THE APOLO 17 DRILL CORE: MODAL DATA (SECTIONS 70007, 70008, 70009); J. J. Papke, S. F. Lellis, R. Becker, and D. T. Vaniman, Dept. of Earth and Space Sciences, State Univ. of New York, Stony Brook, N. Y. 11794

INTRODUCTION. The Apollo 17 drill core was taken approximately one crater diameter east of the 400-meter Camelot Crater. The core contains three major stratigraphic intervals: an upper, massive, coarse-grained interval dominated by basaltic rock fragments; a middle, very fine grained interval dominated by anorthositic fragments; and a lower, distinctly stratified interval containing a variety of breccias and crystalline fragments [1]. The upper interval, which includes x-radiograph units 52-64 (Fig. 1), is considered in this study; the lower units in future studies. We have broken our study into three parts: modal petrology (reported here), characterization of the glass component [2], and characterization of the monomineralic and lithic component [3]. The present study involves modal characterization of 66,000 grid points (2,000 on each of 31 P.T.S. and 1,000 on each of 4 P.T.S.) located in 35 polished thin sections which form a continuous string from the bottom of Section 70007 to the top of Section 70009.

CLAST ABUNDANCE. Our modal analysis divides the core material into four size fractions: extra large clasts (> 2 mm), large clasts (0.2-2 mm), small clasts (0.02-0.2 mm) and undifferentiated matrix (< 0.02 mm). Figure 2 summarizes the data and shows (1) that the majority of the extra large clasts are ilmenite basalts, (2) that the previously recognized [1] coarse-grained unit (x-ray unit 59) is reflected in the modal data by a decrease in matrix abundance and a significant increase in the large clast (0.2-2 mm) population. The later point is perhaps more clearly illustrated in the left-hand portion of the summary modal diagram, Fig. 3. The three units on this diagram a, b and c correspond to x-ray units 52-69, 59, and 60-64, respectively.

LARGE (0.2-2 mm) AND SMALL CLASTS (0.02-0.2 mm). The modal data for large and small clasts, summarized in the central portion of Fig. 3 and in Table 1, shows: (1) a greater abundance of large rather than small clasts, especially in x-ray unit 59; (2) the increase in large clast abundance in x-ray unit 59 is a result of a build-up in the ilmenite basalt population in that size fraction; (3) the large clast population is dominated by lithic types, while the small clast population is dominated by monomineralic fragments—an observation which puts constraints on the grain size of the host rock precursor; (4) the highland component is minor; (5) the fused soil component (dark matrix breccias, DMB, plus agglutinates) is much more abundant in the large than the small clast population.

MONOMINERALIC COMPONENT. The nature of the monomineralic
component summarized in Fig. 3 and Table 1 shows: (1) the abundance of pyroxene > feldspar = opaques >> olivine; (2) the monomineralic population increases significantly in x-ray unit 59.

**GLASS COMPONENT.** The nature of the glass component is summarized in the right-hand portion of Fig. 3 and Table 1 and shows: (1) the glass component (> 0.02 mm and occurring as homogeneous glass beads) is small, < 3%; (2) the abundance of orange/black glass > yellow/green > clear > brown.

**LITHIC FRAGMENTS.**

Classification. Lithic fragments fall into three separate categories: mare rocks, highland rocks, and annealed soil fragments. The mare basalts are classified according to the system of Papike et al. [4]. One type, a low-K titaniferous basalt similar to the Apollo 11 low-K types, is called "Apollo 11 Type." The other mare basalt rock type is far more common in the sections of the drill core studied here; this basalt type is olivine normative, and texturally it ranges from an olivine poikilitic ilmenite basalt to a coarse-grained plagioclase-poikilitic ilmenite basalt.

Highland rock types comprise the second broad category of lithic fragments. Members of the ANT suite are classified as anorthosites, norites, troctolites, and light matrix breccias. Light matrix breccias consist of fragments of plagioclase in a clear glassy, feldspathic matrix. Recrystallized/remelted noritic breccias + poikilitic rock type (RNB + POIK) and feldspathic basalts comprise the remaining two categories of highland rocks.

**Summary of modal data.** Plagioclase poikilitic ilmenite basalts seem to be the most common mare basalt, olivine porphyritic ilmenite basalt fragments are the second most abundant, while Apollo 11 type basalts are far less common.
Apollo 17 Drill Core Modal Data


The total highland component of the sections is small, generally less than 3%.

RNB + POIK fragments comprise the dominant highland lithology present in the core. Bence et al. [5] also found this to be true in the 2-4 mm fragments at the Apollo 17 site. Members of the ANT suite are less common. The dominant anorthositic rock types are light matrix breccias and recrystallized anorthosites.

SUMMARY STATEMENT. The regolith represented in Sections 70007, 70008, and 70009 is dominated by mare components (ilmenite basalts, DMB, orange/black glass) and is quite representative of the large rock populations previously described from the valley floor of Taurus-Littrow. However, we do find a highland component (litthic fragments, clear glass, monomineralic fragments) that is expected to increase at greater depth in the core and probably was delivered from North and South Massifs, as ejecta and/or landslide debris. Two new discoveries involve a preferred compositional cluster in the yellow/green glasses [2] and the occurrence of a new very low Ti (VLT) mare basalts type [3].