INITIAL SUBDIVISION OF GENESIS EARLY SCIENCE POLISHED ALUMINUM COLLECTOR.

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Introduction: A large surface, about 245 cm^2, of highly polished aluminum 6061 T6 alloy was attached to the science canister thermal panel for the purpose of collecting solar wind noble gases. The analysis of this collector will be part of the Genesis Early Science results. The pre-launch configuration of the collector is shown in Figs. 1 & 2. The collector sustained some damage during the recovery impact in Utah, September 8, 2004 (Fig. 3; for details of recovery operations see [1].).

Collector Composition and Pre-Flight Handling: The polished aluminum collector was milled from 0.2-inch-thick Al 6061 T6 stock, such that most of the surface was 0.025-inch thick, supported by 0.1-inch thick ribs (Fig.4). Polishing this surface was challenging, and as a result several iterations of polishing occurred, beginning with Al_2O_3 and ending with diamond paste. Remnant pieces were polished in a similar manner and archived. The polished collector was then rinsed in hexane, soaked in hexane 20 minutes and further rinsed with hexane and isopropanol. Rinsings were archived. Final cleaning was done with ultrapure water using a megasonic wand. Rinse water contained <100 ppb TOC and <5 particles of >1µm diameter. Final cleaning and installation of collector into science canister was done in Class 10 cleanroom.

Utah Recovery Handling: The science canister containing the polished aluminum collector was extracted from the muddy impact site and placed inside a building within 8 hours of impact. The canister was introduced into a Class 10,000 cleanroom 2 hours later. The kidney was extracted from the canister on September 16, and secured into the stainless steel box in which the collector was later shipped. Genesis collectors were transported via NASA jet to Houston on October 4, 2004 and placed inside a Class 10,000 cleanroom. On Nov. 4, the collector was moved to Genesis Class 10 cleanroom for permanent storage and placed under nitrogen cover gas. See [2] for details on handling.

JSC Curation Handling: In preparation for post-flight analyses, the curator provided to the Washington University group (Meshik & Hohenberg) a coupon of similar Al 6061 polished in flight manner for instrument tuning, a specimen of flight remnant for bulk blank measurement, and a specimen of flight remnant polished and cleaned in flight manner for surface blank measurement.

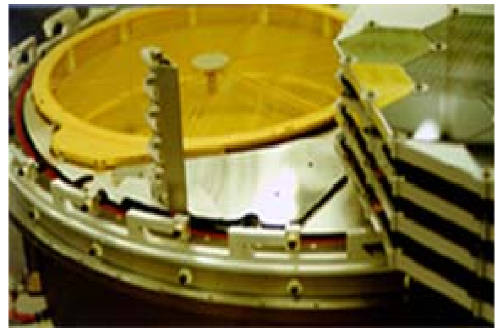

Fig. 1. Polished aluminum collector installed for flight.

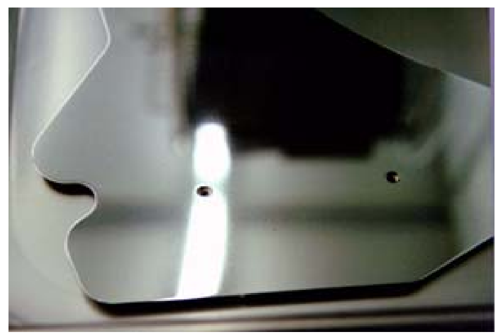

Fig. 2. Pre-flight close-up of polished surface.

Post-flight collector surface observations. Oblique lighting revealed dust or coating patterns on the polished surface (Fig. 5). Mud spatters and smears, often ringed with evaporate deposits, were also observed. Other than nitrogen gas dust-off, no cleaning was performed. The portion of the collector to be removed and sent to Meshik was scanned to map the location of impact craters >40 µm. In this portion of the collector, comprising about 45 cm^2, 13 features were noted of which 8 were identified as craters ranging in size from 40 to 300 µm. Crater diameters were measured at 40, 62, 62, 62, 108, 163, 170 and 300 µm. We plan to scan the entire surface.

Subdivision of the Collector: The collector was secured to the table top on a plate carved-out to allow bent portions of the collector to be recessed. The collector was mounted using the fittings formerly used to install the collector onto the spacecraft. Saw cuts were made adjacent to ribs to minimize flexing of the thin sheet. Using a small handsaw, to minimize contamination and heating (Fig. 6), the collector was subdivided into 5 parts: parent 50684 and subsamples 50684.1, 50684.2, 50684.4, 50684.5 (Fig. 7). Subsample 5 was removed to separate a muddy smudge and severely curled surface from cleaner, flatter specimens. Subsample 1 and 4 are fairly flat and subsample 2 is a rib. Fig. 8 shows a close-up of quality of surface on 50684.4, including an evaporite deposit. The largest piece remains in nitrogen storage at JSC, awaiting continued scanning for micrometeorites.

References: [1] McNamara K. M. *et al*. (2005) LPS XXXVI, this volume. [2] Stansbery E. K. *et al* (2005) LPS XXXVI, this volume.

Fig. 3. Post-impact condition of polished aluminum collector. The yellow marks correlate with those on Fig. 5.

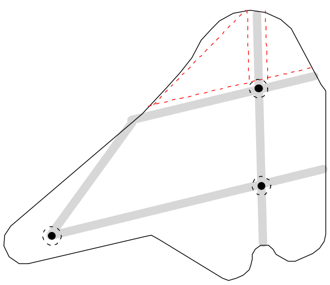

Fig. 4. Ribs on back side are traced in gray to show location. Saw cuts are mapped in red. Width of collector in this view is 23 cm.

Fig. 5. Oblique lighting reveals dust or coatings on surface. Bright spot near center is mud/salt spatter. Between yellow lines a boundary mark exists corresponding to shadowing or impact imprint of saddle thermal shield.

Fig. 6. Polished aluminum collector (it appears a hazy light blue because it reflects the blue cleanroom smock) secured to custom plate being hand- sawed.

Fig. 7. Group view of pieces after subdivision.

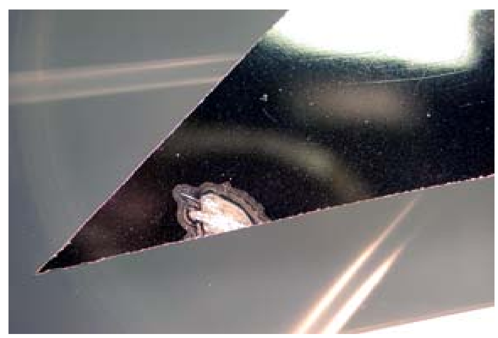

Fig. 8. Close-up of cut piece 50684.4 showing good quality surface, evaporate deposit (5 mm) and 2 cut edges.