite	34.7	.057	.023	25.7	.16	.054	<10	90	2	<5	5	97.4	.96
751	280	"	oosparite	6.0	.074	.034	36.9	.29	.046	<10	55	2	<5	5	77.2	.57
752	281	"	biosparite	8.3	.050	.028	35.7	.33	.059	<10	65	2	5	5	65.0	.76

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x10^{-3}
72960753	607/285	Burt Range	calcarenite	22.9	.055	.025	31.0	.27	.036	<10	105	5	<5	12	69.7	.53
754	289	"	calcarenite	17.8	.095	.028	32.5	.27	.048	<10	75	5	5	12	73.[illegible]	.68
755	290	"	calcarenite	13.0	.087	.032	34.2	.28	.047	10	60	2	<5	55	74.1	.63
756	292	"	biosparite	7.5	.094	.036	37.0	.30	.058	20	70	5	<5	15	74.8	.72
757	301	"	biosparite	13.6	.081	.027	34.5	.27	.051	<10	75	5	<5	10	77.5	.68
758	302	"	calcarenite	25.7	.120	.032	30.3	.31	.078	10	140	5	<5	12	59.3	1.18
759	303	"	calcarenite	11.9	.110	.037	35.5	.27	.085	20	95	5	5	8	79.8	1.10
760	304	"	biocalcarenite	24.6	.150	.043	30.2	.24	.066	280	125	5	<5	12	76.3	1.00
761	307	"	biosparite	15.9	.110	.043	34.2	.26	.055	70	105	5	<5	12	79.8	.74
762	312	"	biosparite	14.4	.100	.042	34.4	.24	.047	<10	90	2	<5	8	86.9	.62
763	314	"	biosparite	4.9	.094	.037	37.9	.35	.065	<10	70	2	<5	5	65.7	.78
764	324	"	biosparite	8.5	.120	.036	37.1	.31	.096	<10	70	2	5	5	72.6	1.18
765	325	"	calcarenite	16.6	.099	.050	34.1	.27	.049	20	95	2	<5	12	76.6	.66
766	335	"	biosparite	5.4	.069	.032	37.9	.25	.058	<10	45	5	<5	5	92.0	.70
767	336	"	dolomite	34.8	.130	.030	25.8	.16	.032	20	135	2	<5	8	97.8	.57
768	337	"	dolomite	37.6	.071	.027	25.6	.16	.033	10	75	2	<5	12	97.1	.59
769	338	"	crinoidal limestone	3.3	.050	.027	38.6	.30	.110	<10	60	2	<5	12	78.1	1.30
770	339	"	calcsandstone	23.2	.064	.032	31.1	.17	.061	<10	60	2	<5	5	111.0	.90

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960771	607/342	Burt Range	biosparite	3.4	.090	.049	37.8	.23	.064	10	45	5	5	8	99.7	.77
772	343	"	biosparite	39.0	.110	.030	23.9	.19	.028	10	215	5	<5	20	76.3	.54
773	344	"	calcarenite	28.3	.088	.034	28.7	.20	.041	<10	160	5	<5	8	87.1	.65
774	346	"	calcarenite	23.9	.110	.033	30.4	.20	.066	<10	120	5	5	15	92.2	.99
775	347	"	calcarenite	25.9	.115	.036	29.3	.19	.048	70	120	5	<5	8	93.5	.75
776	348	"	calcarenite	16.9	.125	.043	32.9	.20	.065	10	95	2	5	8	99.8	.90
777	350	"	calcarenite	42.1	.099	.034	23.2	.12	.018	10	170	2	<5	8	122.4	.35
778	352	"	calcarenite	20.0	.105	.035	32.5	.18	.063	<10	260	2	<5	8	112.6	.89
779	355	"	calcarenite	36.4	.115	.038	25.5	.14	.030	35	110	5	<5	10	110.5	.54
780	356	"	calcarenite	35.6	.155	.045	25.3	.17	.035	10	165	5	5	12	90.3	.63
781	360	"	calcarenite	44.4	.105	.033	22.0	.13	.022	20	190	5	5	15	106.8	.46
782	367	"	biosparite	5.3	.083	.043	38.1	.20	.043	10	30	5	10	5	115.5	.52
783	368	"	biosparite	5.6	.090	.038	37.8	.21	.047	<10	35	5	<5	5	109.2	.57
784	369	"	calcarenite	20.4	.076	.032	31.8	.19	.047	<10	70	5	<5	8	104.3	.68
785	370	"	calcarenite	10.5	.080	.032	35.4	.23	.056	<10	80	2	5	8	93.4	.72
786	374	"	calcarenite	21.1	.076	.029	32.0	.19	.043	<10	135	5	<5	10	102.2	.61
787	375	"	biosparite	1.8	.052	.031	39.2	.35	.061	365	135	5	5	12	67.9	.71
788	608/1	Button Beds	calcsandstone	53.9	.092	.044	18.6	.09	.006	<10	30	5	5	8	129.7	.15

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960789	608/11	Burt Range	pelsparite	21.0	.078	.037	31.4	.36	.027	1035	60	5	5	12	52.9	.39
790	12	"	pelsparite	20.2	.069	.029	32.0	.36	.027	30	65	5	10	8	53.9	.39
791	21	"	biosparite	7.5	.130	.041	36.0	.50	.037	495	30	5	<5	12	43.7	.47
792	22	"	calcarenite	8.0	.190	.049	36.3	.63	.030	1010	35	5	8	5	35.0	.38
793	27	"	biosparite	3.8	.041	.022	38.3	.50	.033	20	<20	5	5	12	46.5	.39
794	28	"	calcarenite	18.4	.080	.024	32.3	.32	.030	15	60	8	5	12	61.2	.42
795	34A	"	calcarenite	42.9	.085	.024	22.6	.21	.014	45	105	5	10	8	65.3	.28
796	34B	"	calcarenite	42.0	.096	.023	23.1	.21	.014	55	110	5	5	8	66.7	.28
797	35	"	calcarenite	5.7	.085	.023	37.4	.43	.055	40	45	5	5	8	52.8	.67
798	40	"	calcarenite	5.3	.083	.023	38.2	.43	.044	<10	45	5	8	5	53.9	.53
799	41	"	pelsparite	5.8	.061	.023	37.2	.43	.058	<10	30	2	<5	8	52.5	.71
800	42	"	pelsparite	8.5	.055	.032	36.5	.40	.080	<10	60	5	5	8	55.4	1.0
801	43	"	biosparite	3.9	.053	.030	38.2	.39	.074	15	30	5	<5	8	59.4	.89
802	44	"	calcarenite	32.3	.067	.017	27.0	.30	.059	15	95	5	<5	12	54.6	1.00
803	45	"	pelsparite	14.2	.033	.010	34.5	.34	.052	<10	30	5	5	5	61.6	.69
804	46	"	pelsparite	10.3	.047	.012	36.0	.45	.076	<10	30	5	8	8	48.5	.97
805	47	"	oosparite	4.2	.043	.011	38.5	.43	.070	330	45	5	<5	5	54.3	.83
806	48	"	biosparite	3.3	.045	.013	39.2	.43	.096	<10	60	5	5	5	5.5	1.12

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960807	608/49	Burt Range	biosparite	2.3	.019	.012	39.0	.44	.105	<10	45	2	<5	5	53.8	1.23
808	50	"	pelsparite	2.8	.027	.016	39.1	.38	.090	<10	70	2	<5	5	62.4	1.05
809	51	"	pelsparite	4.7	.033	.019	38.1	.40	.066	<10	75	<2	<5	5	57.8	.79
810	52	"	biosparite	1.8	.015	.014	39.7	.29	.097	<10	75	2	<5	5	83.0	1.12
811	53	"	pelsparite	3.8	.019	.007	38.7	.30	.089	<10	45	2	<5	8	78.3	1.05
812	54	"	biosparite	2.3	.026	.005	38.9	.40	.085	<10	50	2	<5	5	59.0	1.00
813	55	"	calcarenite	4.6	.040	.005	37.6	.44	.165	50	22	5	<5	5	51.8	2.01
814	56	"	calcarenite	4.7	.033	.008	38.4	.42	.115	85	<20	5	5	12	55.5	1.37
815	57	"	pelsparite	4.6	.024	.005	38.5	.37	.100	<10	<20	5	<5	8	63.1	1.19
816	58	"	pelsparite	37.0	.096	.028	25.3	.15	.025	20	150	2	8	22	102.3	.45
817	59	"	pelsparite	20.0	.088	.027	32.6	17	.038	<10	130	2	8	10	116.3	.53
818	60	"	biosparite	8.5	.069	.034	36.8	.17	.059	55	120	2	<5	8	131.3	.73
819	61	"	biosparite	11.9	.073	.032	35.7	.12	.038	<10	45	2	5	32	180.5	.49
820	62	"	oosparite	8.1	.097	.037	37.0	.20	.030	<10	110	5	8	8	112.2	.37
821	63	"	biosparite	7.7	.130	.054	37.4	.14	.047	<10	42	5	5	8	162.1	.57
822	64	"	biopelsparite	15.7	.155	.053	34.4	.19	.037	<10	75	2	<5	15	109.8	.49
823	65	"	biopelsparite	19.2	.130	.051	32.6	.13	.026	<10	45	2	<5	18	152.1	.36
824	66	"	oosparite	10.6	.097	.035	35.8	.26	.038	<10	80	2	5	28	83.5	.49

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960825	608/67	Burt Range	oosparite	23.7	.090	.034	30.6	.24	.048	<10	46	2	< 5	8	77.3	.72
826	N1/54	Gogo	shale	85.4	.110	.035	4.3	.51	.004	60	420	22	< 5	85	5.1	.43
827	145	"	limestone	53.0	.165	.210	17.0	.42	.009	25	330	5	8	55	24.6	.24
828	148	"	shale	82.3	.165	.045	5.4	.47	.006	70	390	15	5	85	7.0	.51
829	218	"	shale	83.2	.150	.051	5.0	.38	.006	90	390	60	< 5	85	8.0	.55
830	288	"	siltstone	69.6	.280	.125	10.2	.46	.018	80	170	20	< 5	70	13.5	.81
831	386	"	shale	73.1	.290	.175	8.6	.50	.007	75	390	25	140	75	10.4	.37
832	500	"	siltstone	68.6	.280	.210	10.6	.41	.006	50	420	5	5	65	15.7	.26
833	508	"	siltstone	76.8	.270	.125	6.9	.72	.007	100	430	20	5	75	5.8	.46
834	N4/12	Yellow Drum	limestone	14.8	.078	.027	34.1	.37	.022	20	85	5	< 5	15	55.9	.30
835	25	"	limestone	10.8	.230	.030	34.0	1.80	.021	<10	70	5	< 5	35	11.5	.28
836	34	"	limestone	14.6	.240	.032	32.0	2.05	.023	20	70	15	5	70	9.5	.33
837	46	"	calcareous siltstone	48.6	.250	.028	13.1	4.75	.076	45	290	12	5	40	1.7	2.65
838	48	"	dolomitic limestone	18.0	.310	.029	24.1	5.90	.030	15	90	5	8	22	2.5	.57
839	65	"	sandy shale	52.2	.290	.020	11.9	4.55	.012	55	220	10	5	35	1.6	.46
840	69	"	mudstone	81.0	.120	.008	4.8	1.25	.010	60	430	15	5	65	2.3	.95
841	76	"	limestone	12.2	.290	.029	31.0	2.85	.037	405	100	5	8	12	6.6	.55

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	$Sr/Ca \times 10^{-3}$
72960842	N4/79	Yellow Drum	calcareous shale	30.2	.430	.026	16.7	7.20	.012	75	180	12	<5	25	1.4	.33
843	88	"	oolitic dolomite	9.1	.340	.027	27.5	6.90	.011	<10	40	2	<5	12	2.4	.18
844	96	"	silty dolomite	19.8	.270	.017	21.2	8.45	.008	<10	32	<2	<5	8	1.5	.17
845	100	"	calcareous dolomite	16.6	.230	.018	24.3	6.75	.009	<10	40	<2	<5	110	2.2	.17
846	108	"	dolomite	15.0	.290	.018	21.2	9.70	.008	<10	28	<2	<5	8	1.3	.17
847	118	"	dolomite	11.5	.300	.027	22.5	9.75	.009	95	34	2	<5	55	1.4	.18
848	120	"	silty, dolomite	31.4	.480	.030	16.1	7.95	.005	20	110	8	5	38	1.2	.14
849	127	"	calcareous sandstone	70.2	.067	.011	12.6	0.12	.008	10	120	8	5	5	63.7	.29
850	134	"	sandstone	94.7	.085	.003	0.73	0.20	.001	50	340	2	<5	35	2.1	.65
851	146	"	siltstone	95.4	.073	.002	0.42	.17	.001	60	250	18	8	55	1.4	1.14
852	153	"	sandy siltstone	52.8	.360	.044	10.9	5.25	.006	25	220	5	10	22	1.3	.25
853	159	"	shale	63.8	.350	.042	8.1	3.60	.004	50	340	5	5	50	1.4	.23
854	168	"	calcareous sandstone	68.3	.076	.015	12.2	.25	.011	40	160	5	10	10	30.0	.41
855	175	"	sandstone	96.2	.074	.002	0.7	.10	.001	50	210	2	<5	30	4.3	.65
856	185	"	sandstone	96.5	.060	.039	0.3	.11	.001	215	160	2	10	70	1.7	1.52
857	187	"	sandstone	97.4	.048	.001	0.2	.06	.001	30	200	2	<5	22	2.2	2.29
858	189	"	calcareous sandstone	81.6	.050	.011	7.4	.06	.003	20	90	2	12	5	72.4	.19
859	195	"	calcareous sandstone	60.8	.135	.033	13.7	1.25	.007	20	640	2	5	8	6.65	.23

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960860	N4/208	Gum Hole	sandy dolomite	40.3	.640	.054	14.0	6.40	.008	15	590	5	10	12	1.3	.26
861	211	"	calcareous sandstone	81.0	.120	.012	7.7	0.09	.004	30	270	5	5	8	51.9	.24
862	213	"	calcareous sandstone	83.6	.094	.011	5.9	0.11	.004	25	310	5	12	8	32.5	.31
863	223	"	calcareous sandstone	34.8	.550	.069	16.1	6.90	.008	<10	270	5	<5	8	1.4	.23
864	N5/53	Gogo	limestone	3.0	.190	.095	38.6	0.51	.018	<10	32	5	<5	8	45.9	.21
865	56	"	limestone breccia	6.8	.175	.086	36.3	1.15	.016	<10	42	5	<5	8	19.1	.20
866	141	"	shaly limestone	27.9	.220	.043	26.6	0.91	.022	10	180	22	5	38	17.7	.38
867	146	"	limestone	13.7	.220	.050	34.0	0.51	.030	<10	120	8	<5	18	40.4	.40
868	147	"	mudstone	52.5	.460	.031	16.4	1.10	.016	35	280	40	5	32	9.0	.45
869	215	"	limestone	10.7	.081	.026	34.9	0.66	.041	<10	120	2	<5	8	32.1	.54
870	LR1/14	Yellow Drum	silty pelletal grainstone	18.0	.076	.027	29.5	2.70	.025	15	32	2	<5	12	6.6	.39
871	20	"	silty calcareous dolomite	22.2	.088	.028	25.7	4.50	.018	10	45	2	10	28	3.5	.32
872	27	"	limestone	15.4	.085	.031	29.3	3.80	.020	<10	45	<2	<5	28	4.7	.31
873	36	"	sandstone	39.0	.067	.049	24.8	0.52	.007	95	40	2	10	18	28.9	.13
874	43	"	dolomitic v-fine sand	46.0	.076	.037	16.3	4.40	.011	45	180	2	<5	22	2.3	.31
875	59	"	dolomitic silty sandstone	49.5	.097	.023	13.2	5.40	.010	20	120	10	<5	35	1.5	.35
876	63	"	silty dolomite	22.0	.165	.032	19.8	8.50	.015	20	60	18	20	80	1.4	.35
877	67	"	calcareous sandstone	37.7	.100	.033	22.4	2.45	.015	10	42	35	110	22	5.6	.31

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca x 10^{-3}
72960878	LR1/71	Yellow Drum	sandstone	53.5	.073	.032	15.7	2.25	.009	35	32	2	<5	18	4.2	.26
879	74	"	dolomitic sandstone	63.9	.088	.025	8.4	3.70	.006	20	48	2	<5	15	1.4	.33
880	78	"	silty dolomite	34.3	.150	.043	15.9	7.00	.012	35	120	8	50	32	1.4	.35
881	87	"	dolomite	13.5	.150	.055	22.4	7.90	.022	10	60	8	<5	22	1.7	.45
882	90	"	dolomite	39.2	.150	.042	15.1	5.90	.012	35	210	15	<5	70	1.6	.36
883	93	"	oolitic grainstone	15.7	.073	.035	31.4	1.05	.026	<10	45	5	8	17	18.1	.38
884	98	"	silty limestone	42.4	.105	.041	18.5	3.10	.014	<10	150	8	130	75	3.6	.35
885	101	"	siltstone	49.5	.28	.034	12.3	5.45	.008	15	210	18	20	120	1.4	.30
886	103	"	sandy dolomite	41.9	.21	.037	14.3	6.30	.010	10	240	32	30	100	1.4	.32
887	107	"	calcareous sandstone	79.0	.073	.016	7.7	.26	.011	15	90	2	<5	5	18.0	.65
888	119	"	Silty dolomite	36.9	.160	.043	15.4	7.00	.011	<10	150	2	<5	32	1.3	.33
889	123	"	dolomite	51.2	.130	.042	11.6	5.30	.009	50	250	2	<5	48	1.3	.35
890	126	"	limestone	19.2	.081	.055	25.7	4.95	.025	<10	60	2	8	22	3.2	.44
891	135	"	calcareous shale	52.3	.155	.031	11.0	5.20	.008	25	270	25	5	65	1.3	.33
892	141	"	dolomitic sandy mudstone	73.3	.145	.024	5.8	2.80	.004	25	280	5	<5	42	1.3	.32
893	145	"	mudstone	68.0	.175	.032	6.8	3.40	.006	35	400	8	<5	55	1.2	.40
894	153	"	dolomitic silty sandstone	53.6	.210	.054	11.0	5.25	.006	50	120	<2	<5	12	1.3	.25
895	156	"	calcareous shale	39.7	.250	.062	13.9	7.20	.010	20	60	2	<5	22	1.2	.33

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960896	LR1/163	Yellow Drum	dolomite	13.8	.180	.066	22.1	9.50	.019	20	50	5	<5	15	1.4	.39
897	165	"	silty dolomite	18.9	.165	.057	20.1	9.60	.016	10	45	5	<5	8	1.3	.36
898	171	"	calcareous dolomite	12.5	.220	.078	23.7	8.90	.027	<10	32	2	<5	12	1.6	.52
899	175	"	dolomite	16.2	.220	.082	21.9	9.10	.022	<10	48	2	5	15	1.5	.46
900	177	"	dolomite	30.6	.270	.053	17.0	8.30	.015	15	78	5	<5	22	1.2	.40
901	200	Luluigui	siltstone	87.9	.097	.015	2.9	0.65	.007	195	780	12	<5	65	2.7	1.10
902	204	"	dolomite	29.7	.145	.170	17.6	7.50	.019	160	205	12	<5	32	1.4	.49
903	208	"	siltstone	90.0	.074	.002	1.3	0.20	.008	95	640	15	5	75	3.9	2.81
904	LR2/ 17	Grant ?	sandstone	96.4	.083	.001	0.4	.03	.001	30	36	<2	<5	<2	8.7	1.14
905	53	Laurel	skeletal grainstone	11.2	.105	.044	35.4	.21	.023	25	62	8	8	12	102.2	.30
906	58	"	claystone	27.1	.090	.022	28.8	.20	.034	40	340	8	<5	28	87.4	.54
907	72	"	pelletal skeletal grainstone	7.6	.055	.019	37.4	.20	.034	<10	160	2	<5	10	113.4	.42
908	92	"	skeletal grainstone	7.6	.029	.021	37.1	.16	.036	170	480	5	<5	8	140.6	.44
909	104	"	fine skelctal grainstone	15.4	.085	.013	33.1	.36	.065	15	120	5	<5	8	55.8	.90
910	110	"	silty limestone	27.8	.057	.017	28.7	.20	.032	<10	270	5	5	12	87.1	.51
911	117	"	skeletal grainstone	3.1	.026	.026	38.4	.20	.068	55	920	5	<5	5	116.5	.81
912	123	"	fine sandstone	66.5	.041	.017	13.4	.07	.018	20	1260	2	5	8	116.1	.61
913	127	"	skeletal grainstone	4.2	.014	.015	38.3	.30	.059	<10	400	5	5	8	77.4	.70

SAMPLE NO.	LOCALITY	FORMATION	LITHOLOGY	INSOLUBLE	Fe	Mn	Ca	Mg	Sr	Ba	P	Cu	Pb	Zn	Ca/Mg	Sr/Ca.x10^{-3}
72960914	LR2/130	Laurel	skeletal grainstone	14.6	.034	.012	34.6	.37	.063	185	980	5	<5	8	56.7	.83
915	132	"	shale	40.6	.220	.016	20.8	1.30	.021	35	200	10	<5	22	9.7	.46
916	136	"	sandy skeletal limestone	27.6	.099	.014	26.8	.86	.033	15	520	5	<5	20	18.9	.56
917	141	"	skeletal grainstone	16.1	.034	.025	33.9	.26	.049	10	420	2	<5	10	79.1	.66
918	147	"	sandy skeletal grainstone	29.1	.017	.012	28.7	.14	.036	<10	390	<2	<5	5	124.3	.57
919	150	"	sandstone	51.8	.064	.012	18.3	.09	.023	20	790	2	<5	8	126.1	.57
920	153	"	calcareous fine sandstone	27.5	.033	.015	29.0	.11	.031	<10	460	2	5	5	167.5	.49
921	162	"	calcareous fine sandstone	51.9	.055	.010	19.4	.07	.018	15	700	2	<5	8	161.2	.42
922	164	"	skeletal grainstone	11.8	.033	.015	35.3	.14	.042	<10	260	2	<5	5	153.0	.54
923	174	"	skeletal grainstone	13.8	.045	.013	33.4	.38	.062	<10	155	2	8	8	53.3	.85
924	175	"	coral-skeletal grainstone	14.0	.073	.015	32.2	1.50	.063	<10	66	2	<5	20	13.0	.89
925	188	"	shale	37.9	.185	.013	22.9	.74	.034	10	550	8	<5	38	18.8	.68
926	197	"	silty limestone	40.2	.195	.018	21.6	.71	.029	20	155	5	8	32	18.5	.61
927	202	"	skeletal grainstone	8.4	.048	.012	35.7	.41	.047	<10	32	2	<5	8	52.8	.60
928	214	"	skeletal grainstone	16.1	.180	.072	33.3	.26	.039	<10	110	2	<5	8	77.7	.54
929	217	"	shale	80.2	.290	.007	2.9	.13	.008	55	470	35	<5	150	13.5	1.26
930	224	"	skeletal grainstone	18.0	.310	.120	30.9	.48	.058	<10	390	5	<5	120	39.1	.86