TABLE 4

AVERAGE ABUNDANCES OF GROUPS I AND II FOR EACH DISTANCE SCALE

	SSV08		Z95	
Element	Group I	Group II	Group I	Group II
He/H	0.110 ± 0.004	0.099 ± 0.009	0.111 ± 0.004	0.117 ± 0.004
ϵ(N)	8.02 ± 0.06	8.22 ± 0.10	8.07 ± 0.06	8.25 ± 0.08
ϵ(O)	8.49 ± 0.04	8.69 ± 0.06	8.50 ± 0.04	8.64 ± 0.07
ϵ(S)	6.62 ± 0.05	6.74 ± 0.14	6.68 ± 0.06	6.84 ± 0.07
ϵ(Ar)	6.37 ± 0.05	6.56 ± 0.07	6.38 ± 0.05	6.48 ± 0.08
ϵ(Ne)	7.74 ± 0.05	8.00 ± 0.12	7.64 ± 0.07	7.95 ± 0.07

values are between 8.0 and 9.3 dex. The same trend is seen in the distributions for the SSV08 scale when compared with the Z95 scale: compared to Group I objects, the α-element distributions for Group II show a tendency to higher abundances.

Table 4 shows the average abundances and the standard error of the mean for Group I and II objects, adopting the distances 1.5 and 2.2 kpc for the Z95 and SSV08 scales as the limit between the two groups. Although these abundances are similar, reflecting the large dispersion of abundances found in these regions of the Galaxy, some important differences are apparent. In particular, the N, O, S, Ar, and Ne abundances are *smaller* for Group I compared to Group II for both distance scales. For N and O the difference between the two groups is 0.20 dex. For S, Ar, and Ne it is 0.12, 0.19 and 0.26 dex, respectively. In spite of the fact that these differences are not larger than the individual errors in the abundances, we can draw important conclusions about these results. The standard error of the mean is small since both groups have several objects and therefore the difference between both groups is statistically significant. This can be seen considering the lower and upper 90% and 68% confidence limits of each group. Although there are some overlaps between the distributions, for N, O, Ar, and Ne they are statistically significantly different considering the 68% confidence limit of each group for the SSV08 distance scale. Only the S distributions are not statistically different considering this method. For the Z95 distance scale, the distributions of N, O, and S of each group are significantly different considering the same confidence limit. The Ne distributions are statistically different considering the 90% confidence limit for this scale. These results are an important indication that bulge nebulae (Group I) do not follow the trends observed in the inner-disk (Group II), as we will discuss in § 4.

Relaxing the assumption that objects with adopted negative galactocentric distances belong to the bulge would not change the derived conclusions. We performed some tests excluding these objects, and the main conclusions are unchanged: bulge objects have lower α-element abundances than those in the inner disk. Adopting positive distances for these objects makes the group separation less clear, as the mixing of both populations is enhanced, but even in this case bulge objects still have lower abundances compared to inner disk objects.

The galactocentric distance of 1.5 kpc for the Z95 distance scale marks the limit at which the Groups I and II are more likely to separate from the point of view of the chemical abundances, as shown by the Kolmogorov-Smirnov test. On the other hand, the galactocentric distance of 2.2 kpc for the SSV08 scale was chosen from eye inspection in the radial abundances distributions, marking the limit in the α-elements abundances. In this case too, objects from Group II, whose galactocentric distances are greater than 2.2 kpc, have higher abundances than those from Group I, whose distances are lower than this limit.

Since the bulge and the disk display different chemical abundance characteristics, such as for example the radial abundance gradients found in the disk, or the large abundance distribution found in the bulge, as we discussed in § 1, we expect the existence of a galactocentric distance which better separates the two populations. Our analysis point to a separation at $R_L = 1.5$ kpc for the Z95 distance scale and $R_L < 2.9$ kpc for the SSV08 scale. Therefore, we can assign to Group I those objects that pertain to the bulge, and to Group II those that pertain to the inner-disk.

4. DISCUSSION

There are other evidences that point to a transition from the bulge to the inner-disk at a galactocen-