

Processing of Antarctic Meteorites at NASA/Johnson Space Center. C.E. Satterwhite¹, K. M. McBride¹, R.S. Harrington¹ and K. Righter², ¹Jacobs (Jacobs/ESCG, NASA/JSC, Houston, TX. 77058), ²Johnson Space Center/NASA, 2101 NASA Pkwy., Houston TX 77058.

Introduction: Since the beginning of the ANSMET program in 1976, over 18,000 meteorites have been processed in the Meteorite Processing Lab at Johnson Space Center in Houston, TX [1]. The meteorites are collected and returned to JSC on a freezer truck and remain frozen until they are initially processed.

Initial Processing of Meteorites: The first step is to renumber the meteorites from field tag number to generic number and log all the information into the meteorite database. All meteorites are processed either on a flow bench or in a nitrogen glove box. The special meteorites, i.e. lunar, martian, are processed in nitrogen. The ordinary chondrites and other common types are processed on a flow bench either one at a time or in groups of 3 or more depending on size.

Initial processing involves drying the meteorites in a nitrogen glove box for 24 to 48 hours, photographing, measuring, weighing and writing an exterior description. Next step is to break the meteorite and obtain a good representative sample that will be sent to the Smithsonian institution for classification. After breaking the meteorite all splits are numbered, weighed and an interior description is written. All the data is stored online as well as in the data pack.

Newsletter & Requests: Once all the processing is done and the meteorites have been classified, the information is published in the Antarctic meteorite newsletter [2,3]. The newsletter is published twice yearly and is sent electronically to researchers around the world and is also available on line. Researchers are asked to fill out a request form and submit it to the meteorite working group secretary. All sample requests will be reviewed in a timely manner and fall under one of the following categories:

Regular Requests are requests for equilibrated ordinary chondrites and other more common or large (>50 g) meteorites can be reviewed and assessed by the NASA Antarctic Meteorite Curator, and allocated in the course of several weeks to a month.

Special Requests are for meteorites that are protected because of their small size (<50 g) or their rarity. These meteorites are referred to as "special" and, these requests are reviewed and assessed by the Meteorite Working Group (MWG). This group meets twice a year (September and March) to discuss meteorites that fall into this category. MWG also reviews all requests for newly classified meteorites and new investigators. The deadline for submitting a request is gener-

ally two to three weeks before the scheduled meeting [4].

Processing for Sample Requests: In the meteorite processing lab, meteorite samples are prepared several different ways. Most samples are prepared as chips obtained by use of stainless steel chisels in a chipping bowl or rock splitter (see photos). All materials used in processing are used to help prevent contamination to the meteorites, i.e. Teflon, nylon, aluminum, stainless steel, polyvials, to name a few.



In special situations where a researcher needs a slab the meteorite samples can be bandsawed in a dry nitrogen glove box with a diamond blade, no liquids are ever introduced into the cabinet. We have bandsawed close to 100 meteorites in the history of the program [5]. The last type of sample preparation is thin/thick sections. The meteorite thin section lab at JSC can prepare standard 30-micron thin sections, thick sections of variable thickness (100 to 200 microns), or demountable sections using superglue. Water is not used in any part of the thin sectioning process. Polishing oil and alcohol are used for the cutting, grinding, and polishing stages. Polishing compounds are typically diamond paste or diamond fluids, but alumina can be used as a final polish as well. Pure silica slides are available as a substitute for standard petrographic glass slides if requested.

Information for researchers: An electronic request form must be filled out for any Antarctic meteorite sample. All necessary information should be typed on the electronic form, although informative attachments are welcome (examples: Reprints of publication that explain rationale, flow diagrams for analyses, etc.) [4]. It is important that researchers fill the sample request form completely, in order to make sure the meteorite is processed correctly. Researchers

should list any special requirements on the form, i.e. packaging of samples (poly vs. stainless), thick sections and thickness needed, superglue needed, interior chips, exterior chips, fusion crust, contamination issues, all concerns should be listed so processing can be done accurately and any concerns the researcher has can be addressed before the meteorites are broken.

References:

- [1] <http://curator.jsc.nasa.gov/antmet/index.cfm>
- [2] <http://curator.jsc.nasa.gov/antmet/classdb.cfm>
- [3] <http://curator.jsc.nasa.gov/antmet/amn/amn.cfm>
- [4] <http://curator.jsc.nasa.gov/antmet/requests.cfm>
- [5] <http://curator.jsc.nasa.gov/antmet/PDFFiles/1aa-JSC-bandsawList.pdf>