SOURCES OF CLASTS IN IMPACT MELTS. Kelli McCormick[1], G. J. Taylor[1], K.Keil[1], P. D. Spudis [2], R. A. F. Grieve[3], and G. Ryder[4]. 1) Inst. of Meteoritics, Univ. of New Mexico, Albuquerque, NM 87131; 2) Branch of Astrogeology, U.S. G. S., Flagstaff, AZ; 3) Geophysics Division, GSC, Ottawa, Canada; 4) Lunar and Planetary Institute, Houston, TX.

Numerous studies of lunar and terrestrial impact melt rocks show that the melt matrices are chemically homogeneous (e.g., 1). The clast population within impact rocks, however, appear (at least in the lunar case) not to be representative of the chemical components in the melt matrices (2-4). To better understand clast/melt relationship, we are analyzing a suite of impact melt rocks from the Mistastin Lake Crater, Labrador, Canada. As opposed to the Moon where there is no geologic control, the target structure of this crater is well understood and there are only three types of country rocks (i.e., target material): granodiorite (a relatively minor component), quartz monzonite (also referred to as adamellite or mangerite) and anorthosite (5). Previous work on Mistastin Lake Crater indicates that the impact melt can be generated by mechanical mixing of the three rock types, calculated at about 65% anorthosite and 35% quartz monzonite plus granodiorite (5). Our preliminary data, however, indicate that the proportions of target rocks represented as clasts in the Mistastin Lake impact melts vary widely.

Polished thin sections of each type of target material and a suite of melt rock samples were analyzed with a JEOL 733 superprobe using a 10 um diameter beam. Feldspar grains in the three target materials were analyzed for general compositional variations within each grain as well as for compositional ranges among the separate feldspar grains of each rock type (Fig. 1). Clasts from anorthosites can be distinguished clearly from granodiorites and quartz monzonites. Feldspar clasts within each impact melt rock were also analyzed for comparison with feldspar compositions of the target material to determine the specific parent rock type for each clast. Only feldspars that clearly appeared to be clasts were analyzed. In addition, we tried analyzing only unaltered clasts. We found two general types of clast alteration: heat alteration, creating a checkerboard texture, and alteration resulting in a breakdown of the clast to what appears to be clay minerals.

We found that the percentage of each rock type as represented by the clasts varies considerably among the different melt rock samples (Table 1). Fractions of parent rock types within the impact melt rocks determined from clast populations vary from 100% anorthosite to about 66% granodiorite/quartz monzonite, 33% anorthosite. These variations are correlated with sampling location: anorthosite-rich rocks were collected on the north and west shores of Mistastin Lake, whereas those richer in granodiorite and quartz monzonite were collected on the south and southwest. There is, however, one exception: sample LM44-4B (91% anorthosite) was collected 1-2 meters above LM44-2A (34% anorthosite).

We accepted any analysis with a total oxide wt.% of between 98.5 and 101.5 and feldspar stoichiometry between 4.975 and 5.025 (5 cations based on 8 oxygens). Feldspars in a few of the rocks give low totals. In most cases, however, the stoichiometry of these points falls within our accepted 0.5% error. At present we are including the points with poor totals, but acceptable stoichiometry in our data set because (1) they plot within our country rock fields on the ternary An-Ab-Or diagram and (2) both the points with acceptable and those with low oxide wt.% sums give the same results in terms of representative lithologies (Figs. 1 and 2). These low sums may be due to the presence of water and/or glass lamellae smaller than 10 um within the feldspar clasts. These possibilities will be investigated.

From the data collected so far, we conclude that the clast population in the Mistastin Lake melt rocks do not quantitatively reflect the abundances of the components in the melt matrix. This may be caused by the heterogeneous distribution of the target material; that is, the preferential incorporation of clasts from one lithology over another as the melt flowed outward from the point of impact. Radial differences in the clast assemblage are clearly important, but the differences between LM44-2A and 44-4B suggest that the nature of clasts varies vertically as well. In the lunar case an analogous situation may hold: clasts entrained in impact melts may be acquired from source areas far removed from those occurring where the melt formed. As a result, the clast population need not be representative of the components mixed into an impact melt. *This work was supported by NASA Grant NAG 9-30.*

References . 1) R. A. F. Grieve et al. (1977) *Impact and Explosion Cratering*, 791-814. 2) M. R. Dence et al. (1976) *PLSC 7th*, 1821-1832. 3) G. Ryder and J. F. Bower (1977) *PLSC 8th*, 1895-1923. 4) G. Ryder and J. A. Wood (1977) *PLSC 8th*, 655-668. 5) R. A. F. Grieve (1975) *GSA Bull.* **86**, 1617-1629.

Table 1. Percentages of sources of clasts in melt rocks from Mistastin Lake Crater, Labrador, Canada.

Rock	No.[1]	Gd-Qm[2]	Anor.[3]	Uncertain[4]
LM 52-A	54	0	100	0
LM 41A	34	8.8	91.2	0
LM 51BC	59	0	100	0
LM 38B	46	4.3	93.5	2.2
LM 43A	39	48.7	48.7	2.6
LM 44-2A	32	65.6	34.4	0
LM 44-4B	66	9.1	90.9	0
LM 4A	10	30	70	0
LM 55A	34	0	97	3
LM 59H	17	17.6	82.4	0

1. Number of analyses.
2. Percent of Granodiorite plus Quartz monzonite components.
3. Percent of Anorthosite components.
4. Undetermined source (either Gd-Qm or Anor.) in percent.

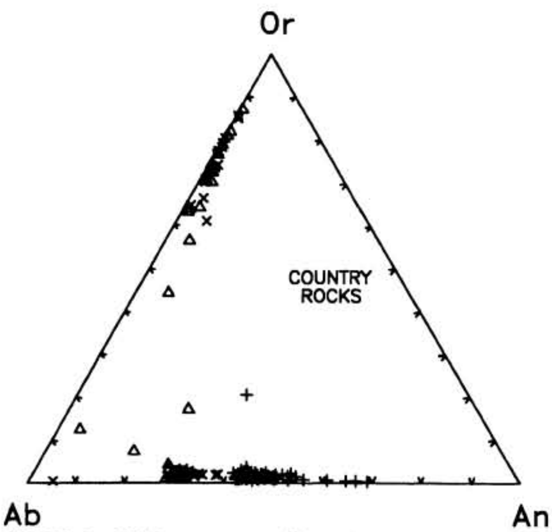

FIGURE 1. Feldspar compositions in country rocks (x = quartz monzonite, + = anorthosite, triangle = granodiorite).

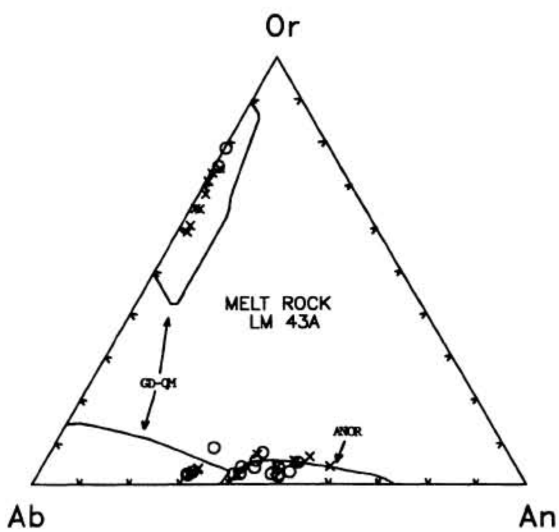

FIGURE 2. Feldspar compositions in melt rock LM 43A (o = good sums, x = bad sums).

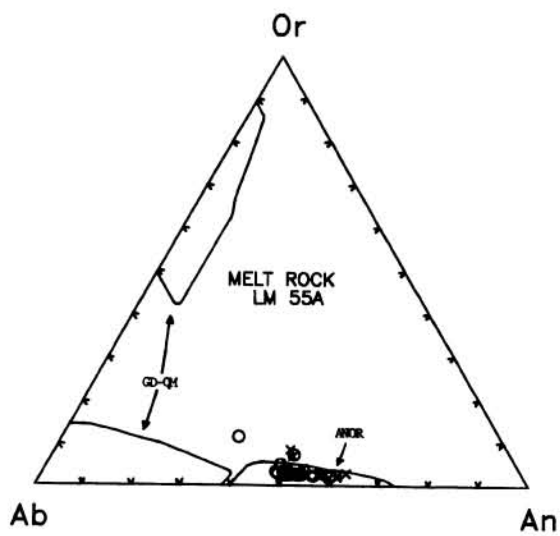

FIGURE 3. Feldspar compositions in melt rock LM 55A (o = good sums, x = bad sums).