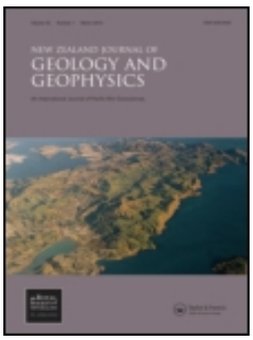

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ADDITIONAL DATA ON THE VOLCANIC ARGILLITES FROM RED ROCK POINT, WELLINGTON

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Summary

The dove-grey volcanic argillite from Red Rock Point is petrographically and chemically very similar to the red and green volcanic argillites, and differs only in the degree of oxidation of the iron oxide. These volcanic argillites are considered to be mainly argillaceous in nature (at least 70 to 80%), with the admixture of volcanic material probably containing a high proportion of finely divided iron oxide.

Introduction

The accessible and well exposed sequence of volcanic rocks intercalated with the Wellington greywackes and argillites at Red Rock Point has been described by several geologists (McKay, 1879, 1888; Broadgate, 1916; Wellman, 1949; Brodie, 1953). A petrographic account has recently been provided (Reed, 1957) but no chemical data was then available on the dove-grey argillite which forms an important member of the volcanic sequence. The purpose of this paper is to present a chemical analysis of this argillite and to discuss the origin of the volcanic argillites in the light of this new knowledge.

Occurrence and Petrography

The volcanic sequence at Red Rock Point is shown in the accompanying rock-column (Fig. 1), and the high proportion of dove-grey argillite will be noted. Except for the colour, the argillite is petrographically identical to the red and green (green-grey) volcanic argillites. All are poorly bedded with an incipient slaty cleavage, and display a distinctive micro-texture in thin section (Fig. 2). This micro-texture, a combination of uniform fine grain-size and slaty cleavage, contrasts markedly with that of the normal argillite (silt-wacke) of the Wellington district (Reed, 1957).

Chemical Composition

A chemical analysis of a sample (P 15888), collected from about the middle of the dove-grey argillite at Red Rock Point, is given in Table 1. The analysis is very similar to that of the red and green volcanic argillites (Reed, 1957; Table 5), as is indicated in Fig. 3. In all samples

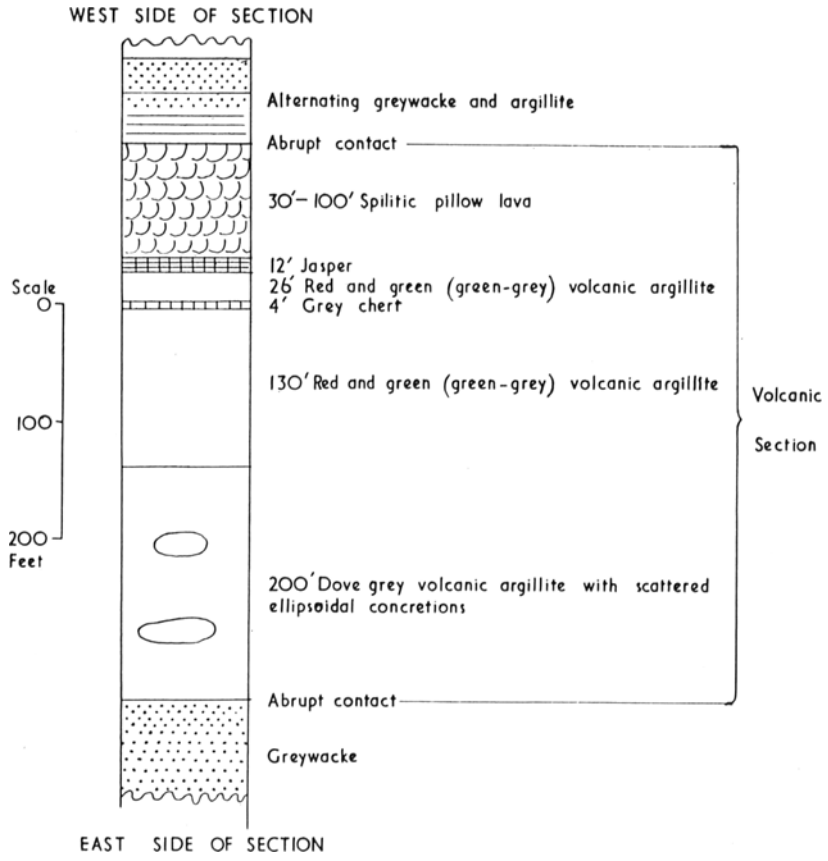

FIG. 1.—Rock Column showing volcanic section at Red Rock Point (after Wellman, 1949, and Reed, 1957).

the total amount of iron is approximately constant, differences in coloration being due to different degrees of oxidation of the iron (see Fig. 4; Table 2).

DISCUSSION

One of the main problems with the volcanic argillites is to determine the proportion of argillaceous sediment to volcanic material. The composition of the volcanic argillites lies between that of the Wellington argillites and spilitic lavas, but much nearer the former (Fig. 3). This does not mean simple admixture of the two, however, for as pointed out elsewhere (Reed, 1957, p. 42), the distinctive micro-texture of the volcanic argillites indicates that they are admixtures, not of the normal argillite but of a finer-grained sediment, either a clay-wacke

TABLE 1.—Chemical Analysis of Dove-grey Volcanic Argillite from Red Rock Point, Wellington.

		Molecular Norm	
SiO_2	59·8	Q = 20·3	Salic = 81·4
Fe_2O_3	18·0	or = 21·5	Femic = 18·7
Al_2O_3	0·7	ab = 26·0	
FeO	5·65	an = 4·0	
MgO	2·9	C = 9·6	
CaO	1·0	en = 7·6	
Na_2O	2·7	fs = 8·6	
K_2O	3·5	il = 1·2	
Li_2O	Nt fd	mt = 0·8	
H_2O+	3·9	ap = 0·5	
H_2O-	0·2		
TiO_2	0·76		
P_2O_5	0·28		
MnO	0·10		
CO_2	Nt fd		
Total:	99·5		

Dove-grey volcanic argillite (P 15888) from Red Rock Point, Wellington (N.Z.M.S. 1 Sheet N164, grid ref. 292133).
Analyst: J. A. Ritchie, Dominion Laboratory, D.S.I.R.

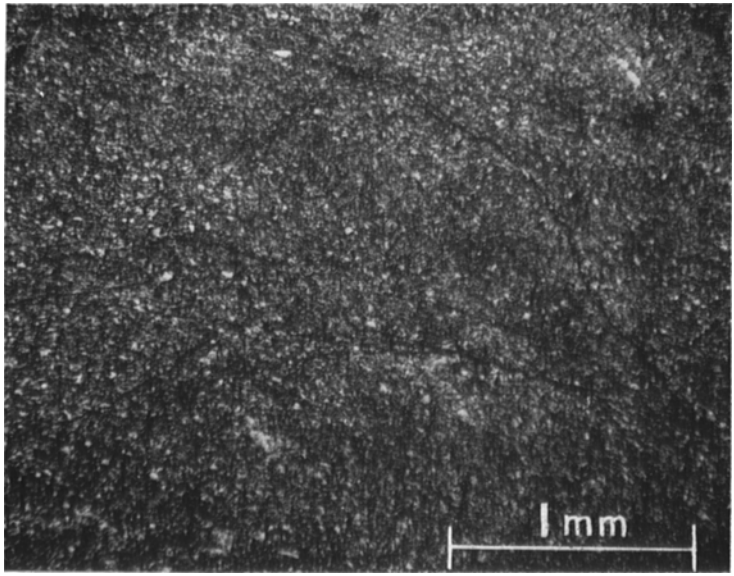

FIG. 2.—Photomicrograph of dove-grey volcanic argillite from Red Rock Point showing characteristic micro-texture.
Photo: A. V. Weatherhead.

or deep-water lutite. Support for this conclusion is provided by the alumina content, which in the volcanic argillites is significantly higher than in both the normal argillite and the spilitic lava (Table 3). There

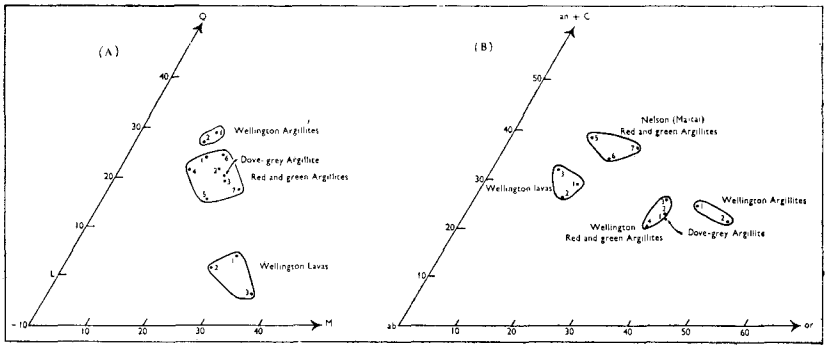

FIG. 3.—Diagrams showing close similarity in composition between the dove-grey and the red and green volcanic argillites from Red Rock Point (after Reed, 1957, Fig. 34).

TABLE 2.—Normative Magnetite in Volcanic Argillites from Red Rock Point, Wellington.

	Dove-grey	Green	Red
mt	0·8	2·3	4·2
		1·5	2·3

are no chemical data on this inferred sediment, but if the analysis of the composite sample of Wellington argillites (Reed, 1957; Table 3, Column 1) is assumed to provide a reasonable indication of its composition, then the theoretical proportions of the various major constituents

TABLE 3.—Comparison of the major constituents in the volcanic argillites, spilitic lavas and normal argillites (compare Reed, 1957).

	(1)	(2)	(3)	(4)
SiO_2	48·21	60·53	64·2	23
Al_2O_3	15·26	18·02	16·3	—
Fe_2O_3	5·89	2·01	0·72	25
FeO	5·09	4·88	4·1	79
MgO	3·12	2·55	1·9	53
CaO	8·05	1·04	1·4	—
Na_2O	4·02	2·83	2·2	35
K_2O	1·58	3·46	3·7	11
TiO_2	1·80	0·81	0·70	10
MnO	0·28	0·14	0·06	36

(1) Average spilitic lava.
(2) Average volcanic argillite.
(3) Average Wellington argillite.
(4) Theoretical Proportion of the various major constituents of the spilitic lava required to be mixed with the Wellington argillite to produce the volcanic argillite.

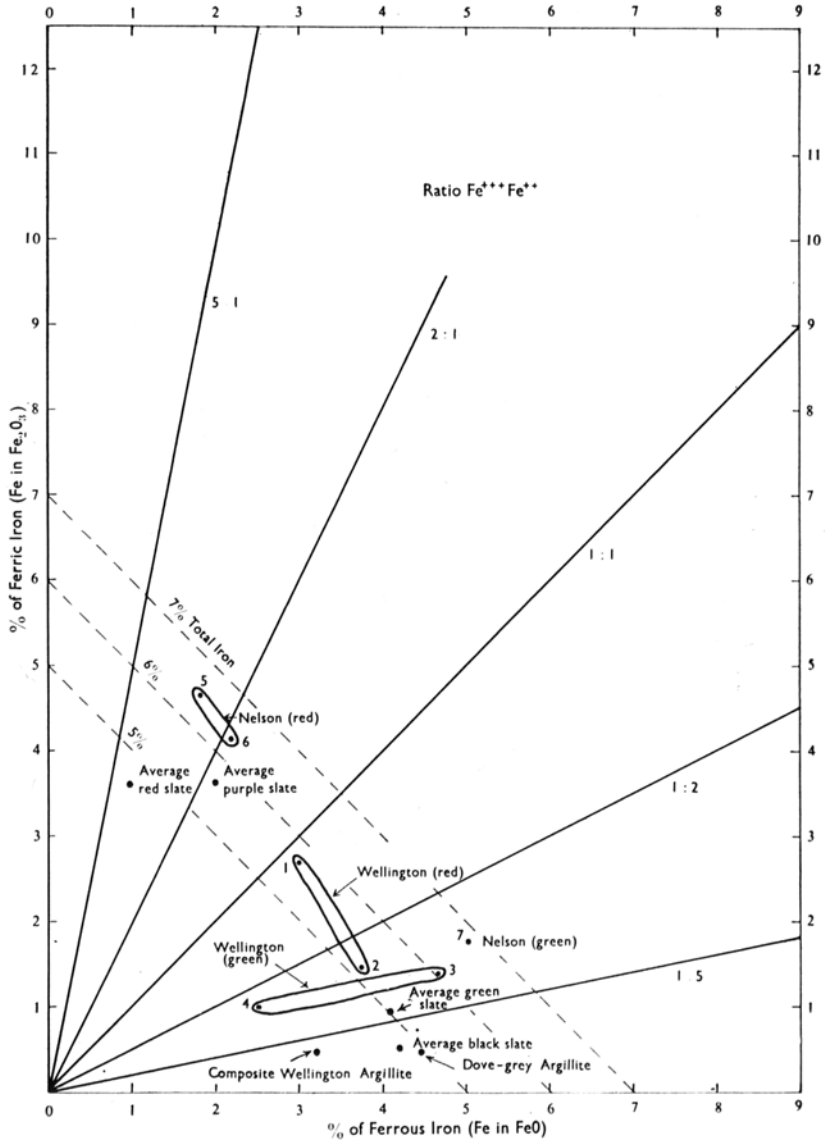

FIG. 4.—Diagram showing proportion of ferrous to ferric iron in dove-grey volcanic argillite from Red Rock Point and in analysis of composite Wellington argillite sample (after Reed, 1957, Fig. 35).

of the spilitic lava required to be mixed with the Wellington argillite to produce the volcanic argillite are indicated in Table 3. The low CaO value in the volcanic argillite is possibly due to concentration of the

lime in concretions. The micro-texture of the volcanic argillites demonstrates that the volcanic material is of a uniform fine-grain size, and judging from Table 3 iron oxide is a prominent addition.

Consideration of the evidence suggests that the volcanic argillites are largely argillaceous in nature (at least 70 to 80 per cent.) and that the admixture of volcanic material probably contains a high proportion of finely divided iron oxide.

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