Antarctic Meteorite Newsletter
Volume 26, Number 2 August 2003

A periodical issued by the Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

Edited by Cecilia Satterwhite and Kevin Righter, NASA Johnson Space Center, Houston, Texas 77058

## Curator's Comments
### *Kevin Righter*

#### New Meteorites

This newsletter contains classifications for 443 new meteorites from the 2000, 2001 and 2002 ANSMET collections. They include samples from the MacAlpine Hills, LaPaz Icefields, Pecora Escarpment, Meteorite Hills, and Odell Glacier. Petrographic descriptions are given for 25 of the new meteorites: 1 lunar basalt, 1 lunar basaltic breccia, 3 acapulcoites, 1 aubrite, 1 diogenite, 2 eucrites, 3 howardites, 1 R chondrite, 8 carbonaceous chondrites, 2 enstatite chondrites, 1 ordinary chondrite impact melt breccia, and 1 mesosiderite. The lunar basalt (LAP02205) is unbrecciated and unlike any lunar meteorite in our collection. It may have similarities to other mare basalt meteorites such as Y793169 or NWA 032/479.

**Field photo of LAP 02205**


#### Changes to the classification database on the JSC website

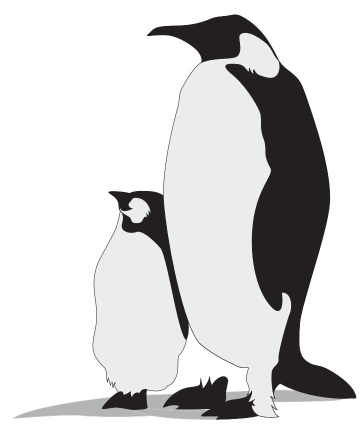
Changes have been made to the website classification database that will make navigation of our collection easier. First, many of the classifications have been updated. For instance, QUE94535 is now properly called a winonaite, and ALH85085 (and related) are now called CH chondrites. In most cases the names have been updated to be consistent with Grady's (2000) Catalogue of Meteorites. Second, search buttons have been added for more meteorite types. The achondrite section has been expanded, and the carbonaceous and enstatite sections are now searchable by petrologic type or compositional type. There are new buttons for "ungrouped" achondrites and chondrites. Finally, search result tables now report both the 'original' weight and 'available' weight of a given meteorite. This should be helpful to those making requests to MWG. The URL for the classification database is:

**http://sn-charon.jsc.nasa.gov/DBSearch/AntMet/MetClass-Form.asp**

*continued on page 2*

## *Inside this Issue*





**Sample Request Deadline**
**September 12, 2003**

**MWG Meets**
**Sept. 25 - 26, 2003**

*continued from page 1*

## Send us your publications

In an effort to track detailed studies of samples in the collection, we are requesting that investigators send in a list of publications that report data obtained on ANSMET collected Antarctic meteorites. There is an enormous amount of data that has been obtained on meteorites in our collection and in order to maintain curation of the highest quality, we wish to compile information for each sample. This information will ONLY be used to help us document analysis of individual meteorites; it may eventually be available to the public through an information database. Please send (a listing only, not the actual publications, reprint or pre-prints) to kevin.righter-1@nasa.gov.

## Upcoming ANSMET Field Season

**Nancy Chabot**
**ANSMET**

At this moment, Ralph Harvey is in Greenland hauling a sled and searching for meteorites, so the task falls to me to write this update about our upcoming Antarctic field season. Just as in the 2002-03 season, we plan to operate two independent ANSMET field teams this year; made possible by additional funding from NASA to supplement the continuing support from NSF. One team will be dedicated to the systematic recovery of meteorites from an icefield that is known to have a large meteorite concentration. The other team will perform high level reconnaissance of quite promising, but also difficult to reach sites.

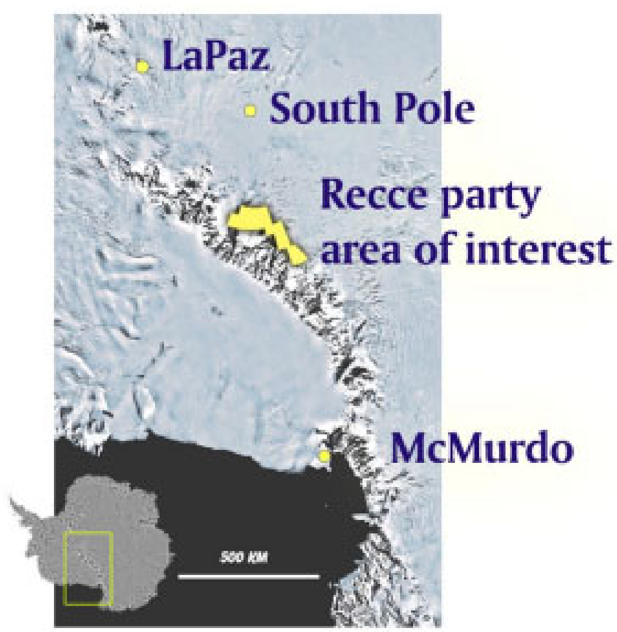
***The systematic searching team:***

An eight person team, supported by NSF funding, will spend the season at the LaPaz icefield, about 350 km from the South Pole Station. This exceptionally large icefield was visited by the reconnaissance ANSMET team just last field season. During their two week visit, the 2002-2003 reconnaissance team recovered more than 250 meteorites, including some rare specimens that are reported in this newsletter. This season, the team will begin the first systematic searches of the LaPaz icefield. Ralph will spend his 14th season leading this team for the first half of the season, after which I will transfer from the reconnaissance team to replace him. This season, we are sorry to not have Jamie Pierce our mountaineer on the 2002-03 systematic team, who decided to enjoy some quality time at home instead. But we're pleased to have as our mountaineer Bill McCormick, who has a great deal of Antarctic experience but is joining his first ANSMET team.

***The reconnaissance team:***

The second team, funded by NASA, will be smaller and more mobile than the systematic team. The four person team will conduct reconnaissance meteorite searches on a number of icefields surrounding the headwaters of the Beardmore Glacier in the region of the central Transantarctic Mountains. Twelve potential target sites have been selected, most of which are just slightly south of the QUE locale. The current plan is for the team to generally move from the Marsh Glacier region in the north to the Shackleton Glacier region in the south. The length of stay at key sites will vary; constant re-evaluation of priorities, depending on the density of meteorite finds, icefield conditions, and logistical needs will be necessary. It is expected that the team will likely visit around 6 of the 12 target sites, moving via Twin Otter aircraft frequently. John Schutt, ANSMET mountaineer of 22 previous seasons, will be with this team for the entire season, and I will be joining them for the first half.

Both teams are scheduled to begin their southbound trips near the end of November. If everything goes according to the current plans, both teams will have field seasons that are just over six weeks in length, and team members will likely be home by late January or early February 2004.



# New Meteorites

### From 2000-2002 Collection

Pages 4-21 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 26(1), Feb. 2003. Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrological type are also recast in Table 2.

Macroscopic descriptions of stony meteorites were performed at NASA/JSC. These descriptions summarize hand-specimen features observed during inital examination. Classification is based on microscopic petrography and reconnaissance-level electron microprobe analyses using polished sections prepared from a small chip of each meteorite. For each stony meteorite the sample number assigned to the preliminary examination section is included. In some cases, however, a single microscopic description was based on thin sections of several specimens believed to be members of a single fall.

Meteorite descriptions contained in this issue were contributed by the following individuals:

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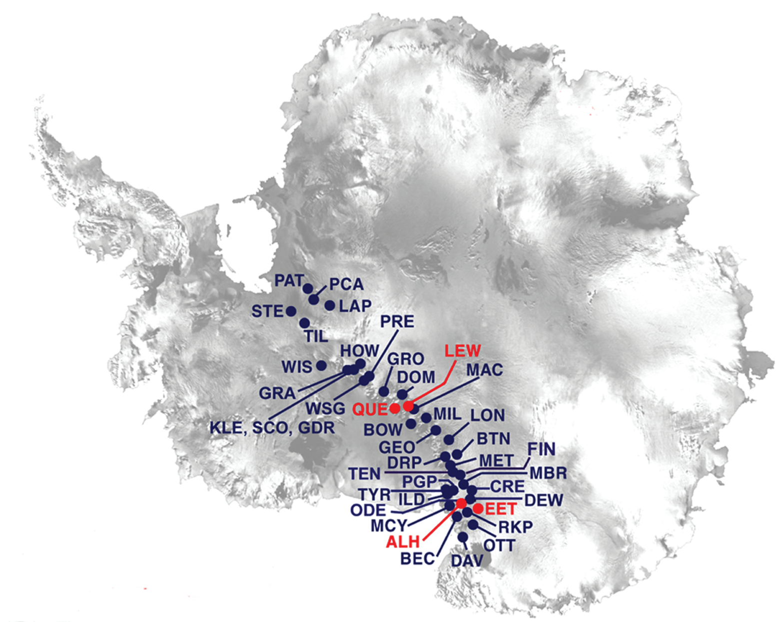
Washington, D.C.

### Antarctic Meteorite Locations

ALH — Allan Hills
BEC — Beckett Nunatak
BOW — Bowden Neve
BTN — Bates Nunataks
CRE — Mt. Crean
DAV — David Glacier
DEW — Mt. DeWitt
DOM — Dominion Range
DRP — Derrick Peak
EET — Elephant Moraine
FIN — Finger Ridge
GDR — Gardner Ridge
GEO — Geologists Range
GRA — Graves Nunataks
GRO — Grosvenor Mountains
HOW — Mt. Howe
ILD — Inland Forts
KLE — Klein Ice Field
LAP — LaPaz Ice Field
LEW — Lewis Cliff
LON — Lonewolf Nunataks
MAC — MacAlpine Hills
MBR — Mount Baldr
MCY — MacKay Glacier
MET — Meteorite Hills
MIL — Miller Range
ODE — Odell Glacier
OTT — Outpost Nunatak
PAT — Patuxent Range
PCA — Pecora Escarpment
PGP — Purgatory Peak
PRE — Mt. Prestrud
QUE — Queen Alexandra Range
RKP — Reckling Peak
SCO — Scott Glacier
STE — Stewart Hills
TEN — Tentacle Ridge
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting



# Table 1: Newly Classified Antarctic Meteorites**

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 00 667 ~ | 22.1 | LL6 CHONDRITE | B/C | A | | |
| MET 00 668 ~ | 6.6 | LL6 CHONDRITE | A/B | A/B | | |
| MET 00 669 ~ | 14.3 | H6 CHONDRITE | B/C | A | | |
| MET 00 700 ~ | 54.0 | H6 CHONDRITE | C | B/C | | |
| MET 00 701 ~ | 15.0 | L5 CHONDRITE | C | B | | |
| MET 00 702 ~ | 43.0 | H6 CHONDRITE | C | B | | |
| MET 00 703 ~ | 32.1 | H5 CHONDRITE | C | B | | |
| MET 00 704 ~ | 5.3 | LL5 CHONDRITE | B | A/B | | |
| MET 00 705 ~ | 6.6 | L6 CHONDRITE | B | B/C | | |
| MET 00 706 ~ | 12.4 | L5 CHONDRITE | C | B | | |
| MET 00 707 ~ | 15.2 | L4 CHONDRITE | B/C | B | | |
| MET 00 708 ~ | 20.5 | LL6 CHONDRITE | B/C | B | | |
| MET 00 710 ~ | 16.9 | L5 CHONDRITE | C | A/B | | |
| MET 00 711 | 17.0 | CO3 CHONDRITE | B | A | 5-34 | 1-11 |
| MET 00 712 ~ | 12.0 | H6 CHONDRITE | B | A | | |
| MET 00 713 ~ | 14.1 | H6 CHONDRITE | C | B | | |
| MET 00 714 ~ | 32.5 | H6 CHONDRITE | C | B | | |
| MET 00 715 ~ | 35.2 | H6 CHONDRITE | C | B | | |
| MET 00 716 ~ | 6.0 | LL6 CHONDRITE | B/C | B/C | | |
| MET 00 717 ~ | 26.1 | L5 CHONDRITE | B | A/B | | |
| MET 00 718 ~ | 28.4 | H6 CHONDRITE | C | A/B | | |
| MET 00 719 ~ | 36.9 | LL6 CHONDRITE | B/C | B | | |
| MET 00 811 ~ | 8.8 | LL6 CHONDRITE | B | B | | |
| MET 00 813 ~ | 8.6 | H5 CHONDRITE | C | A/B | | |
| MET 00 814 ~ | 5.2 | LL4 CHONDRITE | B/C | B | | |
| MET 00 815 ~ | 67.1 | LL6 CHONDRITE | C | B | | |
| MET 00 816 ~ | 54.7 | H6 CHONDRITE | C | B | | |
| MET 00 817 | 52.6 | H5 CHONDRITE | C | B | 19 | 17 |
| MET 00 818 ~ | 21.2 | LL6 CHONDRITE | C | B | | |
| MET 00 819 ~ | 58.6 | L5 CHONDRITE | C | B | | |
| MET 00 830 ~ | 36.5 | H6 CHONDRITE | C | A | | |
| MET 00 831 ~ | 19.2 | LL4 CHONDRITE | A | A | | |
| MET 00 832 ~ | 30.9 | H6 CHONDRITE | C | A | | |
| MET 00 833 ~ | 24.4 | H6 CHONDRITE | C | A | | |
| MET 00 835 ~ | 36.5 | LL5 CHONDRITE | B | B | | |
| MET 00 836 ~ | 29.1 | H5 CHONDRITE | C | A/B | | |
| MET 00 837 ~ | 14.8 | H6 CHONDRITE | C | B | | |
| MET 00 838 ~ | 12.6 | LL5 CHONDRITE | C | A/B | | |
| MET 00 839 ~ | 26.3 | L4 CHONDRITE | B | B | | |
| MET 00 840 ~ | 10.5 | H5 CHONDRITE | C | B | | |
| MET 00 841 ~ | 6.4 | L6 CHONDRITE | C | B | | |
| MET 00 842 ~ | 20.3 | H6 CHONDRITE | C | B | | |
| MET 00 843 ~ | 15.5 | LL6 CHONDRITE | C | A/B | | |
| MET 00 844 ~ | 21.0 | L4 CHONDRITE | B | A/B | | |
| MET 00 845 ~ | 5.8 | L5 CHONDRITE | B/C | B | | |
| MET 00 846 ~ | 18.4 | L5 CHONDRITE | A/B | B | | |
| MET 00 847 ~ | 38.3 | LL5 CHONDRITE | B | A/B | | |
| MET 00 848 ~ | 14.1 | H6 CHONDRITE | C | B | | |
| MET 00 849 ~ | 12.4 | H6 CHONDRITE | C | B | | |
| MET 00 850 ~ | 31.8 | LL6 CHONDRITE | C | B | | |
| MET 00 851 ~ | 44.8 | LL6 CHONDRITE | C | B/C | | |

~Classified by using refractive indices

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 00 852 ~ | 9.4 | H6 CHONDRITE | C | A/B | | |
| MET 00 853 ~ | 7.9 | L5 CHONDRITE | C | A/B | | |
| MET 00 854 ~ | 10.4 | H6 CHONDRITE | C | A/B | | |
| MET 00 856 ~ | 38.9 | L6 CHONDRITE | C | B | | |
| MET 00 857 ~ | 21.7 | LL6 CHONDRITE | C | B | | |
| MET 00 858 ~ | 37.1 | L5 CHONDRITE | C | B | | |
| MET 00 860 ~ | 14.4 | H6 CHONDRITE | C | A/B | | |
| MET 00 861 ~ | 17.5 | LL5 CHONDRITE | B | B | | |
| MET 00 862 ~ | 2.2 | H6 CHONDRITE | C | B/C | | |
| MET 00 863 ~ | 46.1 | H6 CHONDRITE | C | B | | |
| MET 00 865 ~ | 14.7 | H6 CHONDRITE | C | A/B | | |
| MET 00 866 ~ | 58.1 | L5 CHONDRITE | C | B | | |
| MET 00 867 | 21.3 | H5 CHONDRITE | C | B | 19 | 17 |
| MET 00 868 ~ | 17.9 | LL5 CHONDRITE | B | B | | |
| MET 00 869 ~ | 13.6 | H6 CHONDRITE | C | B | | |
| MET 00 870 ~ | 24.8 | H6 CHONDRITE | C | A/B | | |
| MET 00 871 ~ | 23.3 | LL5 CHONDRITE | B | B | | |
| MET 00 872 ~ | 14.3 | H6 CHONDRITE | C | B | | |
| MET 00 873 ~ | 23.4 | H6 CHONDRITE | C | A/B | | |
| MET 00 874 ~ | 17.1 | H6 CHONDRITE | C | B | | |
| MET 00 875 ~ | 12.3 | H5 CHONDRITE | C | B | | |
| MET 00 876 ~ | 22.1 | H6 CHONDRITE | C | B | | |
| MET 00 877 ~ | 28.7 | L5 CHONDRITE | B | B | | |
| MET 00 878 ~ | 13.8 | H6 CHONDRITE | C | B | | |
| MET 00 879 ~ | 26.4 | H6 CHONDRITE | C | B | | |
| MET 00 920 ~ | 30.0 | H5 CHONDRITE | C | A/B | | |
| MET 00 921 ~ | 10.2 | H4 CHONDRITE | C | A/B | | |
| MET 00 922 ~ | 13.9 | H5 CHONDRITE | C | A/B | | |
| MET 00 923 ~ | 13.4 | H6 CHONDRITE | C | B | | |
| MET 00 924 ~ | 18.3 | H5 CHONDRITE | C | B | | |
| MET 00 925 ~ | 11.6 | H5 CHONDRITE | C | B | | |
| MET 00 926 ~ | 25.3 | H6 CHONDRITE | C | A/B | | |
| MET 00 927 ~ | 15.2 | H6 CHONDRITE | C | B | | |
| MET 00 928 ~ | 29.0 | H6 CHONDRITE | C | B | | |
| MET 00 929 ~ | 6.2 | H5 CHONDRITE | C | A/B | | |
| MET 00 930 ~ | 17.2 | H5 CHONDRITE | C | A/B | | |
| MET 00 931 ~ | 6.9 | L6 CHONDRITE | CE | A/B | | |
| MET 00 932 ~ | 12.5 | LL6 CHONDRITE | C | B | | |
| MET 00 933 ~ | 21.4 | L5 CHONDRITE | B/C | B | | |
| MET 00 934 ~ | 30.3 | H6 CHONDRITE | C | A/B | | |
| MET 00 935 ~ | 3.3 | LL6 CHONDRITE | C | B | | |
| MET 00 936 ~ | 4.8 | LL6 CHONDRITE | B | B | | |
| MET 00 937 ~ | 22.1 | H6 CHONDRITE | B/C | B | | |
| MET 00 938 ~ | 45.9 | H6 CHONDRITE | B/C | B | | |
| MET 00 939 ~ | 4.8 | H6 CHONDRITE | C | B | | |
| MET 00 940 ~ | 50.8 | H4 CHONDRITE | A/B | A/B | | |
| MET 00 941 ~ | 38.6 | H6 CHONDRITE | C | B | | |
| MET 00 942 ~ | 68.3 | LL6 CHONDRITE | C | B | | |
| MET 00 943 ~ | 22.3 | H6 CHONDRITE | C | B | | |
| MET 00 945 ~ | 20.2 | LL5 CHONDRITE | A/B | B | | |
| MET 00 946 ~ | 5.1 | L5 CHONDRITE | C | B | | |
| MET 00 947 ~ | 91.7 | H6 CHONDRITE | C | B | | |
| MET 00 948 ~ | 24.2 | L5 CHONDRITE | B | A/B | | |

~Classified by using refractive indices

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 00 949 ~ | 33.6 | LL6 CHONDRITE | B/C | A/B | | |
| MET 00 950 ~ | 7.8 | LL5 CHONDRITE | B | A/B | | |
| MET 00 951 | 25.0 | EL6 CHONDRITE | C | A/B | | 0-1 |
| MET 00 952 ~ | 12.6 | L5 CHONDRITE | B/C | B | | |
| MET 00 953 ~ | 30.5 | L4 CHONDRITE | B | A | | |
| MET 00 954 ~ | 47.9 | LL6 CHONDRITE | B/C | B | | |
| MET 00 955 ~ | 7.8 | L5 CHONDRITE | C | B/C | | |
| MET 00 956 ~ | 50.8 | H6 CHONDRITE | C | A/B | | |
| MET 00 957 ~ | 26.0 | LL5 CHONDRITE | A | A/B | | |
| MET 00 958 ~ | 7.0 | L5 CHONDRITE | C | B | | |
| MET 00 959 ~ | 51.4 | LL6 CHONDRITE | B/C | B | | |
| MET 00 960 ~ | 44.9 | H6 CHONDRITE | C | B/C | | |
| MET 00 961 ~ | 25.4 | LL5 CHONDRITE | A | A | | |
| MET 00 962 ~ | 46.8 | H5 CHONDRITE | C | B | | |
| MET 00 963 ~ | 19.7 | LL6 CHONDRITE | B | B | | |
| MET 00 964 ~ | 8.5 | L5 CHONDRITE | C | B | | |
| MET 00 965 ~ | 28.1 | H6 CHONDRITE | C | B | | |
| MET 00 966 ~ | 20.2 | LL5 CHONDRITE | B/C | B | | |
| MET 00 967 ~ | 69.7 | LL6 CHONDRITE | B/C | B | | |
| MET 00 969 ~ | 44.8 | LL6 CHONDRITE | B/C | B | | |
| MET 00 970 ~ | 15.4 | L5 CHONDRITE | A/B | A | | |
| MET 00 971 ~ | 28.4 | H6 CHONDRITE | B/C | A/B | | |
| MET 00 972 ~ | 1.6 | L6 CHONDRITE | B/C | A | | |
| MET 00 973 ~ | 7.0 | L5 CHONDRITE | A/B | A/B | | |
| MET 00 974 ~ | 40.6 | H5 CHONDRITE | C | A/B | | |
| MET 00 975 ~ | 40.7 | L6 CHONDRITE | B/C | A/B | | |
| MET 00 976 ~ | 24.9 | H5 CHONDRITE | C | B | | |
| MET 00 977 ~ | 13.2 | H5 CHONDRITE | B/C | A/B | | |
| MET 00 978 ~ | 24.1 | LL5 CHONDRITE | B/C | A | | |
| MET 00 979 ~ | 10.6 | LL5 CHONDRITE | B/C | A | | |
| MET 00 980 ~ | 74.8 | L6 CHONDRITE | B | A | | |
| MET 00 981 ~ | 42.3 | LL5 CHONDRITE | A/B | A | | |
| MET 00 982 ~ | 8.7 | L5 CHONDRITE | B | A/B | | |
| MET 00 983 ~ | 9.8 | L5 CHONDRITE | B/C | A/B | | |
| MET 00 984 ~ | 29.0 | L6 CHONDRITE | B/C | A/B | | |
| MET 00 985 ~ | 25.4 | H6 CHONDRITE | B/C | A/B | | |
| MET 00 986 ~ | 38.6 | LL6 CHONDRITE | B/C | A | | |
| MET 00 987 ~ | 31.1 | L5 CHONDRITE | B/C | A/B | | |
| MET 00 988 ~ | 12.8 | LL6 CHONDRITE | A/B | A | | |
| MET 00 989 ~ | 36.1 | L5 CHONDRITE | B | A | | |
| MET 00 990 ~ | 42.6 | LL6 CHONDRITE | B/C | A/B | | |
| MET 00 991 ~ | 25.3 | LL5 CHONDRITE | A/B | A/B | | |
| MET 00 992 ~ | 45.0 | H6 CHONDRITE | B/C | A/B | | |
| MET 00 993 ~ | 59.2 | LL5 CHONDRITE | A/B | A/B | | |
| MET 00 994 ~ | 65.1 | L5 CHONDRITE | A/B | A/B | | |
| MET 00 995 ~ | 53.7 | LL6 CHONDRITE | B/C | A | | |
| MET 00 996 ~ | 11.4 | LL6 CHONDRITE | A/B | A/B | | |
| MET 00 997 | 41.3 | H5 CHONDRITE | B/C | A | 19 | 16 |
| MET 00 998 ~ | 38.1 | L5 CHONDRITE | A/B | A | | |
| MET 00 999 ~ | 8.9 | L5 CHONDRITE | B | A | | |
| MET 001000 ~ | 16.3 | L5 CHONDRITE | B/C | A/B | | |
| MET 001001 ~ | 4.8 | L5 CHONDRITE | C | B | | |
| MET 001002 ~ | 17.9 | H6 CHONDRITE | B/C | B | | |
| MET 001003 ~ | 13.4 | L6 CHONDRITE | B/C | A | | |

~Classified by using refractive indices

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 001004 ~ | 27.0 | L5 CHONDRITE | C | B | | |
| MET 001005 ~ | 29.3 | LL5 CHONDRITE | A | A | | |
| MET 001006 ~ | 10.6 | L5 CHONDRITE | B | A/B | | |
| MET 001007 ~ | 18.4 | L5 CHONDRITE | B | B | | |
| MET 001008 ~ | 10.7 | H6 CHONDRITE | C | A/B | | |
| MET 001009 ~ | 19.1 | L5 CHONDRITE | C | B | | |
| MET 001010 ~ | 1.1 | LL6 CHONDRITE | A/B | A | | |
| MET 001011 ~ | 11.6 | LL5 CHONDRITE | A/B | A | | |
| MET 001013 ~ | 10.1 | H6 CHONDRITE | B/C | A | | |
| MET 001014 ~ | 10.4 | H5 CHONDRITE | B/C | A | | |
| MET 001015 ~ | 22.0 | H6 CHONDRITE | B/C | A | | |
| MET 001016 ~ | 11.5 | H5 CHONDRITE | B/C | A | | |
| MET 001017 ~ | 18.7 | H6 CHONDRITE | B/C | A | | |
| MET 001018 ~ | 11.5 | H6 CHONDRITE | B/C | A | | |
| MET 001019 ~ | 23.0 | H5 CHONDRITE | B/C | A | | |
| MET 001020 ~ | 55.9 | L5 CHONDRITE | B | A/B | | |
| MET 001021 ~ | 23.0 | LL5 CHONDRITE | A/B | A/B | | |
| MET 001022 ~ | 19.3 | H5 CHONDRITE | C | A/B | | |
| MET 001023 ~ | 35.4 | LL6 CHONDRITE | B/C | C | | |
| MET 001024 ~ | 19.7 | LL6 CHONDRITE | B/C | C | | |
| MET 001025 ~ | 31.7 | LL5 CHONDRITE | B/C | C | | |
| MET 001026 ~ | 51.4 | L5 CHONDRITE | B/C | B | | |
| MET 001027 ~ | 18.2 | H5 CHONDRITE | C | A/B | | |
| MET 001028 ~ | 7.3 | H6 CHONDRITE | C | B | | |
| MET 001029 ~ | 34.8 | H5 CHONDRITE | C | B | | |
| MET 001030 ~ | 20.7 | H6 CHONDRITE | C | A/B | | |
| MET 001031 | 6.3 | MESOSIDERITE | C | B | | 30 |
| MET 001032 ~ | 9.7 | H6 CHONDRITE | C | B | | |
| MET 001033 ~ | 16.7 | H6 CHONDRITE | C | A/B | | |
| MET 001034 ~ | 29.9 | LL5 CHONDRITE | B | C | | |
| MET 001035 ~ | 22.6 | H6 CHONDRITE | C | A/B | | |
| MET 001036 ~ | 35.9 | H6 CHONDRITE | C | A/B | | |
| MET 001037 ~ | 18.1 | H6 CHONDRITE | C | A/B | | |
| MET 001039 ~ | 27.7 | H6 CHONDRITE | C | C | | |
| MET 001040 ~ | 43.3 | L5 CHONDRITE | A/B | A | | |
| MET 001041 ~ | 11.6 | H6 CHONDRITE | B/C | A | | |
| MET 001042 ~ | 25.1 | H6 CHONDRITE | B/C | A | | |
| MET 001043 ~ | 58.8 | H6 CHONDRITE | B/C | A | | |
| MET 001044 ~ | 12.6 | H6 CHONDRITE | B/C | A | | |
| MET 001045 ~ | 7.2 | H6 CHONDRITE | B/C | A | | |
| MET 001046 ~ | 6.6 | LL5 CHONDRITE | B | A | | |
| MET 001047 ~ | 22.9 | H5 CHONDRITE | B/C | A | | |
| MET 001048 ~ | 11.0 | H6 CHONDRITE | B/C | A | | |
| MET 001049 ~ | 37.6 | H4 CHONDRITE | B | A/B | | |
| MET 001050 ~ | 67.6 | LL6 CHONDRITE | CE | C | | |
| MET 001051 ~ | 11.2 | H6 CHONDRITE | C | A/B | | |
| MET 001052 ~ | 26.5 | L6 CHONDRITE | B/C | A/B | | |
| MET 001053 ~ | 17.6 | L5 CHONDRITE | B/C | B | | |
| MET 001054 ~ | 4.8 | H6 CHONDRITE | B/C | B | | |
| MET 001055 ~ | 6.8 | L5 CHONDRITE | B/C | B | | |
| MET 001056 ~ | 18.7 | H5 CHONDRITE | C | A/B | | |
| MET 001057 ~ | 27.5 | LL6 CHONDRITE | B | B | | |
| MET 001058 ~ | 37.4 | LL6 CHONDRITE | C | C | | |
| MET 001059 ~ | 26.4 | H6 CHONDRITE | C | B | | |

~Classified by using refractive indices

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 001061 ~ | 23.1 | H6 CHONDRITE | C | A/B | | |
| MET 001062 ~ | 40.7 | H6 CHONDRITE | C | B | | |
| MET 001063 ~ | 12.7 | L6 CHONDRITE | C | B/C | | |
| MET 001064 ~ | 14.2 | H6 CHONDRITE | C | B | | |
| MET 001065 ~ | 10.1 | H6 CHONDRITE | C | A/B | | |
| MET 001066 ~ | 19.6 | H6 CHONDRITE | C | B | | |
| MET 001067 ~ | 33.4 | H5 CHONDRITE | C | A/B | | |
| MET 001068 ~ | 7.2 | L5 CHONDRITE | B | A/B | | |
| MET 001069 ~ | 10.6 | H6 CHONDRITE | C | B | | |
| MET 001070 ~ | 6.8 | LL5 CHONDRITE | A/B | A | | |
| MET 001071 ~ | 7.5 | L5 CHONDRITE | A/B | A | | |
| MET 001072 ~ | 34.2 | LL6 CHONDRITE | B/C | A/B | | |
| MET 001073 ~ | 32.0 | H6 CHONDRITE | B/C | A | | |
| MET 001074 ~ | 19.7 | H6 CHONDRITE | B/C | A/B | | |
| MET 001075 ~ | 7.1 | H6 CHONDRITE | B/C | A | | |
| MET 001076 ~ | 8.6 | H6 CHONDRITE | B/C | A | | |
| MET 001077 ~ | 40.6 | H6 CHONDRITE | B/C | A/B | | |
| MET 001078 ~ | 22.6 | L6 CHONDRITE | B | A | | |
| MET 001079 ~ | 18.6 | LL6 CHONDRITE | B | A | | |
| MET 001080 ~ | 9.3 | L6 CHONDRITE | C | B | | |
| MET 001081 ~ | 8.3 | H5 CHONDRITE | C | B/C | | |
| MET 001082 ~ | 17.0 | LL5 CHONDRITE | B | B | | |
| MET 001083 ~ | 9.7 | LL5 CHONDRITE | B | B/C | | |
| MET 001084 ~ | 8.3 | LL5 CHONDRITE | A | B | | |
| MET 001085 ~ | 29.5 | H5 CHONDRITE | C | A/B | | |
| MET 001086 ~ | 9.8 | LL5 CHONDRITE | B/C | B | | |
| MET 001088 ~ | 34.2 | H6 CHONDRITE | B/C | B | | |
| MET 001089 ~ | 21.0 | H6 CHONDRITE | C | B | | |
| MET 001090 ~ | 33.6 | H6 CHONDRITE | C | A/B | | |
| MET 001091 ~ | 25.7 | H6 CHONDRITE | C | B | | |
| MET 001092 ~ | 0.6 | H5 CHONDRITE | C | A/B | | |
| MET 001093 ~ | 12.4 | L5 CHONDRITE | B | A/B | | |
| MET 001094 ~ | 14.5 | H5 CHONDRITE | C | B | | |
| MET 001095 ~ | 8.9 | H5 CHONDRITE | C | B | | |
| MET 001096 ~ | 17.9 | LL5 CHONDRITE | B | B | | |
| MET 001097 ~ | 36.2 | L6 CHONDRITE | B/C | A/B | | |
| MET 001098 ~ | 9.3 | L6 CHONDRITE | B/C | A/B | | |
| MET 001099 ~ | 16.3 | H6 CHONDRITE | C | B | | |
| MET 001100 ~ | 15.1 | L6 CHONDRITE | B/C | B | | |
| MET 001101 ~ | 36.8 | H6 CHONDRITE | C | A/B | | |
| MET 001102 | 7.1 | H5 CHONDRITE | C | A/B | 19 | 17 |
| MET 001103 ~ | 22.9 | H6 CHONDRITE | C | A/B | | |
| MET 001104 ~ | 19.8 | H5 CHONDRITE | C | B | | |
| MET 001105 ~ | 10.6 | LL5 CHONDRITE | B | B | | |
| MET 001106 ~ | 45.7 | LL4 CHONDRITE | A/B | A/B | | |
| MET 001107 ~ | 16.3 | H6 CHONDRITE | C | B | | |
| MET 001108 ~ | 20.2 | LL6 CHONDRITE | A/B | B | | |
| MET 001109 ~ | 12.0 | L6 CHONDRITE | B/C | B | | |
| MET 001110 ~ | 19.0 | H6 CHONDRITE | C | A/B | | |
| MET 001111 ~ | 36.2 | H5 CHONDRITE | C | B | | |
| MET 001112 ~ | 11.4 | H6 CHONDRITE | C | A/B | | |
| MET 001113 ~ | 12.5 | LL6 CHONDRITE | B/C | B | | |
| MET 001114 ~ | 56.6 | H5 CHONDRITE | C | A/B | | |

~Classified by using refractive indices.

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 001115 ~ | 38.6 | LL6 CHONDRITE | C | B | | |
| MET 001116 ~ | 23.1 | LL6 CHONDRITE | C | B | | |
| MET 001117 ~ | 18.7 | H5 CHONDRITE | B/C | A/B | | |
| MET 001118 ~ | 11.5 | H5 CHONDRITE | C | B | | |
| MET 001119 ~ | 18.5 | LL4 CHONDRITE | B | B | | |
| MET 001120 ~ | 28.4 | H6 CHONDRITE | C | C | | |
| MET 001121 ~ | 24.4 | H5 CHONDRITE | C | B | | |
| MET 001122 ~ | 14.8 | H5 CHONDRITE | C | B | | |
| MET 001123 ~ | 32.6 | H6 CHONDRITE | C | B | | |
| MET 001124 ~ | 5.6 | H6 CHONDRITE | C | B | | |
| MET 001125 ~ | 24.6 | H6 CHONDRITE | C | B | | |
| MET 001126 ~ | 21.9 | H5 CHONDRITE | C | B | | |
| MET 001127 ~ | 17.0 | H6 CHONDRITE | C | B | | |
| MET 001128 ~ | 5.3 | L6 CHONDRITE | C | B | | |
| MET 001129 ~ | 11.4 | LL5 CHONDRITE | C | B | | |
| MET 001130 ~ | 54.5 | H6 CHONDRITE | B/C | A/B | | |
| MET 001131 ~ | 18.5 | H6 CHONDRITE | B/C | A | | |
| MET 001132 ~ | 10.5 | H6 CHONDRITE | B/C | A | | |
| MET 001133 ~ | 4.5 | L5 CHONDRITE | B | A | | |
| MET 001134 ~ | 7.3 | LL4 CHONDRITE | A/B | A | | |
| MET 001135 ~ | 3.8 | H6 CHONDRITE | B/C | A | | |
| MET 001137 ~ | 1.5 | LL5 CHONDRITE | B | A | | |
| MET 001138 | 0.4 | L5 CHONDRITE | B | A | 24 | 21 |
| | | | | | | |
| MET 01 001 ~ | 1591.0 | LL6 CHONDRITE | A/B | A | | |
| MET 01 003 ~ | 2835.0 | LL5 CHONDRITE | A | B/C | | |
| MET 01 010 ~ | 239.5 | LL6 CHONDRITE | A/B | B | | |
| MET 01 011 ~ | 136.6 | LL5 CHONDRITE | B | A | | |
| MET 01 012 ~ | 254.7 | L5 CHONDRITE | B/C | A | | |
| MET 01 013 ~ | 151.8 | L5 CHONDRITE | B/C | B/C | | |
| MET 01 014 ~ | 180.1 | H5 CHONDRITE | C | A | | |
| MET 01 015 ~ | 211.7 | LL5 CHONDRITE | B/C | A/B | | |
| MET 01 016 ~ | 159.3 | LL5 CHONDRITE | B | A/B | | |
| MET 01 017 | 238.0 | CR2 CHONDRITE | C | C | 3-19 | 2-26 |
| MET 01 018 | 222.4 | EH3 CHONDRITE | B/C | A/B | 0-1 | 0-2 |
| MET 01 019 ~ | 164.5 | L5 CHONDRITE | C | B | | |
| MET 01 020 ~ | 739.4 | H6 CHONDRITE | B/C | A/B | | |
| MET 01 021 ~ | 1116.6 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 022 ~ | 1060.3 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 036 ~ | 329.3 | LL6 CHONDRITE | B | C | | |
| MET 01 037 ~ | 421.0 | LL6 CHONDRITE | B | A/B | | |
| MET 01 038 ~ | 388.0 | LL6 CHONDRITE | B | B | | |
| MET 01 039 ~ | 356.2 | L5 CHONDRITE | B/C | B | | |
| MET 01 065 ~ | 395.2 | L5 CHONDRITE | B/CE | A/B | | |
| MET 01 066 ~ | 570.4 | LL5 CHONDRITE | B | A | | |
| MET 01 067 ~ | 125.8 | LL5 CHONDRITE | A/B | A | | |
| MET 01 068 ~ | 186.6 | LL5 CHONDRITE | A/B | A | | |
| MET 01 069 ~ | 117.1 | L5 CHONDRITE | B/C | A/B | | |
| MET 01 092 ~ | 8.1 | H6 CHONDRITE | C | A/B | | |
| MET 01 093 ~ | 70.0 | H6 CHONDRITE | C | A/B | | |
| MET 01 094 ~ | 15.8 | L5 CHONDRITE | C | A/B | | |
| MET 01 095 ~ | 45.0 | LL6 CHONDRITE | B | B | | |
| MET 01 096 ~ | 48.6 | LL5 CHONDRITE | B | B | | |

~Classified by using refractive indices.

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 01 097 ~ | 41.7 | LL5 CHONDRITE | A | A | | |
| MET 01 098 ~ | 21.1 | H5 CHONDRITE | C | A/B | | |
| MET 01 099 ~ | 17.5 | L5 CHONDRITE | C | A/B | | |
| MET 01 120 ~ | 78.8 | H6 CHONDRITE | C | B | | |
| MET 01 121 ~ | 93.1 | L5 CHONDRITE | B | B | | |
| MET 01 122 ~ | 143.0 | LL5 CHONDRITE | B/C | C | | |
| MET 01 123 ~ | 35.0 | LL5 CHONDRITE | B | B/C | | |
| MET 01 124 ~ | 41.6 | H5 CHONDRITE | C | B | | |
| MET 01 125 ~ | 26.7 | H6 CHONDRITE | C | B | | |
| MET 01 126 ~ | 12.3 | L5 CHONDRITE | B/C | B | | |
| MET 01 127 ~ | 15.5 | LL5 CHONDRITE | B | B | | |
| MET 01 128 ~ | 14.0 | L5 CHONDRITE | C | B | | |
| MET 01 129 ~ | 7.0 | L5 CHONDRITE | C | B | | |
| MET 01 130 ~ | 58.7 | L5 CHONDRITE | C | B | | |
| MET 01 131 ~ | 15.5 | L5 CHONDRITE | B | B | | |
| MET 01 132 ~ | 23.7 | LL5 CHONDRITE | A | A/B | | |
| MET 01 133 ~ | 16.6 | LL6 CHONDRITE | B | B | | |
| MET 01 134 ~ | 10.2 | H5 CHONDRITE | C | B | | |
| MET 01 135 | 43.7 | L5 CHONDRITE | B | A/B | 24 | 21 |
| MET 01 136 ~ | 19.1 | H5 CHONDRITE | C | B | | |
| MET 01 138 ~ | 26.3 | LL6 CHONDRITE | B | B/C | | |
| MET 01 139 ~ | 60.5 | L5 CHONDRITE | C | B/C | | |
| MET 01 140 ~ | 80.4 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 141 ~ | 41.2 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 142 ~ | 65.8 | H5 CHONDRITE | B/C | B | | |
| MET 01 143 ~ | 44.0 | H6 CHONDRITE | C | A/B | | |
| MET 01 144 ~ | 29.6 | LL5 CHONDRITE | A/B | B | | |
| MET 01 145 ~ | 19.4 | LL5 CHONDRITE | B | B | | |
| MET 01 146 ~ | 4.9 | L5 CHONDRITE | B/C | B | | |
| MET 01 147 ~ | 34.4 | LL5 CHONDRITE | B | A/B | | |
| MET 01 148 ~ | 18.0 | L5 CHONDRITE | B/C | B | | |
| MET 01 149 | 10.3 | CK3 CHONDRITE | A | B | 2-39 | |
| MET 01 160 ~ | 35.6 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 161 ~ | 92.2 | L5 CHONDRITE | B/C | B | | |
| MET 01 162 ~ | 33.1 | LL5 CHONDRITE | A | A/B | | |
| MET 01 163 ~ | 29.8 | LL5 CHONDRITE | A | A/B | | |
| MET 01 164 ~ | 34.5 | L5 CHONDRITE | B/C | A/B | | |
| MET 01 165 ~ | 31.5 | LL5 CHONDRITE | B | A/B | | |
| MET 01 166 ~ | 40.0 | L5 CHONDRITE | B | A | | |
| MET 01 167 ~ | 43.3 | LL6 CHONDRITE | A/B | A/B | | |
| MET 01 168 ~ | 11.5 | L5 CHONDRITE | B | A | | |
| MET 01 169 ~ | 65.7 | LL6 CHONDRITE | A/B | A/B | | |
| MET 01 170 ~ | 34.9 | L5 CHONDRITE | A/B | A | | |
| MET 01 171 ~ | 32.9 | H6 CHONDRITE | B/CE | A | | |
| MET 01 172 ~ | 13.0 | L5 CHONDRITE | B/C | A/B | | |
| MET 01 173 ~ | 9.4 | H6 CHONDRITE | B/CE | A | | |
| MET 01 174 ~ | 26.3 | LL5 CHONDRITE | A/B | A | | |
| MET 01 175 ~ | 49.3 | H6 CHONDRITE | B/C | A/B | | |
| MET 01 176 ~ | 24.3 | H6 CHONDRITE | B/C | A/B | | |
| MET 01 177 ~ | 15.8 | H6 CHONDRITE | B/C | A/B | | |
| MET 01 178 ~ | 11.9 | H6 CHONDRITE | B/CE | B/C | | |
| MET 01 179 ~ | 12.4 | H5 CHONDRITE | B/C | A | | |
| MET 01 190 ~ | 7.9 | LL6 CHONDRITE | B | B | | |
| MET 01 191 ~ | 65.4 | LL5 CHONDRITE | B | B | | |

~Classified by using refractive indices.

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| MET 01 192 ~ | 25.2 | L6 CHONDRITE | B | B/C | | |
| MET 01 193 ~ | 32.0 | LL5 CHONDRITE | B | A/B | | |
| MET 01 194 ~ | 47.6 | LL5 CHONDRITE | B | B | | |
| MET 01 195 | 98.7 | ACAPULCOITE | C | B | 9 | 8-9 |
| MET 01 196 ~ | 58.1 | H5 CHONDRITE | C | A | | |
| MET 01 197 ~ | 46.4 | H6 CHONDRITE | B/C | B | | |
| MET 01 198 | 98.5 | ACAPULCOITE | C | B | 9 | 9 |
| MET 01 199 ~ | 18.1 | L5 CHONDRITE | B | B | | |
| MET 01 220 ~ | 12.5 | LL5 CHONDRITE | B | A/B | | |
| MET 01 221 ~ | 1.3 | H6 CHONDRITE | C | A/B | | |
| MET 01 222 ~ | 10.8 | L5 CHONDRITE | B | B | | |
| MET 01 223 ~ | 14.4 | LL5 CHONDRITE | A | A | | |
| MET 01 224 ~ | 14.1 | H6 CHONDRITE | C | B | | |
| MET 01 225 ~ | 10.2 | LL6 CHONDRITE | A | A | | |
| MET 01 226 ~ | 14.7 | H6 CHONDRITE | C | B | | |
| MET 01 227 ~ | 17.1 | L5 CHONDRITE | B | B | | |
| MET 01 228 ~ | 13.8 | LL6 CHONDRITE | A | A | | |
| MET 01 229 ~ | 8.5 | H6 CHONDRITE | C | A | | |
| MET 01 240 ~ | 60.3 | L5 CHONDRITE | C | B | | |
| MET 01 241 ~ | 45.3 | L5 CHONDRITE | C | B | | |
| MET 01 242 ~ | 105.4 | H6 CHONDRITE | C | A/B | | |
| MET 01 243 ~ | 11.6 | H6 CHONDRITE | C | B | | |
| MET 01 244 | 76.5 | ACAPULCOITE | C | A/B | 9 | 9 |
| MET 01 245 ~ | 54.7 | H5 CHONDRITE | C | B | | |
| MET 01 246 ~ | 38.0 | LL5 CHONDRITE | B/C | A | | |
| MET 01 247 ~ | 44.9 | H5 CHONDRITE | C | B | | |
| MET 01 248 ~ | 20.5 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 249 ~ | 1.5 | H5 CHONDRITE | C | B | | |
| MET 01 250 ~ | 4.8 | L5 CHONDRITE | B | B | | |
| MET 01 251 ~ | 21.3 | H6 CHONDRITE | C | B/C | | |
| MET 01 252 ~ | 13.0 | LL5 CHONDRITE | B | B | | |
| MET 01 253 ~ | 103.1 | H6 CHONDRITE | C | B | | |
| MET 01 254 ~ | 19.0 | H6 CHONDRITE | C | A/B | | |
| MET 01 255 ~ | 6.9 | L5 CHONDRITE | B | B | | |
| MET 01 256 ~ | 167.0 | LL6 CHONDRITE | A/B | A/B | | |
| MET 01 257 ~ | 1.7 | H5 CHONDRITE | C | B | | |
| MET 01 258 ~ | 26.6 | H6 CHONDRITE | C | A/B | | |
| MET 01 259 ~ | 31.7 | H6 CHONDRITE | C | A/B | | |
| MET 01 260 ~ | 25.5 | L5 CHONDRITE | B | B | | |
| MET 01 261 ~ | 24.2 | LL5 CHONDRITE | A/B | A/B | | |
| MET 01 262 ~ | 9.7 | L5 CHONDRITE | C | B | | |
| MET 01 263 ~ | 11.3 | H6 CHONDRITE | C | B | | |
| MET 01 264 | 20.6 | H5 CHONDRITE | B/C | B/C | 19 | 17 |
| MET 01 265 | 12.3 | H4 CHONDRITE | B | B | 20 | 12-18 |
| MET 01 266 ~ | 32.2 | H5 CHONDRITE | B | B | | |
| MET 01 267 ~ | 4.6 | LL6 CHONDRITE | C | C | | |
| MET 01 268 ~ | 8.0 | H6 CHONDRITE | C | B | | |
| MET 01 269 | 18.6 | H4 CHONDRITE | B | B | 18 | 17 |
| MET 01 270 ~ | 76.7 | L5 CHONDRITE | C | B | | |
| MET 01 271 ~ | 141.8 | L5 CHONDRITE | C | B | | |
| MET 01 272 ~ | 113.2 | L5 CHONDRITE | C | B | | |
| MET 01 273 ~ | 113.1 | H6 CHONDRITE | C | B | | |
| MET 01 274 ~ | 131.9 | H6 CHONDRITE | C | B | | |

~Classified by using refractive indices.

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| ODE 01 502 | 123.5 | H4 CHONDRITE | B/C | B | 18 | 16 |
| | | | | | | |
| LAP 02 205 | 1226.3 | LUNAR-BASALT | B | B/C | 50 | 26-80 |
| LAP 02 206 | 1284.6 | CV3 CHONDRITE | B | A | 0-46 | 1-2 |
| LAP 02 216 | 612.6 | DIOGENITE | B | A/B | | 23 |
| LAP 02 228 | 335.8 | CV3 CHONDRITE | B | A/B | 1-45 | 0-1 |
| LAP 02 233 | 18.1 | AUBRITE | B | C | | 0 |
| LAP 02 238 | 26.6 | R CHONDRITE | B | A | 27-46 | 18-36 |
| LAP 02 239 | 39.3 | CM2 CHONDRITE | B | A/B | 0-46 | 3-9 |
| LAP 02 333 | 131.4 | CM2 CHONDRITE | B | A/B | 0-55 | 1 |
| | | | | | | |
| MAC 02 460 | 54.2 | LL6 CHONDRITE | B | B | 30 | 25 |
| MAC 02 497 | 13.7 | L5 CHONDRITE | B/C | B/C | 23 | 20 |
| MAC 02 522 | 5.7 | EUCRITE (UNBRECCIATED) | B | B | | 38-51 |
| MAC 02 527 | 3.4 | EUCRITE (BRECCIATED) | B | A | | 61 |
| MAC 02 666 | 20.3 | HOWARDITE | B | B | | 23-55 |
| MAC 02 667 | 7.5 | LL6 CHONDRITE | B | B | 29 | 23 |
| MAC 02 703 | 19.3 | HOWARDITE | B | B | | 26-40 |
| | | | | | | |
| PCA 02 007 | 22.4 | LUNAR-BASALTIC BRECCIA | B | A/B | | 19-50 |
| PCA 02 010 | 70.8 | CM2 CHONDRITE | B | B | 1-36 | 1-6 |
| PCA 02 016 | 23.9 | HOWARDITE | B | B | 33 | 33-59 |

## **Notes to Tables 1 and 2:

**"Weathering" Categories:**

A: Minor rustiness; rust haloes on metal particles and rust stains along fractures are minor.
B: Moderate rustiness; large rust haloes occur on metal particles and rust stains on internal fractures are extensive.
C: Severe rustiness; metal particles have been mostly stained by rust throughout.
e: Evaporite minerals visible to the naked eye.

**"Fracturing" Categories:**

A: Minor cracks; few or no cracks are conspicuous to the naked eye and no cracks penetrate the entire specimen.
B: Moderate cracks; several cracks extend across exterior surfaces and the specimen can be readily broken along the cracks.
C: Severe cracks; specimen readily crumbles along cracks that are both extensive and abundant.

~Classified by using refractive indices.

## Table 2: Newly Classified Meteorites Listed By Type **

| Sample Number | Weight (g) | Classification | Weathering | Fracturing | % Fa | % Fs |
|---|---|---|---|---|---|---|
| | | **Achondrites** | | | | |
| MET 01 195 | 98.7 | ACAPULCOITE | C | B | 9 | 8-9 |
| MET 01 198 | 98.5 | ACAPULCOITE | C | B | 9 | 9 |
| MET 01 244 | 76.5 | ACAPULCOITE | C | A/B | 9 | 9 |
| LAP 02 233 | 18.1 | AUBRITE | B | C | | 0 |
| LAP 02 216 | 612.6 | DIOGENITE | B | A/B | | 23 |
| MAC 02 527 | 3.4 | EUCRITE (BRECCIATED) | B | A | | 61 |
| MAC 02 522 | 5.7 | EUCRITE (UNBRECCIATED) | B | B | | 38-51 |
| MAC 02 666 | 20.3 | HOWARDITE | B | B | | 23-55 |
| MAC 02 703 | 19.3 | HOWARDITE | B | B | | 26-40 |
| PCA 02 016 | 23.9 | HOWARDITE | B | B | 33 | 33-59 |
| LAP 02 205 | 1226.3 | LUNAR-BASALT | B | B/C | 50 | 26-80 |
| PCA 02 007 | 22.4 | LUNAR-BASALTIC BRECCIA | B | A/B | | 19-50 |
| | | **Carbonaceous Chondrites** | | | | |
| MET 01 149 | 10.3 | CK3 CHONDRITE | A | B | 2-39 | |
| LAP 02 239 | 39.3 | CM2 CHONDRITE | B | A/B | 0-46 | 3-9 |
| LAP 02 333 | 131.4 | CM2 CHONDRITE | B | A/B | 0-55 | 1 |
| PCA 02 010 | 70.8 | CM2 CHONDRITE | B | B | 1-36 | 1-6 |
| MET 00 711 | 17.0 | CO3 CHONDRITE | B | A | 5-34 | 1-11 |
| MET 01 017 | 238.0 | CR2 CHONDRITE | C | C | 3-19 | 2-26 |
| LAP 02 206 | 1284.6 | CV3 CHONDRITE | B | A | 0-46 | 1-2 |
| LAP 02 228 | 335.8 | CV3 CHONDRITE | B | A/B | 1-45 | 0-1 |
| | | **E Chondrites** | | | | |
| MET 01 018 | 222.4 | EH3 CHONDRITE | B/C | A/B | 0-1 | 0-2 |
| MET 00 951 | 25.0 | EL6 CHONDRITE | C | A/B | | 0-1 |
| | | **R Chondrite** | | | | |
| LAP 02 238 | 26.6 | R CHONDRITE | B | A | 27-46 | 18-36 |
| | | **Stony Irons** | | | | |
| MET 001031 | 6.3 | MESOSIDERITE | C | B | | 30 |

# Table 3: Tentative Pairings for New Meteorites

Table 3 summarizes possible pairings of the new specimens with each other and with previously classified specimens based on descriptive data in this newsletter issue. Readers who desire a more comprehensive review of the meteorite pairings in the U.S. Antarctic collection should refer to the compilation provided by Dr. E.R. D. Scott, as published in issue 9(2) (June 1986). Possible pairings were updated in *Meteoritical Bulletins* No. 76 (*Meteoritics* **29**, 100-143), No. 79 (*Meteoritics and Planetary Science* **31**, A161-174), No. 82 (*Meteoritics and Planetary Science* **33**, A221-A239), No. 83 (*Meteoritics and Planetary Science* **34**, A169-A186), No. 84 (*Meteoritics and Planetary Science* **35**, A199-A225), No. 85 (*Meteoritics and Planetary Science* **36**, A293-A322), No. 86 (*Meteoritics and Planetary Science* **37**, A157-A184) and No. 87 (*Meteoritics and Planetary Science* **38,** A189-A248*)*.

**ACAPULCOITES**

MET 01198 and MET 01244 with MET 01195

**CM2 CHONDRITES**

LAP 02333 with LAP 02239

**CO3 CHONDRITES**

MET 00711 with MET 00694

**CV3 CHONDRITES**

LAP 02228 with LAP 02206

**DIOGENITES**

LAP 02216 with LAP 91900

# Petrographic Descriptions


**Sample No.:** **MET 00711**
Location: Meteorite Hills
Field No.: 13369
Dimensions (cm): 2.5 x 2.5 x 1.5
Weight (g): 17.013
Meteorite Type: CO3 Chondrite

Macroscopic Description:
Kathleen McBride
100% of the exterior is covered with brown/black fusion crust with oxidation haloes. The interior is mostly rusty with tiny patches of gray matrix. This meteorite has a high metal content.

Thin Section (,2) Description:
Linda Welzenbach, Tim McCoy
The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and mineral grains in a dark matrix. Metal and sulfide occur within and rimming the chondrules. Olivine ranges in composition from $Fa_{5-34}$, with a clustering of compositions around $Fa_{34}$. Orthopyroxene is $Fs_{1-11}$. The meteorite is a CO3 chondrite of moderately high subtype (estimated 3.6) and is almost certainly paired with MET 00694 and MET 00737.


**Sample No.:** **MET 00951**
Location: Meteorite Hills
Field No.: 13794
Dimensions (cm): 4.0 x 3.0 x 1.5
Weight (g): 25.030
Meteorite Type: EL6 Chondrite

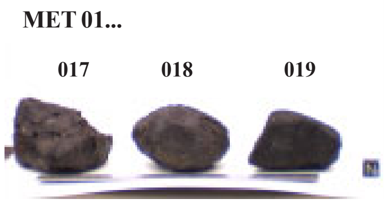
Macroscopic Description:
Kathleen McBride
The exterior surface has brown/black fusion crust with oxidation haloes. The rust and black colored crystalline interior is fine grained with a high metal content.

Thin Section (,2) Description:
Linda Welzenbach, Tim McCoy
The section shows an equigranular aggregate of enstatite, with abundant metal and sulfide. Weathering is moderate, with alteration along fractures. Microprobe analyses reveal pyroxene compositions of $Fs_{0-1}$ and metal contains 1.2 wt.% Si. The section exhibits extensive evidence of post-formation heating, probably due to shock. Quenched metal-sulfide intergrowths are common and sulfides grade from, e.g., FeS to MnS in a complete range at their mutual boundary. The meteorite is an EL6 chondrite.


**Sample No.:** **MET 001031**
Location: Meteorite Hills
Field No.: 12891
Dimensions (cm): 2.0 x 1.5 x 1.0
Weight (g): 6.336
Meteorite Type: Mesosiderite

Macroscopic Description:
Kathleen McBride
Smooth brown/black fusion crust with oxidation haloes covers the exterior of this meteorite. It has a rusty crystalline interior with a high metal content intermingled with small patches of gray matrix.

Thin Section (,2) Description:
Tim McCoy, Linda Welzenbach
The section is a breccia composed of angular isolated grains up to 1.5 mm and clasts of orthopyroxene ($Fs_{30}Wo_2$), anorthitic feldspar, metal (with included tetrataenite and schreibersite), troilite and oxides. The meteorite appears to be an isolated clast from a mesosiderite.




**Sample No.:** **MET 01017**
Location: Meteorite Hills
Field No.: 13814
Dimensions (cm): 7.5 x 5.0 x 3.5
Weight (g): 238.000
Meteorite Type: CR2 Chondrite

Macroscopic Description:
Kathleen McBride
50% of the exterior has weathered fusion crust with oxidation haloes and polygonal fractures. The interior is very fractured and weathered. It is friable with an abundant amount of rust. Some light colored mm-sized chondrules are visible.

Thin Section (,2) Description:
Tim McCoy, Linda Welzenbach
The section exhibits large (up to 2 mm), well-defined, metal-rich chondrules and CAI's in a dark matrix of FeO-rich phyllosilicate. Weathering is extensive, with staining, patches and veins of hydrated iron oxide. Silicates are unequilibrated; olivines range from $Fa_{3-19}$ and pyroxenes from $Fs_{2-26}$. The meteorite is a CR2 chondrite.


**Sample No.:** **MET 01018**
Location: Meteorite Hills
Field No.: 13874
Dimensions (cm): 6.5 x 5.5 x 3.5
Weight (g): 222.40
Meteorite Type: EH3 Chondrite

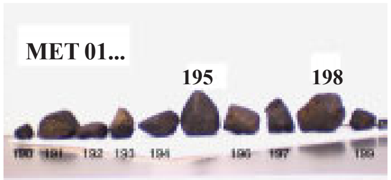
Macroscopic Description:
Kathleen McBride
80% of the sample's exterior has weathered fusion crust with oxidation haloes and polygonal fractures. The interior is weathered with some rust and light colored chondrules (mm sized).

Thin Section (,4) Description:
Linda Welzenbach, Tim McCoy
The section shows an aggregate of chondrules (up to 1 mm), chondrule fragments, and pyroxene grains in a matrix of about 30% metal and sulfide. Several chondrules contain olivine. Weathering is modest, with staining of some enstatite grains and minor alteration of metal and sulfides. Microprobe analyses show the olivine is $Fa_{0-1,}$ orthopyroxene is $Fs_{0-2}$ and metal contains ~3.5 wt.% Si. The meteorite is an EH3 chondrite.


**Sample No.:** **MET 01149**
Location: Meteorite Hills
Field No.: 13028
Dimensions (cm): 3.5 x 1.5 x 1.25
Weight (g): 10.251
Meteorite Type: CK3 Chondrite

Macroscopic Description:
Kathleen McBride
30% of the exterior has dull black fusion crust with polygonal fractures. The interior is medium gray matrix with very little weathering. Some gray and white clasts and chondrules are visible.

Thin Section (,2 ) Description:
Linda Welzenbach, Tim McCoy
The section consists of well-defined chondrules (up to 1 mm) in a matrix of finer grained silicates, sulfides, magnetite and abundant sulfide. The meteorite is a little weathered, but extensively shocked. Silicates are heterogeneous, with olivine $Fa_{2-39}$, with many grains around $Fa_{39}$. The meteorite is probably a CK3 chondrite.





**Sample No.:** **MET 01195; MET 01198; MET 01244**
Location: Meteorite Hills
Field No.: 13884; 13820; 13050
Dimensions (cm): 4.0 x 3.5 x 3.0; 5.0 x 4.0 x 2.5; 5.0 x 3.5 x 3.0
Weight (g): 98.725; 98.489; 76.490
Meteorite Type: Acapulcoite

Macroscopic Description:
Kathleen McBride
The exteriors of these meteorites are covered with brown/black fusion crust with oxidation haloes. The interiors are a fine-grained, rusty, crystalline material with some metal.

Thin Sections (,2) Description:
Tim McCoy, Linda Welzenbach
The meteorites are so similar that a single description suffices. The sections consist of an equigranular aggregate with grains up to 0.5 mm. Minerals include olivine ($Fa_{8-9}$), orthopyroxene ($Fs_9$), chromian diopside ($Fs_{3-4}Wo_{44-45}$), phosphates, metal and troilite. Metal and sulfide occur as large grains, veinlets and metal-sulfide blebs within orthopyroxene. Weathering is moderate, with extensive staining. The meteorites are acapulcoites.


**Sample No.:** **LAP 02205**
Location: LaPaz Ice Field
Field No.: 15503
Dimensions (cm): 10.0 x 8.5 x 5.5
Weight (g): 1226.300
Meteorite Type: Lunar Basalt

Macroscopic Description:
Kathleen McBride
95% of the exterior surface has black fusion crust. Small areas of material have been plucked out. The fusion crust exhibits a slight ropy texture with polygonal fractures. The interior consists of interlocking tan and white coarse-grained minerals. There are numerous criss-crossing fractures filled with black glass.

Thin Section (,6) Description:
Tim McCoy, Linda Welzenbach
The section consists of coarse-grained unbrecciated basalt with elongate pyroxene (up to 0.5 mm) and plagioclase laths (up to 1 mm) (~60:40 px:plag), rare phenocrysts of olivine (up to 1 mm) and interstitial oxides and late-stage mesostasis. Shock effects include undulatory extinction in pyroxene and shock melt veins and pockets. Microprobe analyses reveal pigeonite to augite of $Fs_{26-80}Wo_{14-36}$, plagioclase is $An_{85-90}Or_{0-1}$ and a single olivine phenocryst is $Fa_{50}$. The Fe/Mn ratio in the pyroxenes averages ~60. The meteorite is a lunar olivine-bearing basalt.

Oxygen Isotope Analysis:
T.K. Mayeda and R.N. Clayton

Our analysis for LAP 02205 gives:
$\delta^{18}O = +5.6$ and $\delta^{17}O = +2.7$.
This is consistent with a lunar basalt.

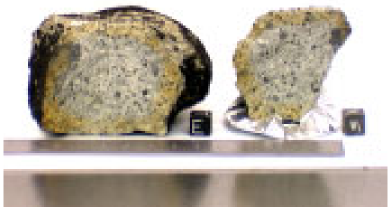

LAP 02228

**Sample No.:** **LAP 02206; LAP 02228**
Location: LaPaz Ice Field
Field No.: 15504; 15409
Dimensions (cm): 9.5 x 7.5 x 8.0; 7.25 x 5.0 x 5.0
Weight (g): 1284.60; 335.80
Meteorite Type: CV3 Chondrite

Macroscopic Description:
Kathleen McBride
The exteriors of these meteorites are covered with a rough, black fusion crust with polygonal fractures. The interior reveals a medium to dark gray matrix with white, irregularly shaped inclusions. A few dark crystalline clasts are present. Chondrules are mm sized and are gray or rust in color.

Thin Section (,5) Description:
Tim McCoy, Linda Welzenbach
The sections are so similar that a single description suffices. The sections exhibit large chondrules (up to 3 mm) and CAIs in a dark matrix with minor metal and sulfide. Olivines range from $Fa_{0-45}$, with many $Fa_{0-5}$, and pyroxenes from $Fs_{0-2}$. The meteorites are CV3 chondrites.

LAP 02216



**Sample No.:** **LAP 02216**
Location: LaPaz Ice field
Field No.: 15523
Dimensions (cm): 9.0 x 7.0 x 4.25
Weight (g): 612.6
Meteorite Type: Diogenite

Macroscopic Description:
Kathleen McBride
50% of the exterior has a chocolate brown fusion crust. The fusion crust is in patches and has a dull luster with polygonal fractures. The exposed interior has a greenish gray color and shows numerous inclusions. The interior is composed of a concrete gray matrix containing numerous olivine clasts of various sizes (mm to cm). The clasts range in color from a deep gray-green to light areas. There are a few black minerals with a rusty stain around them. The rock has a 0.5 to 0.75 cm weathering rind, yellow to rust in color. The clasts are easily plucked. There are many "casts" where olivine grains had been.

Thin Section (,6) Description:
Tim McCoy, Linda Welzenbach
The section shows a groundmass of coarse (up to 1.5 mm) comminuted pyroxene, with minor $SiO_2$. Orthopyroxene has a composition of $Fs_{23}Wo_2$ and an Fe/Mn ratio of ~28. The meteorite is a diogenite and is compositionally similar to LAP 91900, with which it may be paired.

LAP 02233

**Sample No.:** **LAP 02233**
Location: LaPaz Ice field
Field No.: 15156
Dimensions (cm): 3.0 x 2.5 x 2.0
Weight (g): 18.056
Meteorite Type: Aubrite

Macroscopic Description:
Kathleen McBride
This meteorite has no fusion crust. The interior is striated, snow white crystalline material that is loosely held together. There are numerous fractures and "canyons". Accessory minerals are rounded, black and rootbeer colored (1–2 mm in size) crystals. Small areas of rust are present.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section consists of an aggregate of coarse (up to 5 mm), heavily shocked enstatite grains with minor to trace abundances of diopside, Si-bearing metal, Ti-bearing troilite, oldhamite, and a Mn,Mg,Fe-sulfide. Silicates are essentially FeO-free enstatite ($Fs_0Wo_1$) and diopside ($Fs_0Wo_{45}$). The meteorite is an aubrite.

LAP 02238

**Sample No.:** **LAP 02238**
Location: LaPaz Ice field
Field No.: 15181
Dimensions (cm): 3.0 x 2.5 x 2.0
Weight (g): 26.553
Meteorite Type: R Chondrite

Macroscopic Description:
Kathleen McBride
75% of the exterior has a shiny, black fusion crust. The bottom portion of the rock shows polygonal fractures. The exposed interior has weathered to a greenish-brown color. The interior is a gray matrix with white to light gray clasts 1-3 mm in length. Black clasts < 1 mm. This meteorite is moderately hard, with metal grains. Some rusty and oxidized areas are present.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section consists of relatively few chondrules (up to 1 mm) and chondrule fragments in a fine-grained brecciated matrix, with very abundant iron sulfide and pentlandite and lesser abundances of oxides and graphite. Mineral compositions are olivine of $Fa_{27-46}$ (most $Fa_{38-40}$), orthopyroxene of $Fs_{18-36}Wo_{1-3}$ and augite $Fs_{9-15}Wo_{44-48}$. The olivine composition is similar to R chondrites although graphite has not been previously reported in this group.

Oxygen Isotope Analysis:
T.K. Mayeda and R.N. Clayton

Our analysis for LAP 02238 gives $\delta^{18}O = +3.5$ and $\delta^{17}O = +4.5$. This gives $\Delta^{17}O$ of +2.7, in the range of R-chondrites, consistent with the very iron-rich olivine. The $\delta$ values are a little lower than the previous low values seen in R chondrites (Y-75302).



**Sample No.:** **LAP 02239; LAP 02333**
Location: LaPaz Ice field
Field No.: 15176; 15531
Dimensions (cm): 4.25 x 3.5 x 3.0; 7.5 x 4.5 x 3.0
Weight (g): 39.272; 131.430
Meteorite Type: CM2 Chondrite

Macroscopic Description:
Kathleen McBride
65% of the exterior of 239 has rough pitted black fusion crust with polygonal fractures and a purple cast. The interior is a black matrix with < mm sized tan and gray chondrules. 95% of 333's exterior is covered with thick chocolate brown fusion crust with a purplish tinge and polygonal fractures. The interior is a black matrix with mm sized white chondrules and inclusions. Two 4-5 mm gray clasts are visible.

Thin Section Description: (,4; ,5)
Tim McCoy, Linda Welzenbach
The meteorites are so similar that a single description suffices. The sections consist of abundant small chondrules (most less than 0.5 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are $Fa_{0-55,}$ with a majority $Fa_{0-2}$, orthopyroxene is $Fs_{1-9}$. The matrix consists dominantly of an Fe-rich serpentine. The meteorites are CM2 chondrites.

MAC 02497

**Sample No.:** **MAC 02497**
Location: MacAlpine Hills
Field No.: 14036
Dimensions (cm): 3.0 x 2.25 x 1.5
Weight (g): 13.731
Meteorite Type: L5 Chondrite

Macroscopic Description:
Kathleen McBride
Chocolate brown fusion crust covers ~75% of the exterior surface. The meteorite has a rough appearance. The interior is a dark gray, fine-grained crystalline matrix with a lot of rust and some fractures. It has a high metal content and a few gray clasts are visible.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section consists dominantly of a fine-grained (2-50 micron grain size) melt-textured matrix of olivine and pyroxene with elongated metal and sulfides and fragments of mineral grains and chondrules reaching 200 microns. Lenticular clasts of relict chondritic material also occur. These clasts are heavily shocked, but chondrule outlines can be discerned. The mineral compositions are homogenous; olivine is $Fa_{23}$ and orthopyroxene is $Fs_{20}$. The meteorite is an L5 impact-melt breccia.

MAC 02522

**Sample No.:** **MAC 02522**
Location: MacAlpine Hills
Field No.: 14069
Dimensions (cm): 2.5 x 1.5 x 1.25
Weight (g): 5.695
Meteorite Type: Eucrite (Unbrecciated)

Macroscopic Description:
Kathleen McBride
40% of the exterior is covered with a brown/black, slightly shiny, rough fusion crust. The exposed interior is dark gray. The interior reveals a moderately hard tan/gray matrix with dark gray clasts.

Thin Section (,3) Description:
Tim McCoy, Linda Welzenbach
The section consists of a coarse-grained (0.5-1 mm) basalt composed of pyroxene and plagioclase, with minor $SiO_2$ and oxides. The meteorite has been extensively shocked, producing mosaicism in the pyroxene and undulatory extinction in the plagioclase. Mineral compositions are intermediate pyroxene ranging from $Fs_{51}Wo_{12}$ to $Fs_{38}Wo_{30}$ (Fe/Mn ~30) and plagioclase of $An_{87-90}$. The meteorite is an unbrecciated eucrite.

**MAC 02527**

**Sample No.:** **MAC 02527**
Location: MacAlpine Hills
Field No.: 14272
Dimensions (cm): 2.0 x 1.0 x 0.75
Weight (g): 3.377
Meteorite Type: Eucrite (Brecciated)

Macroscopic Description:
Kathleen McBride
50% of the exterior has a dark brown, dull fusion crust. The interior is light gray matrix with white and tan inclusions < 1 mm in size.

Thin Section (,3) Description:
Tim McCoy, Linda Welzenbach
The sections are composed of a groundmass of pyroxene and plagioclase (up to 0.5 mm) with few basaltic clasts. Pyroxene grains are mixtures of orthopyroxene and augite with exsolution lamellae of 1-5 microns. Most pyroxene analyses were intermediate compositions, but end members appear to be FeO-rich with orthopyroxene of $Fs_{61}Wo_3$ and augite of $Fs_{28}Wo_{41}$ (Fe/Mn ~ 30). Plagiolcase is $An_{90}$. The meteorite is a brecciated eucrite.


**Sample No.:** **MAC 02666**
Location: MacAlpine Hills
Field No.: 14149
Dimensions (cm): 3.0 x 2.5 x 1.5
Weight (g): 20.273
Meteorite Type: Howardite

Macroscopic Description:
Kathleen McBride
A brown/black fusion crust covers over 50% of the exterior. Exposed interior is gray with white clasts. Some areas show plucking. The gray matrix has white to tan clasts. Some have black rims. A few angular black clasts are visible.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section shows a groundmass of comminuted pyroxene (up to 1 mm) and plagioclase with fine- to coarse-grained basaltic clasts ranging up to 3 mm. It also contains clasts (up to 0.5 mm) of C1 carbonaceous chondrite material. Minerals include abundant orthopyroxene with compositions ranging from $Fs_{23-55}Wo_{2-4}$ (Fe/Mn ~30), a single augite of $Fs_{30}$, plagioclase ($An_{90-95}$) and $SiO_2$. The meteorite is a howardite.

**MAC 02703**

**Sample No.:** **MAC 02703**
Location: MacAlpine Hills
Field No.: 14103
Dimensions (cm): 3.5 x 2.5 x 2.25
Weight (g): 19.269
Meteorite Type: Howardite

Macroscopic Description:
Kathleen McBride
Shiny, black fusion crust covers ~50% of the exterior. Some areas actually look like they are wet. Interior is a concrete gray matrix with numerous clasts of various shapes, sizes and colors.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section shows a groundmass of comminuted, compositionally zoned pyroxene (up to 3 mm) and plagioclase with fine- to coarse-grained basaltic clasts ranging up to 1 mm. Most of the pyroxene is orthopyroxene with compositions ranging from $Fs_{26-40}Wo_{2-3}$ (Fe/Mn ~ 30), a single augite of $Fs_{19}Wo_{43}$ and plagioclase $An_{74-94}$. The meteorite is a howardite.


**Sample No.:** **PCA 02007**
Location: Pecora Escarpment
Field No.: 13690
Dimensions (cm): 4.0 x 3.5 x 1.0
Weight (g): 22.372
Meteorite Type: Lunar Basaltic Breccia

Macroscopic Description:
Kathleen McBride
This is a disk shaped meteorite with brown exterior on the top portion of the rock. The bottom face has tan colored, ropy glass with a frothy appearance. Polygonal fractures and various clasts of different sizes, shapes and colors can be seen. The interior is composed of a hard, dark gray matrix with white clasts. Underneath the tan ropy glass is a layer of shiny green glass.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section consists of an extremely fine-grained (melt?) matrix with isolated mineral grains and fine- to coarse-grained basaltic clasts in all size ranges up to 2 mm. Microprobe analyses reveal olivine of $Fa_{27-33}$, pyroxene in a wide range of compositions from pigeonite $Fs_{50}Wo_4$ to augite of $Fs_{19}Wo_{43}$ with intermediate and more FeO-rich compositions, and plagioclase of $An_{64-100}$ (with the most $An_{96-100}$). The Fe/Mn ratio of the pyroxene averages ~53. The meteorite is a basaltic lunar breccia.


**Sample No.:** **PCA 02010**
Location: Pecora Escarpment
Field No.: 13635
Dimensions (cm): 5.5 x 3.5 x 3.0
Weight (g): 70.772
Meteorite Type: CM2 Chondrite

Macroscopic Description:
Kathleen McBride
30% of the exterior has a thick, black fusion crust with polygonal fractures. The exposed interior is brown with tiny chondrules of various colors. The interior is a rusty gray matrix with white chondrules < mm in size. It has an oxidation rind and is relatively hard and contains some metal.

Thin Section (,6) Description:
Tim McCoy, Linda Welzenbach
The sections consist of a few small chondrules (up to 0.8 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are $Fa_{0-36}$, orthopyroxene is $Fs_{1-6}$. The matrix consists dominantly of an Fe-rich serpentine. Chondrules are flattened and exhibit a distinctive preferred alignment. The meteorite is a CM2 chondrite.


**Sample No.:** **PCA 02016**
Location: Pecora Escarpment
Field No.: 13652
Dimensions (cm): 3.0 x 2.5 x 1.75
Weight (g): 23.865
Meteorite Type: Howardite

Macroscopic Description:
Kathleen McBride
Brown/black fusion crust covers over 50% of the exterior surface. The crust exhibits polygonal fractures and oxidation halos. The exposed interior is multiple shades of gray with some rust and exposed clasts. The interior is brecciated with a medium gray matrix with numerous multi-colored clasts, round to angular in shape and varying in size from 1 -2 mm.

Thin Section (,4) Description:
Tim McCoy, Linda Welzenbach
The section contains abundant basaltic clasts with rare orthopyroxene clasts. The basaltic clasts include heavily shocked coarse-grained clasts, clasts dominated by metal and sulfide and a glassy quench-textured clast, with individual clasts ranging up to 2 mm. Minerals present include olivine ($Fa_{33}$), orthopyroxene ($Fs_{33-59}$; Fe/Mn ~ 25), augite (up to $Fs_{53}$), plagioclase ($An_{92-95}$), metal and sulfide. The meteorite is a howardite.

# Sample Request Guidelines

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. Graduate student requests should have a supervising scientist listed to confirm access to facilities for analysis. All sample requests will be reviewed in a timely manner. For sample requests that do not meet the curatorial guidelines the Meteorite Working Group (MWG) will review those requests. Issuance of samples does not imply a commitment by any agency to fund the proposed research. Requests for financial support must be submitted separately to the appropriate funding agency. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation, and all allocations are subject to recall.

Samples can be requested from any meteorite that has been made available through announcement in any issue of the ***Antarctic Meteorite Newsletter*** (beginning with 1(1) in June, 1978). Many of the meteorites have also been described in five *Smithsonian Contributions to the Earth Sciences*: Nos. 23, 24, 26, 28, and 30. Tables containing all classified meteorites (as of July 2003) have been published in the Meteoritical Bulletins 76, 79, and 82-87, available in the following volumes and pages of *Meteoritics* and *Meteoritics and Planetary Science*: 29, p. 100-143; 31, A161-A174; 33, A221-A240; 34, A169-A186; 35, A199-A225; 36, A293-A322; 37, A157-A184; 38, p. A189-A248. They are also available online at:

**http://www.meteoriticalsociety.org/simple_template.cfm?code=pub_bulletin**

The most current listing is found online at:

**http://www-curator.jsc.nasa.gov /curator/antmet/us_clctn.htm**

All sample requests should be made electronically using the form at:

**http://curator.jsc.nasa.gov/curator/antmet/samreq.htm**

The purpose of the sample request form is to obtain all information MWG needs prior to their deliberations to make an informed decision on the request. Please use this form if possible.

The preferred method of request transmittal is via e-mail. Please send requests and attachments to:

**cecilia.e.satterwhite1@jsc.nasa.gov**

Type **MWG Request** in the e-mail subject line. Please note that the form has signature blocks. The signature blocks should only be used if the form is sent via Fax or mail.

Each request should accurately refer to meteorite samples by their respective identification numbers and should provide detailed scientific justification for proposed research. Specific requirements for samples, such as sizes or weights, particular locations (if applicable) within individual specimens, or special handling or shipping procedures should be explained in each request. Some meteorites are small, of rare type, or are considered special because of unusual properties. Therefore, it is very important that all requests specify both the optimum amount of material needed for the study and the minimum amount of material that can be used. Requests for thin sections that will be used in destructive procedures such as ion probe, laser ablation, etch, or repolishing must be stated explicitly.

Consortium requests should list the members in the consortium. All necessary information should be typed on the electronic form, although informative attachments (reprints of publication that explain rationale, flow diagrams for analyses, etc.) are welcome.

The Meteorite Working Group (MWG), is a peer-review committee which meets twice a year to guide the collection, curation, allocation, and distribution of the U.S. collection of Antarctic meteorites. The deadline for submitting a request is 2 weeks prior to the scheduled meeting.

Requests that are received by the MWG secretary by **Sept. 12, 2003** deadline will be reviewed at the MWG meeting **Sept 25-26, 2003** in Washington D.C. Requests that are received after the deadline may be delayed for review until MWG meets again in the Spring of 2004. **Please submit your requests on time.** Questions pertaining to sample requests can be directed to the MWG secretary by e-mail, fax or phone.

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# Meteorites On-Line

Several meteorite web site are available to provide information on meteorites from Antarctica and elsewhere in the world. Some specialize in information on martian meteorites and on possible life on Mars. Here is a general listing of ones we have found. We have not included sites focused on selling meteorites even though some of them have general information. Please contribute information on other sites so we can update the list.

| | |
|---|---|
| **JSC Curator, Antarctic meteorites** | http://www-curator.jsc.nasa.gov/curator/antmet/antmet.htm |
| **JSC Curator, martian meteorites** | http://www-curator.jsc.nasa.gov/curator/antmet/marsmets/contents.htm |
| **JSC Curator, Mars Meteorite Compendium** | http://www-curator.jsc.nasa.gov/curator/antmet/mmc/mmc.htm |
| **Antarctic collection** | http://www.cwru.edu/affil/ansmet |
| **LPI martian meteorites** | http://www.lpi.usra.edu |
| **NIPR Antarctic meteorites** | http://www.nipr.ac.jp/ |
| **BMNH general meteorites** | http://www.nhm.ac.uk/mineralogy/collections/meteor.htm |
| **UHI planetary science discoveries** | http://www.psrd.hawaii.edu/index.html |
| **Meteoritical Society** | http://www.meteoriticalsociety.org/ |
| **Meteoritics and Planetary Science** | http://meteoritics.org/ |
| **Meteorite! Magazine** | http://www.meteor.co.nz |
| **Geochemical Society** | http://www.geochemsoc.org |
| **Washington Univ. Lunar Meteorite** | http://epsc.wustl.edu/admin/resources/moon_meteorites.html |
| **Washington Univ. "meteor-wrong"** | http://epsc.wustl.edu/admin/resources/meteorites/meteorwrongs/meteorwrongs.htm |

## *Other Websites of Interest*

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|---|---|
| **Mars Exploration** | http://mars.jpl.nasa.gov |
| **Lunar Prospector** | http://lunar.arc.nasa.gov |
| **Near Earth Asteroid Rendezvous** | http://near.jhuapl.edu/ |
| **Stardust Mission** | http://stardust.jpl.nasa.gov |
| **Genesis Mission** | http://genesismission.jpl.nasa.gov |