emission at 1-500μ. Power-law slopes with $\alpha = -0.5$ and -1.0 are also shown, as well as selected wavelength and energy points.

We assume that the BALR is nearly optically thin, *i.e.* N(H)$\lesssim 10^{18}$ cm^{-2}, where N(H) is the total column density of hydrogen. This is consistent with estimates of the column densities of some metal line troughs, assuming solar abundances and a fairly high ionization, log(U)$\gtrsim -2$. For example, if N(C^{+3})$\sim 10^{15-16}$ (*cf.* Weymann *et al.* 1985, Grillmair and Turnshek 1987, and Turnshek *et al.* 1987), the fractional abundance of C^{+3} is $\sim$0.5, and the relative abundance of total Carbon to total Hydrogen is about 10^{-3} (solar), then N(H)$\sim 10^{19}$. However, it is likely that metals are enhanced relative to solar (Turnshek *et al.* 1987), which would decrease this estimate of N(H). We also note that recent observational work with *ROSAT* on the intrinsic x-ray absorption of PG 1416$-$1256 implies that N(H)$\lesssim 10^{20}$ (Meurs and de Kool 1992).

We used the radiative-collisional equilibrium program CLOUDY, with the input spectrum shown in figure 3-1, to calculate fractional abundances of relevant ions as a function of U. For our case, the program assumes a uniform plane parallel slab, with a user specified value of U. Figure 3-2 shows the fractional abundance curves for four relevant ions (H^+, Al^{+2}, C^{+3}, and O^{+5}), with varying values for N(H) (10^{18}, 10^{19}, and 10^{20}). We have plotted the values both for the front of the slab (solid line) and for the back of the slab (dotted line). For the lowest column density, the fractional abundances are essentially the same throughout the slab, but the difference between the front and back increases at higher N(H). Also, at higher values of N(H), the fractional abundance peaks tend to shift towards higher U. In the bottom plot, we get a large fraction of neutral hydrogen at low U at the back edge. If the fraction were this high, we would expect to see absorption from neutral ions from the back of the region, which is not seen in BALQSOs. Note that at high ionization levels, log(U)$\gtrsim -2$, the curves are very similar even at the higher values of N(H), due to the lack of neutral hydrogen.

We note that CLOUDY defines U with $n_{\rm H}$ instead of n_e. This means the ionization parameter shown in the plots is lower than the above definition by a factor of about