DISCUSSIONS

WATER PRESSURES DURING DIFFERENTIATION AND CRYSTALLIZATION OF SOME ASH-FLOW MAGMAS FROM SOUTHERN NEVADA

A. EWART*

New Zealand Geological Survey, Lower Hutt, New Zealand

I should like to make two observations which arise from the paper by Peter Lipman published in this Journal in December 1966. One concerns Lipman's comments regarding sodium leaching from the Taupo pumices; the second is to describe a third possible method of estimating water pressure in rhyolitic extrusive rocks.

1. *Sodium leaching in the Taupo (New Zealand) pumice glasses.*—Lipman (p. 812, 822) suggests that the Taupo pumices (Ewart, 1963) have undergone appreciable leaching of alkalis, in particular the selective loss of sodium, as a result of their high degree of hydration. To attempt to evaluate whether, in fact, selective alkali leaching has occurred, alkali determinations (by flame photometry) have been made on coexisting pumice and obsidian fragments from eight of the pumice horizons (referred to as members) within the Taupo pumice sequence. The results are presented in table 1. The samples were recollected from the original locality.

In the orignal work (Ewart, 1963), the obsidian fragments were regarded as being derived from the same magma as the coexisting pumices (in each horizon), mainly from the evidence of similarities of phenocryst mineralogy (see Ewart, 1963, table 3). In some of the obsidian fragments, there was evidence of partially assimilated xenolithic material (presumably wall rock). The percentage of recognizable xenoliths was, however, shown to be extremely small. It is therefore believed that the obsidians and coexisting pumices are chemically co-magmatic.

If preferential leaching of sodium had occurred due to the post-eruptive hydration of the pumice glasses, the Na_2O/K_2O ratios of the pumices should be consistently lower than the coexisting obsidians. From table 1, it is clear that this is not the case and that the Na_2O/K_2O ratios show reasonably close agreement for all eight pairs. The writer interprets this as indicating that preferential loss of Na_2O has not occurred from the Taupo pumice glasses. Some additional confirmation is obtained by the absence (with one exception) of normative corundum in the Taupo glasses (Ewart, 1963, table 7). Normative corundum should increase significantly as the result of alkali leaching of these rhyolitic glasses. A possible reason for the lack of sodium loss could be the very young age of the pumice deposits—all are younger than about 10,000 years.

2. *Additional method of estimating water pressures in acidic magmas.*—This method depends on combining both modal and chemical data in

* Present address: Dept. Geology, University of Queensland, Brisbane, Australia.

TABLE 1

Alkali analyses of coexisting obsidians and pumices from the Taupo Pumice sequence, New Zealand

Member number	5		7		10		12		14A		14C		16 (upper)		19	
Material	O	P	O	P	O	P	O	P	O	P	O	P	O	P	O	P
Na_2O	4.74	4.55	4.69	4.49	4.68	4.48	4.60	4.52	4.76	4.66	4.52	4.32	4.79	4.54	4.56	4.28
K_2O	2.91	2.71	2.86	2.73	2.68	2.65	2.87	2.79	2.77	2.65	3.13	2.78	2.87	2.84	2.80	2.65
Na_2O/K_2O	1.63	1.68	1.64	1.64	1.75	1.69	1.60	1.62	1.72	1.76	1.44	1.55	1.67	1.60	1.63	1.62
Total ignition loss*	0.75	3.7	0.48	3.0	1.04	2.4	0.26	3.1	0.22	2.5	0.33	4.0	0.1	2.9	0.61	3.4

O = obsidian; P = pumice; all alkali analyses were done in duplicate.

* Includes $H_2O(-)$, $H_2O(+)$, and other volatiles.