Antarctic Meteorite Newsletter

Volume 31, Number 1 Feb. 2008

Curator's Comments

Kevin Righter
NASA-JSC

New meteorites and meteorite enclosed in ice

This newsletter reports 418 new meteorites from the 2004 and 2006 ANSMET seasons from the Cumulus Hills (CMS), LaPaz Ice Field (LAP), Graves Nunataks (GRA), Grosvenor Mountains (GRO), Larkman Nunatak (LAR), MacAlpine Hills (MAC), Miller Range (MIL), Roberts Massif (RBT), and Scott Glacier (SCO). These new samples include one iron, 1 eucrite, 1 mesosiderite, 6 CK chondrites (2 with pairing), 2 CV3 chondrites, 1 CM1, 7 CM2 (4 with pairing), 3 CR2 (2 with pairing), and one each of a type 3 L and H chondrites. The CK6 chondrites (LAR 06869, 06872, 06873) are unusual in that they have no discernable chondrules, extremely fine-grained texture, and are full of veins. This newsletter represents a break from recent newsletters in which we have announced many unusual and popular samples, including new lunar and martian meteorites, an unusual achondrite (GRA 06128 and 06129 – the topic of a special session at this years LPSC).

Last fall we received the third highest number of requests for samples since the start of the program in 1977 (73), yet we also continue to announce >300 new meteorites in newsletters. This combined level of activity from the field teams, Smithsonian and NASA-JSC has resulted in the allocation of >600 samples to 87 PI's, including thin sections, since last year at this time. With such a high load of samples, there can be temporary delays, and we appreciate everyone's patience during these busy periods.

This newsletter also marks the completion of characterization and announcement of the 2004 season samples. To see a summary of the seasons finds, you can search "2004" in our Classification database online.

Meteorite fully enclosed in ice: A call for proposals

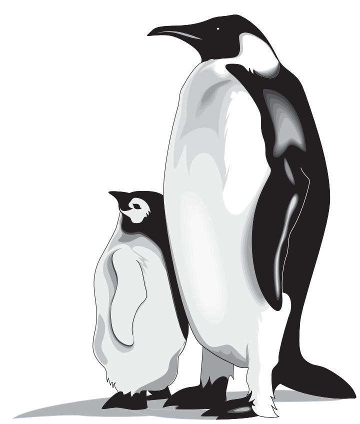
During the recently completed 2007-2008 ANSMET field season the field team recovered a specimen (presumably a meteorite) fully enclosed within blue ice. Although specimens partially enclosed in ice have been recovered and studied before, the 2007 specimen is unique in two important ways. First, it is fully enclosed by ice and thus potentially sealed off from any anthropogenic contamination; second, it is larger than any previously discovered "in-ice" specimen (4-5 cm in longest dimension), making it easier to work with. The block of ice (roughly 30x45x60 cm) containing the new specimen is currently en route to the Meteorite Processing Laboratory at JSC, sealed in a double set of nylon bags and kept frozen since recovery. It should arrive at JSC in early April.

continued on p.2

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

Inside this Issue



Sample Request Deadline
February 29, 2008

MWG Meets
March 15-16, 2008

The Meteorite Working Group would like to receive proposals from researchers interested in joining a consortium that will extract this specimen from the ice and conduct in situ sampling of the ice or the meteorite specimen at the moment of extraction. The following ground rules apply......

•All participation must be self-funded; The MWG can offer no monetary support to aid participation in these activities.
•We are currently searching for a clean, ice-capable lab where we can saw the ice block to within a few mm of the specimen to allow extraction while also preserving ice structure. Participants may need to travel to this lab to participate (depending on what you propose).
•All proposed sampling must take place under cleanroom conditions, at a level appropriate for ice core studies.
•Currently we expect to saw the ice to within a cm of the enclosed rock using a lubricant-free steel bandsaw, and then applying gentle pressure to release the sample. Your proposed studies should take this into account.
•We do not anticipate storing or making available ice samples beyond this immediate opportunity; but requests for ice samples that can be gathered during the initial extraction will be considered.
•Proposals for sampling of the enclosing ice are welcome; please specify the minimum and optimum volumes you hope to collect and
•Proposals for sampling of the enclosed specimen should be limited to scrapings or swabbings if possible.
•After extraction and initial examination, the specimen will go to JSC for processing using normal Antarctic meteorite procedures, and larger samples can be requested at that time.

If you would like to be involved in the extraction of this meteorite, please prepare a short (1 page) proposal describing exactly what you'd like to do (sample or direct measurement needs, samples sizes, etc) and your willingness to participate. Proposals should be sent to Ralph Harvey via email (rph@case.edu) no later than March 21, 2008. The Meteorite Working Group will review these proposals in late March and the consortium will be formed shortly thereafter. We anticipate extracting the meteorite in mid- to late-summer.

Presumed meteorite enclosed in ice

Antarctic Meteorite Workshop - July 26-27, 2008 at Matsue Meteoritical Society

At the upcoming Meteoritical Society meeting in Matsue, Japan (July 28 - August 1, 2008), there will be a pre-meeting Antarctic Meteorite Workshop hosted by the NIPR and MetSoc. The purpose of the workshop is to gather meteoriticists to discuss issues relating to these collections, and how to allow these new discoveries to have the largest impact on our field. The workshop format will allow discussion of topics not usually covered during the regular sessions of the Meteoritical Society meeting. Specifically, the topics of interest will include the search, recovery, classification, weathering and curation of Antarctic Meteorites. Information about the workshop will be distributed soon.

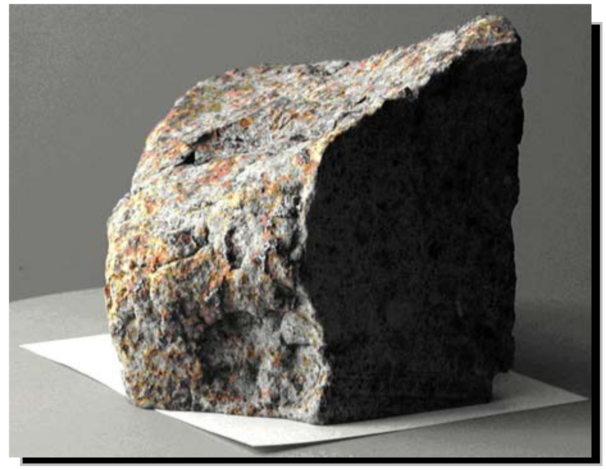
Changes and additions to the US Antarctic meteorite webpage

Some substantial changes and additions have been made to our webpage recently, including an updated sample request form, addition of an updated master list and spreadsheet for all samples in the US Antarctic meteorite collection (cross-checked against the Meteoritical Bulletin announcements), and a summary of bandsawing at NASA-JSC and the Smithsonian Institution. Also, augmentation of photographic information available about the US Antarctic meteorite collection continues on our webpage. You will notice many new photos of achondrites announced in pre-1996 newsletters. These photos will be added for all classes of meteorites over the next few months, so please watch for updates. There are some beautiful photos taken of samples from the period 1977 to 1995 that have only been available in hard copy through JSC. Now many of these will be available electronically on our webpage in the "Classification Database" section.

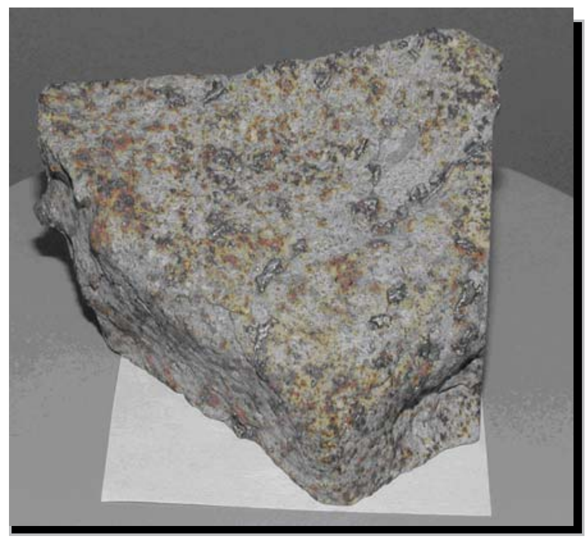
Availability of possible impact crater feature in LAP 02200

NASA-JSC scientist, Mark Cintala received four ~400 g bandsawed pieces of the large LL6 chondrite LAP 02200 in May 2007 for shock experiments in his lab at JSC. After sandblasting the fusion crust off of the samples, which is customary for these shock experiments, Cintala observed what looks like a pre-existing impact crater and spallation zone in this chondrite sample. In order to preserve this feature for study by other researchers, he has traded two pieces with these features for two different pieces of LAP 02200. Below are several photos of this sample, before and after sandblasting, and then after one shock experiment, showing the artificial crater as well as the potential natural crater. If you are interested in studying these samples, please contact us through the normal request channel, but it may be beneficial to speak with the curator in advance of such a request to discuss sample dimensions, sampling needs, etc.

split ,18 before sandblasting (white pad is ~ 10 cm in length).



post gun experiment of split ,18 showing artificial crater (obliquely) on top surface and possible natural crater on lower front surface.



split ,18 after sandblasting and crater feature is already visible at lower right hand side of sample. (All photos courtesy of Mark Cintala, JSC/NASA.)

Staff changes at the Smithsonian

Tim McCoy

This newsletter announces the end of the classification of the 04's and continues working through the 06's. It also marks a significant transition at the Smithsonian. The staff of the Div. of Meteorites is growing and changing. LuElla Speakman has joined our staff as a Collections Technician and will assume responsibility for samples that are permanently transferred to the Smithsonian. Also joining our staff as a trust-funded Geologist is Cari Corrigan, who has twice traveled to Antarctica to collect meteorites and previously worked as a postdoctoral fellow with us. She joins us in what we anticipate to be an ongoing position funded in part by an endowment generously provided by former curator Ed

Henderson. Cari will assume the day-to-day responsibilities in the classification of Antarctic meteorites and will serve as the Smithsonian's representative to the Meteorite Working Group. Linda Welzenbach continues as Collection Manager and serves as the Fall Secretary for the Meteorite Working Group. Finally, I am moving from the MWG, where I have served for a decade, to the Meteorite Steering Group, replacing Glenn MacPherson who served on the Steering Group. We are extremely pleased to welcome LuElla and Cari and will continue to make sure the high level of service you have come to expect from the Smithsonian continues.

Results from the 2007-2008 ANSMET field season

Ralph Harvey

Sometimes it starts with just one little find. Back in 1985 the US Antarctic Research Program established a remote helicopter camp on the Bowden Névé (Beardmore South Camp), an effort designed to promote field explorations in the mid-Transantarctic Mountains. It worked, at least for us; with a bit of helicopter support and some snowmobile traversing, during that season my predecessor (Bill Cassidy) and his team discovered the meteorite concentrations near Lewis Cliff, the Queen Alexandra Range, the Grosvenor Mountains, the Geologists Range, and the Miller Range. More than 8000 LEW, QUE, GRO, GEO and MIL meteorites have been recovered over the past 22 years as a result, and there are more to come.

During that prodigal season, Bill and company found only a single meteorite on ice near the Miller Range; that find took a back seat to the dense concentrations found at Lewis Cliff and nearby areas. But that lone H5 wasn't forgotten. In 1999 we sent a two person team back to the Miller Range, where 30 meteorites found in a day and vast extents of blue ice revealed enormous potential. A four-person team found another 100 or so meteorites in 2003, and in 2005 a full 8-person, 6-week and weather-confounded expedition found about 170 more. The Miller Range icefields yielded many meteorites of unique interest as a result of these efforts, including lunar and martian specimens; so while the numbers weren't huge, the potential of the Miller Range icefields continued to grow.

The just-completed 2007-2008 field season was the first to really exploit that potential. Good weather and lighter snow cover allowed more than 700 meteorites to be recovered, including a good number of non-OC specimens. Our efforts were concentrated on the informally-named Middle Icefields, sitting (rather obviously) between the North icefields partially searched in 2005, and the as-yet unsearched South icefields. Searching conditions were interesting, to say the least. Around the north and east ends of the Middle Icefield are myriad separate patches of exposed ice and hard firn, with both meteorites and terrestrial rocks unevenly scattered on their surfaces. We set ourselves to search all the potential stranding surfaces, not just the convenient ones, and meteorites were found in some very unexpected settings, including the steep slopes of local nunataks. We also used special techniques to recover several "ultraclean" meteorite samples to support detailed chemical and biological investigations; these will be fully described and made available in a future newsletter. Another meteorite (at least we think it's a meteorite) was found while still fully submerged in the ice. The block of ice containing this specimen was collected; look elsewhere in this newsletter for a description of what we hope to do with this sample.

My thanks to the field team, which consisted of Les Bleamaster III, Marc Caffee, Marc Fries, Marie Keiding, Lucy McFadden, John Schutt, Tim Swindle, Dejun Tan and me. Several future seasons will be required to complete the harvest of meteorites from the Miller Range and I think they'll all agree it's something to look forward to.

Group photo of 07-08 team:From left to right Les Bleamaster, Marc Fries, Marie Keiding, Lucy McFadden,Marc Caffee, Dejun Tan, Tim Swindle not pictured: Ralph Harvey and John Schutt (Photo courtesy of Lucy McFadden.)

Re-classifications of ANSMET samples

In the last newsletter (AMN 30, no. 2) we announced 10 reclassifications of various chondrites and achondrites. Continuing to update our database, here are listed re-classifications of various carbonaceous, enstatite and R chondrites. These are based on either new published information or correction of terminology. Also, R chondrites were rare about a decade ago, and now we have 20 in the US collection making the subtypes more important for distinction. We anticipate more in future newsletters, and we thank Jeff Grossman for his aid in identifying many of these.

Sample	Previous	New	References
ALH 85005	C2	CM2	See notes below
ALH 85007	C2	CM2	"
ALH 85008	C2	CM2	"
ALH 85009	C2	CM2	"
ALH 85010	C2	CM2	"
ALH 85011	C2	CM2	"
ALH 85012	C2	CM2	"
ALH 85013	C2	CM2	"
ALH 85106	C2	CM2	"
ALH 90407	C2	CM2	"
ALHA 81312	C2	CM2	"
EET 83224	C2	CM2	"
EET 83250	C2	CM2	"
EET 83389	C2	CM2	"
EET 90021	C2	CM2	"
EET 90043	C2	CM2	"
EET 92005	C2	CM2	"
EET 92007	C2	CM2	"
EET 92008	C2	CM2	"
EET 92009	C2	CM2	"
EET 92010	C2	CM2	"
EET 96005	C2	CM2	"
EET 96006	C2	CM2	"
EET 96007	C2	CM2	"
EET 96011	C2	CM2	"
EET 96012	C2	CM2	"
EET 96013	C2	CM2	"
EET 96014	C2	CM2	"
EET 96016	C2	CM2	"
EET 96017	C2	CM2	"
EET 96019	C2	CM2	"
EET 96096	C2	CM2	"
EET 96097	C2	CM2	"
EET 96098	C2	CM2	"
EET 96226	C2	CM2	"
GRO 85202	C2	CM2	"
LEW 85306	C2	CM2	"
LEW 85307	C2	CM2	"
LEW 85309	C2	CM2	"
LEW 85311	C2	CM2	"
LEW 85312	C2	CM2	"
LEW 86004	C2	CM2	"
LEW 86005	C2	CM2	"
LEW 86007	C2	CM2	"
LEW 86008	C2	CM2	"
LEW 86009	C2	CM2	"
LEW 87016	C2	CM2	"
LEW 87148	C2	CM2	"

Sample	Previous	New	References
LEW 87271	C2	CM2	“
LEW 88001	C2	CM2	“
LEW 88002	C2	CM2	“
LEW 88003	C2	CM2	“
LEW 90500	C2	CM2	“
MAC 88101	C2	CM2	“
MAC 88176	C2	CM2	“
PCA 91008	C2	CM2	“
QUE 93005	C2	CM2	“
QUE 93018	C2	CM2	“
WIS 91608	C2	CM2	“
EET 90047	C2	CM1/2	1
EET 83334	CM1-2	CM1	1
LAP 031214	CM1-2	CM1/2	It is intermediate between 1 and 2
MAC 02820	CM1-2	CM1/2	It is intermediate between 1 and 2
ALH 83100	CM2	CM1/2	1
GRO 95566	C2	C2-ung	2
QUE 94411	CB	CBb	3
QUE 94627	CB	CBb	3
QUE 99309	CB	CBb	3
PCA 82500	CK4-5	CK4/5	It is intermediate between 4 and 5
EET 87860	CK5-6	CK5/6	It is intermediate between 5 and 6
ALH 82101	CO3	CO3.4	4
ALH 83108	CO3	CO3.5	5
ALH 85003	CO3	CO3.5	4
ALHA 77003	CO3	CO3.6	6,7
ALHA 77029	CO3	CO3.4	6
MET 00694	CO3	CO3.6	AMN 26, no. 1
MET 00737	CO3	CO3.6	AMN 26, no. 1
ALHA 77307	CO3 (?)	CO3.0	8
ALH 82132	E4	EH4	9
QUE 93513	E4	EH4	9
QUE 94368	E5	EL4	10
TIL 91714	E5	EL5	11
LON 94100	E6	EL6	12
QUE 99473	EH	EH-imp melt	AMN 25, no.2
EET 87746	EH3	EH4	13
EET 96135	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96202	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96217	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96223	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96299	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96309	EH4-5	EH4/5	It is intermediate between 4 and 5
EET 96341	EH4-5	EH4/5	It is intermediate between 4 and 5
LEW 88180	EH6	EH5	11
LEW 87119	EL6 (7?)	EL6	7 not verified
QUE 97289	E-ungr	Aubrite-an	Paired with QUE94204
QUE 97348	E-ungr	Aubrite-an	Paired with QUE94204
LAP 03780	Aub (Anom)	Aubrite	AMN 27, no. 3
ALH 85151	R	R3.6	14
PCA 91002	R	R3.8-6	15

Sample	Previous	New	References
PCA 91241	R	R3.8-6	15
PRE 95410	R	R3	AMN 20, no. 2
PRE 95411	R	R3	AMN 20, no. 2
PRE 95412	R	R3	AMN 20, no. 2
LAP 031135	R	R4	AMN 29, no. 1
LAP 031144	R	R4	AMN 29, no. 2
LAP 031156	R	R4	AMN 29, no. 1
LAP 031275	R	R5	AMN 29, no. 2
LAP 031387	R	R4	AMN 29, no. 2
LAP 03639	R	R4	AMN 29, no. 2
LAP 03731	R	R4	AMN 29, no. 2
LAP 03793	R	R4	AMN 29, no. 2
LAP 03902	R	R4	AMN 29, no. 2
LAP 04840	R	R6	AMN 29, no. 1
LAP 04845	R	R4	AMN 29, no. 2
PRE 95404	CV3	R3	16

Notes and references: Many carbonaceous chondrites were initially classified as C2 in early newsletters. These are mostly CM2, based on matrix properties, chondrules abundance and sizes, and therefore all these samples have been reclassified more specifically here as CM2. References for other samples: 1) Zolensky et al., 1997, GCA 61, 5099-5115; 2) Clayton and Mayeda, 1999, GCA 63, 2089-2104; 3) Weisberg et al., 2001, MAPS 36, 401-418; 4) D.W.G.Sears et al., 1991, Proc. NIPR Symp. Ant. Met. 4, 319; 5) R.H.Jones, 1997, Workshop on Modification of Chondritic Materials, LPI Tech. Rpt. 97-02, Part 1, p.30 (abs.); 6) subtype classification, E.R.D.Scott and R.H.Jones, 1990, GCA 54, 2485; 7) TL data, petrologic type 3.4, D.W.G.Sears et al., 1991, Proc. NIPR Symp. Ant. Met. 4, 319; 8) Grossman, J.N. and Brearley, A. (2005) MaPS 40, 87-122; 9) A.E.Rubin and E.R.D.Scott, 1997, GCA 61, 425; 10) A.E.Rubin, 1997, LPSC 28, 1201; 11) A.E.Rubin et al., 1995, LPSC 26, 1197; 12) A.E.Rubin et al., 1997, GCA 61, 849; 13) Y.Zhang et al., 1995, J. Geophys. Res. 100, 9417–9438; 14) A.E.Rubin and G.W.Kallemeyn, 1989, GCA 53, 3035; 15) Rubin, A.E. and Kallemeyn, 1994, Meteoritics 29, 255-264; 16) G.W.Kallemeyn, 1998, MAPS 33, p.A80 (abs.).

Terrestrial age survey of Antarctic meteorites

Kuni Nishiizumi and Kees Welten

We are continuing a terrestrial age survey of Antarctic meteorites, based on the concentration of cosmogenic ^{36}Cl (half-life = 3.01×10^5 yr) in the metal fraction. After separation of clean metal and chemical separation of Cl at the Space Sciences Laboratory, University of California, Berkeley, the ^{36}Cl concentrations were measured by accelerator mass spectrometry (AMS) at PRIME Lab, Purdue University (mcaffee@purdue.edu). Table 1 shows the results of ^{36}Cl concentrations and terrestrial ages in 100 Antarctic meteorites that were measured since our last report in Antarctic Meteorite Newsletter (Volume 29, Number 1, 2006). Since the ^{36}Cl saturation values in the metal phase of small to medium-sized meteorites are in a relatively narrow range of 19-25 dpm/kg (2s), the measured ^{36}Cl concentrations yield a direct measure of the terrestrial age (Nishiizumi et al. 1989). The apparent terrestrial age, T(terr), (in kyr) can be calculated using the following equation:

$$T(terr) = -434 \times \ln(A/A_0)$$

where A is the measured ^{36}Cl concentration and A_0 is the average ^{36}Cl saturation value of 22.1±2.8 dpm/kg (2s) (Nishiizumi 1995). For meteorites with ^{36}Cl concentrations >22.1 dpm/kg we only report an upper limit of the terrestrial age, whereas for meteorites with ^{36}Cl concentrations between 19.3 and 22.1 dpm/kg, we report the possible range of terrestrial ages, with the age and error in Table 1 having the same value, e.g. 37±37 kyr instead of 8±57 kyr for ALHA 79016. For meteorites with ^{36}Cl concentrations <19 dpm/kg there is a small possibility that these low values are due to unusually high shielding conditions or a short exposure age, but this can only be verified by measuring additional cosmogenic nuclides. For more information about the ^{36}Cl results, or the terrestrial ages, please contact Kees Welten (kcwelten@berkeley.edu) or Kuni Nishiizumi (kuni@ssl.berkeley.edu). This work was supported by NASA's Cosmochemistry Program.

References.

Nishiizumi K., Elmore D. and Kubik P. W. (1989) Update on terrestrial ages of Antarctic meteorites *Earth Planet. Sci. Lett*. 93, 299-313.

Nishiizumi K. 1995. Terrestrial ages of meteorites from cold and cold regions. In *Workshop on meteorites from cold and hot deserts*. (eds. L. Schultz, J. O. Annexstad and M. E. Zolensky) pp. 53-55. LPI Technical Report No. 95-02, Lunar and Planetary Institute, Houston, Texas.

Table 1. Measured ^{36}Cl concentrations (in dpm/kg-metal) and ^{36}Cl-derived terrestrial ages (in kyr) of Antarctic meteorites.

Meteorite	Type	^{36}Cl	T(terr)
ALHA 79012	H5	23.1±0.5	<43
ALHA 79016	H6	21.7±0.7	37±37
ALHA 79018	L6	21.1±0.5	42±42
ALH 94001	L4	17.9±0.8	91±58
ALH 97100	L6	13.6±0.5	210±60
ALH 97101	H5	16.5±0.5	125±60
ALH 99506	L5	14.8±0.5	175±60
CMS 04001	L5	22.5±0.5	<53
CMS 04002	LL6	22.4±0.8	<63
CMS 04010	LL5	22.3±0.6	<60
CMS 04019	H6	21.5±0.5	38±38
DOM 03195	LL6	24.0±0.5	<28
DOM 03260	LL5	20.5±0.5	51±51
FIN 01602	H5	24.3±0.5	<26
FIN 01604	H5	25.5±0.5	< 5
GEO 99102	H4	23.3±0.5	<40
GEO 99104	L6	20.3±0.5	53±53
GEO 99109	H4	23.4±0.5	<53
GRA 98013	H4	14.2±0.5	190±60
GRA 98118	L6	22.2±0.5	<64
GRO 95526	L6	18.7±0.8	73±60
GRO 95528	L6	7.4±0.2	470±60
GRO 95529	L5	21.9±0.5	34±34
GRO 95532	H6	18.4±0.7	79±57
GRO 95537	H5	19.9±1.0	59±59
GRO 95538	H5	18.6±0.7	75±57
GRO 95540	L5	14.7±0.6	180±60
GRO 95541	H4	19.6±0.8	60±60
GRO 95547	H6	18.6±0.9	74±59
GRO 95552	LL4	20.5±0.6	49±49
GRO 95553	L6	18.9±0.9	69±59
GRO 95556	LL6	19.7±0.5	56±56
GRO 95557	LL5	16.0±0.4	140±56
GRO 95590	LL4	18.9±0.6	68±57
GRO 95607	L6	20.8±1.0	50±50
GRO 95616	L4	17.6±0.6	99±57
GRO 03017	LL5	13.8±0.5	200±70
GRO 03032	H5	17.6±0.5	98±57
GRO 03051	H5	23.1±0.5	<46
GRO 03063	L4	24.2±0.5	<26
GRO 03104	H5	22.5±0.5	<56
GRO 03105	LL6	22.5±0.5	<57
GRO 03114	H5	20.1±0.5	58±58
GRO 03138	L5	23.1±1.1	<53
LAP 02204	L5	19.4±0.8	63±63
LAP 02218	L4	21.3±0.7	42±42
LAP 02230	LL6	17.6±0.8	100±60
LAP 02231	H5	20.7±0.8	49±49
LAP 02266	LL4	19.8±0.5	55±55
LAP 02353	L6	23.0±1.3	<59
LAR 04328	H5	18.6±0.7	76±57
MAC 87307	H4	17.6±0.3	98±55
MAC 88119	H5	15.5±0.4	150±60
MAC 88175	LL6	13.0±0.5	230±60
MAC 02452	LL5	17.6±0.6	99±57
MAC 02454	L4	24.8±1.6	<31
MAC 02458	LL6	22.6±0.9	<60
MAC 02601	L4	23.9±0.7	<30
MAC 02832	H5	20.2±0.7	53±53
MAC 02918	L4	22.8±0.8	<27
MET 00437	L6	15.2±0.4	160±60
MET 00442	H4	17.4±0.7	100±60
MET 00444	LL6	16.9±0.7	120±60
MET 00445	L5	17.7±0.7	96±58
MET 00447	L5	18.1±0.7	88±57
MET 00449	LL6	21.7±0.6	36±36
MET 00461	L6	20.3±0.7	52±52
MIL 99310	L5	23.6±0.9	<40
MIL 03362	LL5	19.9±0.8	55±55
PCA 02002	L5	19.7±0.7	60±60
PCA 02003	H5	20.4±0.6	50±50
QUE 93019	L6	24.8±0.7	<14
QUE 93046	H5	22.7±0.5	<51
QUE 93182	L5	21.0±0.5	43±43
QUE 93264	L6	20.2±0.5	50±50
QUE 93572	H5	19.7±0.5	57±57
QUE 93711	H5	21.2±0.5	40±40
QUE 93724	L6	15.1±0.3	165±55
QUE 94237	H5	18.1±0.5	86±56
QUE 94243	H6	20.3±0.7	52±52
QUE 94501	H6	19.7±0.3	54±54
QUE 94719	L6	21.8±0.4	32±32
RBT 03531	H5	23.5±0.5	<35
SAN 03453	LL5	11.3±1.4	290±80
SAN 03458	LL6	19.9±0.4	55±55
SAN 03461	L6	20.7±0.6	46±46
SAN 03480	L5	19.5±0.5	59±59
SAN 03487	LL4	15.8±0.6	150±60
SAN 03488	H5	21.1±0.5	41±41
TIL 82400	L5	23.1±0.6	22±22
TIL 82404	L4	17.5±0.3	100±55
TIL 82405	H6	21.7±0.8	38±38
TIL 82409	H5	15.5±0.5	155±60
WIS 90300	L5	15.9±0.3	140±60
WIS 91602	L5	15.5±0.4	155±60
WIS 91603	L4	18.2±0.5	85±56
WIS 91610	H6	23.4±1.1	<47
WIS 91612	L6	21.2±0.5	40±40
WIS 91617	H5	22.5±0.5	<53
WIS 91618	LL4	20.7±0.5	45±45

New Meteorites

2004 and 2006 Collections

Pages 10-26 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 30 (2), Sept.. 2007. 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 initial 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:

Kathleen McBride, Cecilia Satterwhite
Antarctic Meteorite Laboratory
NASA Johnson Space Center
Houston, Texas

Cari Corrigan, Linda Welzenbach and Tim McCoy
Department of Mineral Sciences
U.S. National Museum of Natural History
Smithsonian Institution
Washington, D.C.

Antarctic Meteorite Locations

ALH — Allan Hills
BEC — Beckett Nunatak
BOW — Bowden Neve
BTN — Bates Nunataks
CMS — Cumulus Hills
CRA — Mt.Cranfield Ice Field
CRE — Mt. Crean
DAV — David Glacier
DEW — Mt. DeWitt
DNG — D'Angelo Bluff
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
LAR — Larkman Nunatak
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
PRA — Mt. Pratt
PRE — Mt. Prestrud
QUE — Queen Alexandra Range
RBT — Roberts Massif
RKP — Reckling Peak
SAN — Sandford Cliffs
SCO — Scott Glacier
STE — Stewart Hills
TEN — Tentacle Ridge
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting

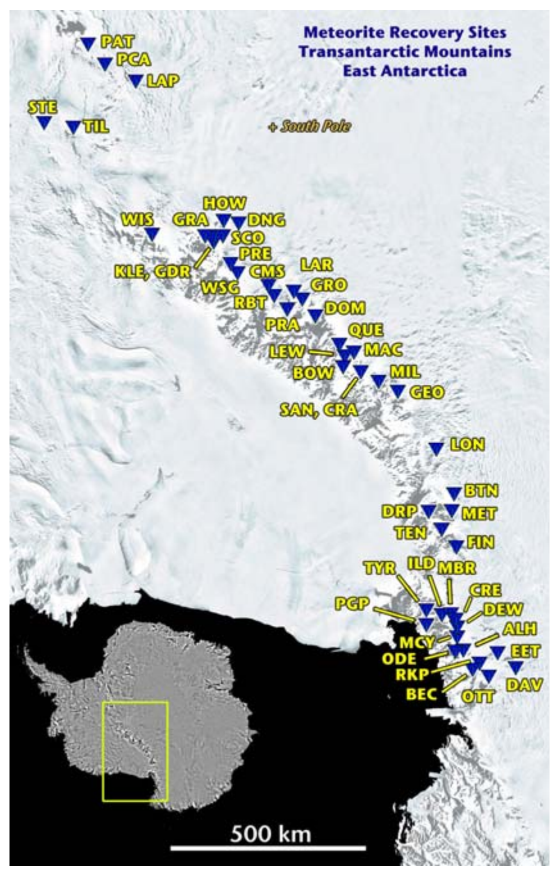


Table 1

List of Newly Classified Antarctic Meteorites **

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
CMS 04004	~	493.1	LL6 CHONDRITE	B/C	B/C		
CMS 04005	~	491.4	H5 CHONDRITE	B/C	A		
CMS 04020	~	97.8	LL6 CHONDRITE	A/BE	A/B		
CMS 04022	~	197.3	L5 CHONDRITE	C	B		
CMS 04023	~	22.7	L5 CHONDRITE	C	A/B		
CMS 04024	~	152.6	LL5 CHONDRITE	AE	A		
CMS 04025	~	12.8	L5 CHONDRITE	B	A/B		
CMS 04026	~	114.0	LL6 CHONDRITE	A/B	A/B		
CMS 04027	~	82.3	LL6 CHONDRITE	B/C	B		
CMS 04028	~	116.6	L5 CHONDRITE	CE	C		
CMS 04029	~	96.0	H6 CHONDRITE	C	A		
CMS 04030	~	117.6	L5 CHONDRITE	B	A/B		
CMS 04031	~	32.4	L5 CHONDRITE	B	A/B		
CMS 04032		84.9	MESOSIDERITE	B/C	BE		30-33
CMS 04033	~	35.1	L5 CHONDRITE	B/C	B		
CMS 04034	~	14.6	L5 CHONDRITE	B	B		
CMS 04035	~	6.7	L5 CHONDRITE	B	A/B		
CMS 04036	~	19.4	L5 CHONDRITE	C	A/B		
CMS 04037	~	56.0	H5 CHONDRITE	C	B		
CMS 04038	~	28.0	H6 CHONDRITE	C	B		
CMS 04039	~	43.2	L5 CHONDRITE	C	B/C		
CMS 04050	~	3908.0	H6 CHONDRITE	CE	B		
CMS 04051	~	1789.9	H5 CHONDRITE	B/C	A/B		
CMS 04052	~	1511.2	LL5 CHONDRITE	BE	A/B		
CMS 04053	~	1310.6	L5 CHONDRITE	B/E	B		
CMS 04054	~	1113.6	LL6 CHONDRITE	A/BE	A/B		
CMS 04055	~	1715.0	LL6 CHONDRITE	A/BE	A/B		
CMS 04056	~	2291.6	L6 CHONDRITE	B/C	B		
CMS 04057	~	2403.2	L6 CHONDRITE	B/CE	B/C		
CMS 04059	~	1858.0	L5 CHONDRITE	B/CE	B		
CMS 04060	~	320.7	LL5 CHONDRITE	A/B	A		
LAP 04430	~	2408.0	L5 CHONDRITE	AB	B		
LAP 04431	~	531.5	L5 CHONDRITE	B/C	B		
LAP 04432	~	162.7	L5 CHONDRITE	A/B	A/B		
LAP 04433	~	226.6	L5 CHONDRITE	B	A/B		
LAP 04434	~	227.2	H6 CHONDRITE	C	C		
LAP 04435	~	148.7	L5 CHONDRITE	B/C	B		
LAP 04436	~	408.9	L5 CHONDRITE	B	A		
LAP 04437	~	190.0	LL5 CHONDRITE	A	B		
LAP 04438	~	166.9	L5 CHONDRITE	B	A/B		
LAP 04439	~	576.5	L5 CHONDRITE	B	B		
LAP 04440	~	3085.9	L5 CHONDRITE	A/B	A		
LAP 04441	~	702.8	L6 CHONDRITE	B	A/B		
LAP 04442	~	291.0	L6 CHONDRITE	B	A/B		
LAP 04443	~	144.7	L5 CHONDRITE	B	A/B		
LAP 04445	~	258.7	L5 CHONDRITE	B	B		
LAP 04447	~	104.5	H6 CHONDRITE	C	C		
LAP 04540	~	180.2	L5 CHONDRITE	A	A/B		
LAP 04541	~	63.0	L5 CHONDRITE	B/C	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAP 04542	~	94.0	L5 CHONDRITE	B/C	B		
LAP 04543	~	35.3	L5 CHONDRITE	B/C	B		
LAP 04544	~	50.5	H5 CHONDRITE	C	B		
LAP 04545	~	71.5	L5 CHONDRITE	A/B	A/B		
LAP 04546	~	48.6	LL6 CHONDRITE	B	B		
LAP 04547	~	93.9	L6 CHONDRITE	C	A/B		
LAP 04548	~	99.5	LL6 CHONDRITE	A	A		
LAP 04549	~	96.9	H5 CHONDRITE	C	A		
LAP 04710	~	154.6	L5 CHONDRITE	A/B	A		
LAP 04711	~	54.4	L5 CHONDRITE	B	A		
LAP 04712	~	128.3	L5 CHONDRITE	B	A		
LAP 04713	~	92.8	L5 CHONDRITE	A/B	A		
LAP 04714	~	61.7	LL6 CHONDRITE	B	A		
LAP 04715	~	93.4	L6 CHONDRITE	A/B	A		
LAP 04716	~	66.6	LL6 CHONDRITE	B/C	A/B		
LAP 04717	~	100.8	L5 CHONDRITE	A/B	A		
LAP 04718	~	50.3	L5 CHONDRITE	B/C	A		
LAP 04719	~	61.9	LL6 CHONDRITE	A/B	A/B		
LAP 04720		58.8	CR2 CHONDRITE	B/C	A/B	1-2	2-3
LAP 04721		35.0	CR2 CHONDRITE	B/C	A/B	1-68	1-2
LAP 04722	~	36.5	L5 CHONDRITE	B/C	A		
LAP 04723	~	36.9	L5 CHONDRITE	B/C	A/B		
LAP 04724	~	33.7	H5 CHONDRITE	B/C	A		
LAP 04725	~	33.0	L5 CHONDRITE	A/B	A		
LAP 04726	~	47.2	L5 CHONDRITE	A/B	A/B		
LAP 04727	~	29.3	L5 CHONDRITE	A/B	A/B		
LAP 04728	~	45.1	L5 CHONDRITE	B/C	A		
LAP 04729	~	43.3	L5 CHONDRITE	A/B	A		
LAP 04754		7.2	CM2 CHONDRITE	C	A	1-5	
LAP 04780	~	74.9	LL6 CHONDRITE	A/B	A/B		
LAP 04781	~	43.2	LL6 CHONDRITE	A	A		
LAP 04782	~	69.2	L5 CHONDRITE	B	A/B		
LAP 04783	~	55.0	LL6 CHONDRITE	A/B	A/B		
LAP 04784	~	56.5	L5 CHONDRITE	B/C	B		
LAP 04785	~	132.5	LL6 CHONDRITE	A/B	A/B		
LAP 04786	~	68.9	LL6 CHONDRITE	A/B	A/B		
LAP 04787	~	69.3	L5 CHONDRITE	A/B	A/B		
LAP 04788	~	119.8	L5 CHONDRITE	A/B	A/B		
LAP 04789	~	83.1	L5 CHONDRITE	B/C	B		
LAR 04320	~	463.0	L6 CHONDRITE	B/C	A/B		
LAR 04321	~	266.0	L6 CHONDRITE	A/B	A/B		
LAR 04322	~	261.2	H6 CHONDRITE	B/C	B/C		
LAR 04323	~	380.4	L6 CHONDRITE	A/B	A/B		
LAR 04324	~	1194.8	LL5 CHONDRITE	A/B	A/B		
LAR 04325		806.5	LL5 CHONDRITE	B	B	28	23
LAR 04326	~	582.9	LL6 CHONDRITE	A/B	B		
LAR 04327	~	719.0	L5 CHONDRITE	B/C	A		
LAR 04329	~	2005.1	LL6 CHONDRITE	A/B	A/B		
LAR 04330	~	2237.2	LL5 CHONDRITE	A/B	A/B		
LAR 04331	~	172.0	L5 CHONDRITE	B	B		
LAR 04332	~	95.0	L5 CHONDRITE	B/C	A		
LAR 04333	~	211.4	L5 CHONDRITE	C	B		
LAR 04334	~	211.9	LL6 CHONDRITE	B	B		
LAR 04335	~	192.0	LL5 CHONDRITE	B	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAR 04336	~	228.2	H5 CHONDRITE	B/C	A		
LAR 04337	~	192.7	L5 CHONDRITE	B/C	B		
LAR 04338	~	199.3	L5 CHONDRITE	B	B		
LAR 04339	~	166.5	L5 CHONDRITE	A/B	B		
LAR 04340	~	322.8	L5 CHONDRITE	A/B	A		
LAR 04341	~	153.9	L5 CHONDRITE	B/C	A		
LAR 04342	~	132.0	H6 CHONDRITE	B/C	A/B		
LAR 04343	~	171.2	LL5 CHONDRITE	A/B	A/B		
LAR 04344	~	121.3	H6 CHONDRITE	B/C	A		
LAR 04345	~	255.2	L6 CHONDRITE	A/B	A/B		
LAR 04346	~	72.3	H5 CHONDRITE	B/C	A		
LAR 04347	~	96.4	L5 CHONDRITE	B/C	A/B		
LAR 04348	~	50.0	L6 CHONDRITE	A/B	A/B		
LAR 04349	~	69.9	L6 CHONDRITE	A/B	A		
LAR 04350	~	31.6	L5 CHONDRITE	B	A/B		
LAR 04351	~	62.9	L5 CHONDRITE	C	A		
LAR 04352	~	31.5	L5 CHONDRITE	B	B		
LAR 04353	~	55.8	L5 CHONDRITE	B/C	A/B		
LAR 04354	~	39.3	H6 CHONDRITE	B	A		
LAR 04355	~	44.0	H6 CHONDRITE	C	A		
LAR 04356	~	31.7	L5 CHONDRITE	B	A/B		
LAR 04357	~	79.5	H5 CHONDRITE	C	B		
LAR 04358	~	46.6	L5 CHONDRITE	B	B		
LAR 04359	~	40.5	L5 CHONDRITE	B	B		
LAR 04362	~	22.1	H5 CHONDRITE	C	B		
LAR 04390	~	15.8	H6 CHONDRITE	C	B		
LAR 04391	~	12.0	H6 CHONDRITE	C	B		
LAR 04392	~	6.2	H6 CHONDRITE	C	B		
LAR 04393	~	19.2	H6 CHONDRITE	C	B		
MAC 04850	~	1999.1	L5 CHONDRITE	B/CE	A/B		
MAC 04851	~	2007.3	H5 CHONDRITE	B/C	A		
MAC 04852	~	906.1	H5 CHONDRITE	B/C	A		
MAC 04853	~	375.8	LL5 CHONDRITE	A/B	A		
MAC 04854	~	373.0	H5 CHONDRITE	B/C	A		
MAC 04855	~	83.7	LL5 CHONDRITE	B	B		
MAC 04856	~	75.5	H5 CHONDRITE	C	B		
MAC 04857	~	88.0	LL6 CHONDRITE	A/B	A/B		
MAC 04858	~	38.2	H5 CHONDRITE	B/C	B		
MAC 04859	~	43.9	H5 CHONDRITE	C	B		
MAC 04873	~	2.3	H5 CHONDRITE	C	A/B		
MAC 04875	~	1.4	H5 CHONDRITE	C	A/B		
MAC 04878	~	0.9	H5 CHONDRITE	C	A/B		
MAC 04879	~	1.4	H5 CHONDRITE	C	A/B		
MAC 04890	~	8.3	H5 CHONDRITE	B/C	A		
MAC 04891	~	6.2	LL6 CHONDRITE	A/B	A/B		
MAC 04892	~	17.5	L5 CHONDRITE	B	A/B		
MAC 04893	~	12.2	L6 CHONDRITE	A/B	A		
MAC 04894	~	57.6	L5 CHONDRITE	B/C	A		
MAC 04895	~	33.7	H5 CHONDRITE	B/C	A		
MAC 04896	~	105.9	LL5 CHONDRITE	A/B	A/B		
MAC 04897	~	17.4	L5 CHONDRITE	B/C	A		
MAC 04898	~	11.6	L5 CHONDRITE	B	A		
MAC 04899	~	26.5	L5 CHONDRITE	B	A/B		
MAC 04901	~	5.1	H6 CHONDRITE	C	C		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MAC 04902 ~	2.9	L5 CHONDRITE	B	B		
MAC 04910 ~	2.5	L5 CHONDRITE	B/C	A/B		
MAC 04913 ~	1.6	H5 CHONDRITE	B/C	A/B		
MAC 04914 ~	2.8	H5 CHONDRITE	C	B		
MAC 04916 ~	4.9	L5 CHONDRITE	B/C	A/B		
MAC 04917 ~	1.1	H5 CHONDRITE	B	A/B		
MAC 04920 ~	1.9	L5 CHONDRITE	B/C	A/B		
MAC 04921 ~	1.9	L5 CHONDRITE	B/C	A/B		
MAC 04922 ~	3.0	L5 CHONDRITE	B	A/B		
MAC 04923 ~	2.1	L5 CHONDRITE	B	A/B		
MAC 04924 ~	1.8	L5 CHONDRITE	B	A/B		
MAC 04925 ~	0.3	H5 CHONDRITE	B	B		
MAC 04926 ~	1.9	H5 CHONDRITE	B	B		
MAC 04927 ~	1.2	L5 CHONDRITE	B	B		
MAC 04928 ~	0.3	L5 CHONDRITE	B	B		
MAC 04929 ~	0.2	H5 CHONDRITE	B	B		
MAC 04942 ~	13.1	L4 CHONDRITE	B/C	A/B		
MAC 04943 ~	1.6	L5 CHONDRITE	B/C	A/B		
MAC 04944 ~	0.9	H5 CHONDRITE	B	B		
MAC 04945 ~	2.0	L5 CHONDRITE	B/C	A/B		
MAC 04949 ~	4.5	LL5 CHONDRITE	B	A/B		
MAC 04950 ~	6.5	L5 CHONDRITE	C	A		
MAC 04951 ~	7.4	L5 CHONDRITE	C	B		
MAC 04952 ~	9.0	L5 CHONDRITE	C	B		
MAC 04953 ~	3.6	L5 CHONDRITE	B/C	A/B		
MAC 04954 ~	11.7	H6 CHONDRITE	C	A/B		
MAC 04967 ~	1.5	L5 CHONDRITE	B/C	A		
MAC 04969 ~	1.1	H5 CHONDRITE	B/C	A		
MAC 04971 ~	2.0	H5 CHONDRITE	B/C	A		
MAC 04975 ~	1.2	H5 CHONDRITE	B/C	A		
MAC 04976 ~	2.9	L5 CHONDRITE	B/C	A		
MAC 041021	2.8	H4 CHONDRITE	C	B	19	14-27
MAC 041025~	3.1	L5 CHONDRITE	B	B		
MAC 041026~	8.5	L5 CHONDRITE	B	B		
MAC 041028~	2.5	L5 CHONDRITE	B/C	B		
MAC 041029~	2.5	L5 CHONDRITE	B/C	B		
MAC 041040~	1.7	H5 CHONDRITE	C	B		
MAC 041041~	1.6	L5 CHONDRITE	C	B		
MAC 041042~	2.8	L5 CHONDRITE	C	B		
MAC 041043~	7.7	L5 CHONDRITE	C	B		
MAC 041044~	16.0	L5 CHONDRITE	C	B		
MAC 041045~	15.5	L5 CHONDRITE	C	B		
MAC 041046~	14.2	H6 CHONDRITE	C	B/C		
MAC 041047~	5.6	H5 CHONDRITE	C	B		
MAC 041048~	8.1	H5 CHONDRITE	C	B		
MAC 041049~	33.4	H5 CHONDRITE	C	B		
MAC 041050~	25.6	H6 CHONDRITE	C	C		
MAC 041051~	40.0	H6 CHONDRITE	C	B		
MAC 041052~	7.3	L5 CHONDRITE	B/C	A/B		
MAC 041053~	4.3	L5 CHONDRITE	B/C	A/B		
MAC 041054~	4.2	L5 CHONDRITE	C	A/B		
MAC 041055~	9.5	L5 CHONDRITE	B	A/B		
MAC 041056~	2.8	H5 CHONDRITE	B/C	A/B		
MAC 041057~	7.8	L5 CHONDRITE	B/C	A/B		
MAC 041058~	5.2	L5 CHONDRITE	B/C	A/B		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MAC 041059~	5.7	L5 CHONDRITE	C	A/B		
MAC 041060~	8.2	L5 CHONDRITE	C	B		
MAC 041061~	2.3	L5 CHONDRITE	B/C	A/B		
MAC 041062~	2.4	L5 CHONDRITE	B	A/B		
MAC 041063~	4.6	L5 CHONDRITE	B/C	A/B		
MAC 041064~	5.0	H5 CHONDRITE	C	B		
MAC 041065~	2.5	H5 CHONDRITE	B/C	A/B		
MAC 041066~	3.0	L5 CHONDRITE	B	A/B		
MAC 041067~	2.7	H5 CHONDRITE	B/C	A/B		
MAC 041068~	1.6	H5 CHONDRITE	B/C	A/B		
MAC 041069~	3.3	L5 CHONDRITE	B/C	A/B		
MAC 041085~	1.6	L5 CHONDRITE	B/C	A/B		
MAC 041086~	1.8	H5 CHONDRITE	C	A/B		
MAC 041087~	1.5	L5 CHONDRITE	B	A/B		
MAC 041088~	2.6	H5 CHONDRITE	B/C	A/B		
MAC 041089~	1.5	H5 CHONDRITE	B/C	A/B		
MAC 041090~	2.9	L5 CHONDRITE	B/C	B		
MAC 041091~	7.7	H5 CHONDRITE	B/C	B		
MAC 041092~	2.1	H5 CHONDRITE	C	B		
MAC 041093~	7.2	L5 CHONDRITE	B/C	B		
MAC 041094~	4.8	L6 CHONDRITE	B/C	B		
MAC 041095~	2.5	L5 CHONDRITE	B/C	B		
MAC 041096~	2.8	L5 CHONDRITE	C	B		
MAC 041098~	2.4	H6 CHONDRITE	C	B		
MAC 041099~	1.7	H5 CHONDRITE	C	B		
MAC 041160~	1.4	H5 CHONDRITE	B/C	A		
MAC 041161~	1.7	H5 CHONDRITE	B/C	A		
MAC 041162~	2.1	H5 CHONDRITE	B/C	A		
MAC 041163~	1.8	L5 CHONDRITE	B/C	A		
MAC 041165~	1.9	L6 CHONDRITE	B/C	A/B		
MAC 041166~	2.4	L5 CHONDRITE	B/C	A		
MAC 041167~	6.2	H5 CHONDRITE	B/C	A/B		
MAC 041168~	2.4	L5 CHONDRITE	B	A		
MAC 041170~	26.4	H5 CHONDRITE	C	B		
MAC 041171~	30.6	H5 CHONDRITE	C	B		
MAC 041172~	32.5	LL5 CHONDRITE	B	A/B		
MAC 041173~	34.0	LL5 CHONDRITE	B	A/B		
MAC 041174~	6.9	L5 CHONDRITE	B/C	A/B		
MAC 041175~	11.4	H5 CHONDRITE	C	B		
MAC 041176~	24.1	H5 CHONDRITE	C	B		
MAC 041177~	52.2	H5 CHONDRITE	C	C		
MAC 041178~	97.8	H5 CHONDRITE	C	B		
MAC 041179~	185.6	H5 CHONDRITE	C	B		
MAC 041260~	2.6	H5 CHONDRITE	B/C	A/B		
MAC 041261~	4.0	H5 CHONDRITE	B/C	A		
MAC 041262~	3.4	H5 CHONDRITE	B/C	A/B		
MAC 041263~	2.6	H5 CHONDRITE	B/C	A/B		
MAC 041264~	1.2	H5 CHONDRITE	B/C	A/B		
MAC 041265~	3.3	H5 CHONDRITE	B/C	A/B		
MAC 041266~	3.9	H5 CHONDRITE	B/C	A/B		
MAC 041267~	2.7	H5 CHONDRITE	B/C	A/B		
MAC 041268~	1.5	H5 CHONDRITE	B/C	A/B		
MAC 041270~	4.6	H5 CHONDRITE	B/C	A		
MAC 041271~	3.3	H5 CHONDRITE	B/C	A		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
RBT 04130	~	897.1	L5 CHONDRITE	B/C	A/B		
RBT 04131	~	392.4	L5 CHONDRITE	B/C	A/B		
RBT 04132	~	950.7	L5 CHONDRITE	B/C	A/B		
RBT 04133		459.4	CR2 CHONDRITE	B/C	A/B	1-12	1-2
RBT 04240	~	58.1	LL5 CHONDRITE	A	A		
RBT 04278	~	271.0	H5 CHONDRITE	C	B/		
GRA 06102	~	12497.5	L5 CHONDRITE	B	C		
GRA 06150	~	179.5	L6 CHONDRITE	B	B		
GRA 06151	~	63.4	L5 CHONDRITE	B	B		
GRA 06152	~	126.4	L5 CHONDRITE	C	A/B		
GRA 06153	~	106.2	L5 CHONDRITE	B/C	B		
GRA 06154	~	38.8	H5 CHONDRITE	C	B		
GRA 06155	~	24.9	H6 CHONDRITE	C	A/B		
GRA 06156	~	7.0	L5 CHONDRITE	B/C	B		
GRA 06158		1.3	CM2 CHONDRITE	B/C	B	1-23	3-4
GRA 06159	~	5.2	L5 CHONDRITE	B/C	B		
GRA 06160	~	1.2	L5 CHONDRITE	B/C	C		
GRA 06161	~	0.5	L5 CHONDRITE	B	B		
GRA 06162	~	42.1	L6 CHONDRITE	B/C	A/B		
GRA 06163	~	20.2	LL5 CHONDRITE	B	A		
GRA 06164	~	11.4	L5 CHONDRITE	C	A/B		
GRA 06165	~	3.0	H5 CHONDRITE	C	A/B		
GRA 06166	~	15.5	L5 CHONDRITE	C	B		
GRA 06167	~	4.9	LL6 CHONDRITE	A/B	B		
GRA 06168	~	1.8	L5 CHONDRITE	B	B		
GRA 06169	~	4.1	L5 CHONDRITE	B	B		
GRA 06180	~	23.7	L5 CHONDRITE	B/C	B		
GRA 06181	~	50.4	LL5 CHONDRITE	B	A/B		
GRA 06182	~	30.7	LL6 CHONDRITE	B	B		
GRA 06183	~	7.1	L5 CHONDRITE	B/C	B		
GRA 06184	~	37.4	L6 CHONDRITE	B/C	B		
GRA 06185	~	54.4	LL6 CHONDRITE	B	B		
GRA 06186	~	9.5	LL6 CHONDRITE	B	B		
GRA 06187	~	2.7	L5 CHONDRITE	C	B		
GRA 06188	~	7.5	L5 CHONDRITE	C	B		
GRA 06190	~	12.7	L6 CHONDRITE	B	B		
GRA 06191	~	10.1	L5 CHONDRITE	A/B	B		
GRA 06192	~	32.4	H6 CHONDRITE	C	B		
GRA 06193	~	4.2	L5 CHONDRITE	C	B		
GRA 06194	~	3.3	L5 CHONDRITE	B	A		
GRA 06195	~	6.2	L5 CHONDRITE	B/C	C		
GRA 06196	~	12.0	L5 CHONDRITE	B/C	B		
GRA 06197	~	11.7	L6 CHONDRITE	B/C	B		
GRA 06198	~	8.4	LL5 CHONDRITE	B	B		
GRA 06199	~	6.0	H6 CHONDRITE	C	A/B		
GRA 06200	~	158.6	L5 CHONDRITE	C	B		
GRA 06201	~	91.6	L5 CHONDRITE	B	B		
GRA 06202	~	65.6	L5 CHONDRITE	B/C	B		
GRA 06203	~	63.6	LL5 CHONDRITE	A	A/B		
GRA 06204	~	84.5	L5 CHONDRITE	C	B		
GRA 06210	~	38.8	H5 CHONDRITE	C	B/C		
GRA 06211	~	22.1	H5 CHONDRITE	C	B/C		
GRA 06212	~	32.1	LL5 CHONDRITE	A	A		
GRA 06213	~	31.3	LL6 CHONDRITE	B	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
GRA 06214	~	21.4	LL6 CHONDRITE	B	B		
GRA 06215	~	8.0	L5 CHONDRITE	B	B		
GRA 06216	~	1.1	L5 CHONDRITE	B	C		
GRA 06217	~	5.3	L5 CHONDRITE	C	C		
GRA 06218	~	1.6	L5 CHONDRITE	C	C		
GRA 06219	~	4.0	L5 CHONDRITE	C	C		
GRA 06220	~	4.5	H5 CHONDRITE	C	B/C		
GRA 06221	~	0.4	L5 CHONDRITE	B	B		
GRA 06222	~	1.1	L5 CHONDRITE	B	B		
GRA 06223	~	9.2	L6 CHONDRITE	B	A/B		
GRA 06224	~	3.8	L5 CHONDRITE	C	B		
GRA 06225	~	1.0	L5 CHONDRITE	B	B		
GRA 06226	~	2.2	L5 CHONDRITE	B	B		
GRA 06227	~	13.8	L5 CHONDRITE	B	B		
GRA 06228	~	10.9	L5 CHONDRITE	B/C	B		
GRA 06229	~	7.2	L5 CHONDRITE	B/C	B		
GRA 06230	~	3.3	LL6 CHONDRITE	B	A		
GRA 06231	~	3.2	L5 CHONDRITE	C	C		
GRA 06232	~	7.5	L6 CHONDRITE	B/C	B		
GRA 06233	~	7.3	LL6 CHONDRITE	A/B	B		
GRA 06234	~	4.1	L5 CHONDRITE	B/C	B		
GRO 06050		9130.0	IRON-IAB	BE	B	2	8
GRO 06051	~	1501.6	L5 CHONDRITE	B/C	A		
GRO 06052	~	907.6	LL6 CHONDRITE	A/B	A/B		
GRO 06053	~	1033.1	L5 CHONDRITE	B	A		
GRO 06054		1319.4	L3 CHONDRITE	A	A	4-28	4-23
GRO 06055	~	917.9	L6 CHONDRITE	B	A/B		
GRO 06056	~	500.6	L5 CHONDRITE	C	C		
GRO 06057	~	730.9	L5 CHONDRITE	B/CE	A		
GRO 06058	~	482.3	LL6 CHONDRITE	B	B		
GRO 06059		433.5	EUCRITE (BRECCIATED)	A	A/B		29-58
GRO 06060	~	325.7	H6 CHONDRITE	C	A/B		
GRO 06061	~	199.3	L5 CHONDRITE	C	C		
GRO 06062	~	243.0	LL5 CHONDRITE	B	B		
GRO 06063	~	218.0	L5 CHONDRITE	C	A		
GRO 06064	~	174.0	L5 CHONDRITE	B/C	A/B		
GRO 06065	~	139.6	H5 CHONDRITE	B/C	B		
GRO 06066	~	292.7	L6 CHONDRITE	B/C	B		
GRO 06067	~	176.0	H5 CHONDRITE	C	C		
GRO 06068		174.3	H3 CHONDRITE	B/C	A/B	9-30	3-23
GRO 06069	~	94.0	H6 CHONDRITE	C	B		
GRO 06070	~	80.8	H5 CHONDRITE	C	A/B		
GRO 06071	~	108.1	L6 CHONDRITE	C	A/B		
GRO 06072	~	83.8	L5 CHONDRITE	C	A/B		
GRO 06073	~	67.6	H5 CHONDRITE	C	A/B		
GRO 06074	~	98.5	H5 CHONDRITE	C	A/B		
GRO 06075	~	41.5	H6 CHONDRITE	C	A/B		
GRO 06076	~	156.7	L6 CHONDRITE	B	A		
GRO 06077	~	138.8	H6 CHONDRITE	C	B		
GRO 06078	~	75.6	L6 CHONDRITE	C	B		
GRO 06079	~	88.7	H6 CHONDRITE	C	B/C		
GRO 06080	~	99.6	L5 CHONDRITE	A/B	A/B		
GRO 06081	~	66.2	L6 CHONDRITE	B/C	B		
GRO 06083	~	42.4	H5 CHONDRITE	C	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
GRO 06084	~	50.7	L6 CHONDRITE	C	B		
GRO 06085	~	49.0	L5 CHONDRITE	C	B		
GRO 06086	~	29.4	LL6 CHONDRITE	A/B	A/B		
GRO 06087	~	33.2	H6 CHONDRITE	C	B/C		
GRO 06088	~	23.5	H5 CHONDRITE	C	B/C		
GRO 06089	~	23.4	H5 CHONDRITE	C	B		
GRO 06090	~	16.3	L6 CHONDRITE	B/C	A/B		
GRO 06091	~	27.7	LL5 CHONDRITE	A	A		
GRO 06092	~	15.0	H6 CHONDRITE	C	B/C		
GRO 06093	~	3.4	LL5 CHONDRITE	A	A		
GRO 06094	~	3.7	L5 CHONDRITE	B	A/B		
GRO 06096	~	10.3	LL5 CHONDRITE	A	A		
GRO 06097	~	2.3	L6 CHONDRITE	B	A/B		
GRO 06098	~	3.3	L5 CHONDRITE	B/C	B		
LAR 06253	~	7595.0	H6 CHONDRITE	B/C	C		
LAR 06317		167.2	CV3 CHONDRITE	B	B	0-34	1-3
LAR 06318		25.0	CM2 CHONDRITE	A/B	A/B	0-54	1-4
LAR 06867		6.5	CV3 CHONDRITE	B	A/B	1-4	1
LAR 06868		15.4	CK5 CHONDRITE	C	B/C	31	26
LAR 06869		18.4	CK6 CHONDRITE	C	B/C	34	
LAR 06871		25.7	CK5 CHONDRITE	B	A/B	29	26
LAR 06872		31.0	CK6 CHONDRITE	C	B	34	
LAR 06873		15.5	CK6 CHONDRITE	C	B/C	34	
LAR 06874		42.2	CK5 CHONDRITE	A/B	A/B	29	25
SCO 06012		14.3	CM2 CHONDRITE	B/C	C	0-39	
SCO 06013		20.7	CM2 CHONDRITE	B/C	C	1-30	
SCO 06014		48.2	CM2 CHONDRITE	B/C	C	1-35	
SCO 06015	~	205.1	L5 CHONDRITE	A	A/B		
SCO 06016	~	204.2	L5 CHONDRITE	A	A/B		
SCO 06017	~	64.1	L5 CHONDRITE	A	A/B		
SCO 06018	~	32.7	L5 CHONDRITE	A	A/B		
SCO 06019	~	65.4	L5 CHONDRITE	A	A/B		
SCO 06020	~	13.4	L5 CHONDRITE	A/B	B		
SCO 06021	~	17.0	L5 CHONDRITE	A/B	B		
SCO 06022	~	3.5	L5 CHONDRITE	A/B	B		
SCO 06023	~	6.1	L5 CHONDRITE	A/B	B		
SCO 06024	~	9.5	H6 CHONDRITE	C	B		
SCO 06025	~	5.7	L5 CHONDRITE	A/B	B		
SCO 06026	~	14.4	L5 CHONDRITE	C	B		
SCO 06027	~	22.4	L5 CHONDRITE	A/B	B		
SCO 06028	~	39.1	L5 CHONDRITE	A/B	B		
SCO 06029	~	16.8	L5 CHONDRITE	A/B	B		
SCO 06042		6.4	CM2 CHONDRITE	C	C	0-36	
SCO 06043		27.6	CM1 CHONDRITE	B/CE	B/C		

Table 2

Newly Classified Specimens Listed By Type

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
GRO 06059	433.5	EUCRITE (BRECCIATED)	A	A/B		29-58
		Carbonaceous Chondrites				
LAR 06868	15.4	CK5 CHONDRITE	C	B/C	31	26
LAR 06871	25.7	CK5 CHONDRITE	B	A/B	29	26
LAR 06874	42.2	CK5 CHONDRITE	A/B	A/B	29	25
LAR 06869	18.4	CK6 CHONDRITE	C	B/C	34	
LAR 06872	31.0	CK6 CHONDRITE	C	B	34	
LAR 06873	15.5	CK6 CHONDRITE	C	B/C	34	
SCO 06043	27.6	CM1 CHONDRITE	B/CE	B/C		
LAP 04754	7.2	CM2 CHONDRITE	C	A	1-5	
GRA 06158	1.3	CM2 CHONDRITE	B/C	B	1-23	3-4
LAR 06318	25.0	CM2 CHONDRITE	A/B	A/B	0-54	1-4
SCO 06012	14.3	CM2 CHONDRITE	B/C	C	0-39	
SCO 06013	20.7	CM2 CHONDRITE	B/C	C	1-30	
SCO 06014	48.2	CM2 CHONDRITE	B/C	C	1-35	
SCO 06042	6.4	CM2 CHONDRITE	C	C	0-36	
LAP 04720	58.8	CR2 CHONDRITE	B/C	A/B	1-2	2-3
LAP 04721	35.0	CR2 CHONDRITE	B/C	A/B	1-68	1-2
RBT 04133	459.4	CR2 CHONDRITE	B/C	A/B	1-12	1-2
LAR 06317	167.2	CV3 CHONDRITE	B	B	0-34	1-3
LAR 06867	6.5	CV3 CHONDRITE	B	A/B	1-4	1
		Chondrites - Type 3				
GRO 06068	174.3	H3 CHONDRITE	B/C	A/B	9-30	3-23
GRO 06054	1319.4	L3 CHONDRITE	A	A	4-28	4-23
		Irons				
GRO 06050	9130.0	IRON-IAB	BE	B	2	8
		Stony Irons				
CMS 04032	84.9	MESOSIDERITE	B/C	BE		30-33

**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.

The ~ indicates classification by optical methods. This can include macroscopic assignment to one of several well-characterized, large pairing groups (e.g., the QUE LL5 chondrites), as well as classification based on oil immersion of several olivine grains to determine the approximate index of refraction for grouping into H, L or LL chondrites. Petrologic types in this method are determined by the distinctiveness of chondrules boundaries on broken surfaces of a 1-3 g chip. While this technique is suitable for general characterization and delineation of equilibrated ordinary chondrites, those undertaking detailed study of any meteorite classified by optical methods alone should use caution. It is recommended that a polished thin section be requested to accompany any chip and appropriate steps for a more detailed characterization should be undertaken by the user. (Tim McCoy, Smithsonian Institution)

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), No. 87 (Meteoritics and Planetary Science 38, A189-A248), No. 88 (Meteoritics and Planetary Science 39, A215-272), No. 89 (Meteoritics and Planetary Science 40, A201-A263), No. 90 (Meteoritics and Planetary Science 41, 1383-1418), No. 91 (Meteoritics and Planetary Science, 42, 413-466), No. 92 (Meteoritics and Planetary Science 42, 1647-1692), and No. 93 (Meteoritics and Planetary Science 43, in preparation).

CK5 CHONDRITE

LAR 06871 and LAR 06874 with LAR 06868

CK6 CHONDRITE

LAR 06872 and LAR 06873 with LAR 06869

CM2 CHONDRITE

SCO 06013, SCO 06014 and SCO 06042 with SCO 06012

CR2 CHONDRITE

LAP 04721 with LAP 04720

Petrographic Descriptions

Sample No.:	CMS 04032
Location:	Cumulus Hills
Field No.:	14646
Dimensions (cm):	4.5 x 3.0 x 2.5
Weight (g):	84.85
Meteorite Type:	Mesosiderite

Macroscopic Description: Kathleen McBride

40% of the exterior surface has brown/black, fractured fusion crust. The interior is an "odd" combination of fine-grained material and a more coarse grained, dark crystalline material, some weathered to a rusty tan color. Some areas are gray with "holes". The meteorite has some metal rich inclusions. It is somewhat friable and has a granular texture.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section shows a groundmass of comminuted pyroxene and plagioclase with abundant metal and sulfide that occur as stringers up to several mm in length and a cm-sized clast containing two pyroxene grains each approaching 5 mm. Orthopyroxene compositions are reasonably homogenous ranging from $Fs_{30-33}Wo_{1-3}$ (Fe/Mn ~30) and plagioclase is $An_{89}Or_{1}$. The meteorite is probably a silicate-rich clast from a mesosiderite. Pairing with CMS 04021 is possible given the very similar mineral compositions, although the latter is poorer in metal and sulfide and perhaps more metamorphosed. These differences may be within the expected variation in a single mesosiderite.

Sample No.:	LAP 04720, LAP 04721
Location:	LaPaz Ice Field
Field No.:	17621, 17613
Dimensions (cm):	5.0 x 2.8 x 2.2; 3.8 x 3.0 x 2.0
Weight (g):	58.847; 34.993
Meteorite Type:	CR2 Chondrite

Macroscopic Description: Cecilia Satterwhite

These carbonaceous chondrites have black, fractured fusion crust with oxidation haloes. The interiors are black with abundant inclusions and chondrules. Some weathering is visible.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The sections exhibit mm-sized, well-defined, metal-rich chondrules and CAI's in a dark matrix of FeO-rich phyllosilicate. Weathering is locally extensive. Silicates are unequilibrated; olivines range from $Fa_{1-68,}$ with most Fa_{0-2}, and pyroxenes from Fs_{1-3}. The meteorites are CR2 chondrites.

Sample No.:	LAP 04754
Location :	LaPaz Ice Field
Field No.:	17602
Dimensions (cm):	2.25 x 1.5 x 2.0
Weight (g):	7.229
Meteorite Type:	CM2 Chondrite

Macroscopic Description: Kathleen McBride

30% of the exterior has shiny purple-black fusion crust with black spots. The interior is a black matrix with tiny white chondrules/inclusions.

Thin Section (,2) Description: Tim McCoy

The section consists of abundant small, light to moderately-altered chondrules (up to 1 mm), chondrule fragments, mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are Fa_{1-5}. The matrix consists dominantly of an Fe-rich serpentine. The meteorite is a CM2 chondrite.

Sample No.: RBT 04133
Location: Roberts Massif
Field No.: 16216
Dimensions (cm): 7.1 x 6.2 x 5.8
Weight (g): 459.4
Meteorite Type: CR2 Chondrite

Macroscopic Description: Cecilia Satterwhite

Black fusion crust covers 40% of the meteorite's exterior surface. Abundant white inclusions (some very large) are visible on the exterior. Other smaller inclusions are gray and some are weathered. Areas without fusion crust are grayish black with brown weathered areas. Fractures penetrate the surface. The interior is a coarse grained matrix, weathered a rusty brown with some gray areas visible. Abundant white, gray and rusty inclusions/chondrules are visible on the interior.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section exhibits large (up to 2 mm), well-defined, chondrules and CAI's in a dark matrix of FeO-rich phyllosilicate. Metal is present in only modest abundances. Weathering is moderate. Silicates are unequilibrated; olivines range from $Fa_{1-12,}$ with many Fa_{0-2}, and pyroxenes from Fs_{1-2}. The meteorite is a CR2 chondrite.

Sample No.: GRA 06158
Location: Graves Nunataks
Field No.: 17726
Dimensions (cm): 1.25 x 1.0 x 0.75
Weight (g): 1.333
Meteorite Type: CM2 Chondrite

Macroscopic Description: Kathleen McBride

75% of the exterior is a rough black fusion crust. The interior is a brown/black matrix with an oxidation rind.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section consists of abundant small chondrules (up to 2 mm), chondrule fragments, mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are Fa_{1-23} and orthopyroxene is Fs_{3-4}. The matrix consists dominantly of an Fe-rich serpentine. The meteorite is a CM2 chondrite.

Sample No. GRO 06050
Location: Grosvenor Mountains
Field No.: 19555
Dimensions (cm): 14.0 x 20.0 x10.0
Weight (g): 9130.0
Meteorite Type: IAB Iron

Macroscopic Description: Tim McCoy and Linda Welzenbach

The meteorite is a rounded, flattened mass, and all surfaces are irregular. One large surface exhibits several cm-sized rounded pits suggestive of regmaglypts, a few linear fractures, <5% of a black coating that may be fusion crust and is dominated by irregular rocky surfaces suggestive of spallation of the original surface. The opposite large surface has a much higher percentage of the black, vesicular material which exhibits flow lines and is almost certainly the original fusion crust. This side exhibits numerous, intersecting linear fractures. Minor evaporites are present, primarily on one end of the meteorite.

Thin section (,2) and thick sections (,4 & ,5) description: Tim McCoy, Linda Welzenbach and Cari Corrigan

A longitudinal slice measuring ~14 x 6 cm was examined prior to thin section preparation. The slice exhibits numerous angular polymineralic silicate clasts which range from a few hundred microns up to 4 cm in maximum dimension. Many of these inclusions have been fragmented with metal injected in fractures of these single inclusions but with offsets small enough that the original pieces can be easily recognized as a single clast. The clasts themselves exhibit disseminated metal and sulfide within them. Silicate-free or –poor regions can reach 1 cm and exhibit a Widmanstatten pattern consistent with a medium octahedrite, with kamacite bandwidths of ~1 mm. Many of the clasts are surrounded by swathing kamacite. Sulfide is relatively rare in hand samples, but can occur in local patches up to a few mm across and is found occasionally as veins within the silicate inclusions. Two polished thick sections and one polished thin section were prepared from the meteorite. In one thick section, fusion crust was observed on one

Sample No.	GRO 06050	edge of the section, confirming that the vesicular, black material on the surface is the original fusion crust. Metal underlying this edge exhibits α_2 structure to a depth of ~1 mm. The metallic host is dominated by kamacite lamellae with widths of 0.8-1 mm and L/W ratios of 2-4. Subgrains are present in most kamacite crystals, with subgrains of a few tens of microns to hundreds of microns and Neumann bands are reasonably common. Taenite ribbons are typically small and highly zoned, although a few larger ones exhibit a plessitic structure. Other phases present include troilite, chromite, daubreelite, schreibersite, graphite (occasionally with cliftonitic forms), and copper. In thin section, the silicate clasts exhibit an equigranular structure of olivine, pyroxene and plagioclase with typical grains sizes of 100-200 μm, although grains up to 0.5 mm are present. Minor staining from terrestrial weathering is present. In hand sample, we observed a single green elongate silicate reaching 4 mm in length which is likely a chromian diopside. Silicates are homogeneous with olivine of Fa_2, orthopyroxene of Fs_8Wo_2, diopside of Fs_4Wo_{46}, and plagioclase of $An_{16}Or_3$. The meteorite is almost certainly a silicate-bearing, low-Ni IAB iron similar in composition to others, e.g., Landes.

Sample No.:	GRO 06054	<u>Macroscopic Description: Kathleen McBride</u>
Location:	Grosvenor Mountains	The exterior has a brown/black fusion crust with polygonal fractures and minor evaporites. The interior is a dark gray to black matrix, loaded with chondrules and inclusions of various colors. The meteorite is moderately hard.
Field No.:	19303	
Dimensions (cm):	12.5 x 8.0 x 5.0	
Weight (g):	1319.4	
Meteorite Type:	L3 Chondrite	<u>Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan</u> The section exhibits numerous closely-packed, well-defined chondrules of a range of sizes (up to 3 mm) in a black matrix of fine-grained silicates, metal and troilite. Modest shock effects and weathering are present. Silicates are unequilibrated; olivines range from Fa_{4-28} and pyroxenes from Fs_{4-23}. The meteorite is an L3 chondrite (estimated subtype 3.6).

Sample No.:	GRO 06059	<u>Macroscopic Description: Kathleen McBride</u>
Location:	Grosvenor Mountains	90% of the exterior has shiny, black fusion crust with thin "ripples". The interior is a light gray matrix with gray, black, and white angular clasts. A few rust halos are visible.
Field No.:	19430	
Dimensions (cm):	7.0 x 6.5 x 5.0	
Weight (g):	433.5	
Meteorite Type:	Eucrite (Brecciated)	<u>Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan</u> This meteorite is dominated by fine-grained basaltic material which occurs as both the host and clasts. Occasional coarser-grained clasts, with grain sizes up to 2 mm, are observed. Pyroxene exhibits a range of compositions from orthopyroxene of $Fs_{58}Wo_3$ to augite of $Fs_{29}Wo_{41}$. Single pyroxene grains often exhibit lamellae of orthopyroxene and augite. Plagioclase is $An_{90}Or_{0.5}$. The Fe/Mn ratio of the pyroxene is ~30. The meteorite is a brecciated eucrite.

Sample No.:	GRO 06068
Location:	Grosvenor Mountains
Field No.:	19047
Dimensions (cm):	5.5 x 5.0 x 3.0
Weight (g):	174.314
Meteorite Type:	H3 Chondrite

Macroscopic Description: Kathleen McBride

Brown/black slightly rough fusion crust covers 90% of this ordinary chondrite's exterior. The interior is a dark gray matrix with rust and high metal content. Some light chondrules are visible.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section exhibits numerous closely-packed, well-defined, small (up to 1 mm) chondrules in a black matrix of fine-grained silicates, metal and troilite. Modest shock effects and weathering are present. Silicates are unequilibrated; olivines range from Fa_{9-30} and pyroxenes from Fs_{3-23}. The meteorite is an H3 chondrite (estimated subtype 3.6).

Sample No.:	LAR 06317
Location:	LarkmanNunatak
Field No.:	19086
Dimensions (cm):	5.5 x 5.5 x 4.0
Weight (g):	167.168
Meteorite Type:	CV3 Chondrite

Macroscopic Description: Kathleen McBride

The exterior of this meteorite has 30% purplish patches of fusion crust with polygonal fractures. The interior is gray to black with light colored inclusions and chondrules.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section exhibits large chondrules (up to 3 mm) and CAIs in a dark matrix. The section includes a multi-mm olivine-rich vesicular chondrule (?) and a cm-long clast. Olivines range from Fa_{0-34}, with most Fa_{1-5}, and pyroxenes from Fs_{1-3}. The meteorite is a brecciated CV3 chondrite.

Sample No.:	LAR 06318
Location:	LarkmanNunatak
Field No.:	19596
Dimensions (cm):	4.0 x 3.0 x 2.0
Weight (g):	25.035
Meteorite Type:	CM2 Chondrite

Macroscopic Description: Kathleen McBride

The exterior of this meteorite has 40% purplish patches of fusion crust with polygonal fractures. The interior is dark gray to black with light colored, gray to tan inclusions and chondrules.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The section consists of abundant small chondrules (up to 1 mm), chondrules fragments, mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are Fa_{0-54} and orthopyroxene is Fs_{1-4}. The matrix consists dominantly of an Fe-rich serpentine. The meteorite is a CM2 chondrite.

Sample No.:	LAR 06867
Location:	Larkman Nunatak
Field No.:	19514
Dimensions (cm):	2.0 x 2.0 x 1.25
Weight (g):	6.545
Meteorite Type:	CV3 Chondrite

Macroscopic Description: Kathleen McBride

30% black thin fusion crust is on the exterior. The interior is rusty brown with metal and light colored inclusions/chondrules.

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

This small section exhibits large chondrules (up to 3 mm) and a few CAIs in a dark matrix. Olivines range from Fa_{1-4} and pyroxene is Fs_1, although few grains were measured. The meteorite is a CV3 chondrite.

Sample No.:	LAR 06868, LAR 06871, LAR 06874	Macroscopic Description: Kathleen McBride The fusion crust on the exteriors of these meteorites is brown/black with polygonal fractures. The interiors are gray to black matrix, fine grained with some evaporites. Inclusions/chondrules are light colored. Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan The sections consist of large (up to 2 mm) chondrules in a matrix of finer-grained silicates, sulfides and magnetite. The meteorites are extensively shock blackened. Silicates are homogeneous. Olivine is Fa_{29-31} and orthopyroxene is Fs_{25-26} across the pairing group. The meteorites are CK5 chondrites
Location:	Larkman Nunatak	
Field No.:	19994, 19255, 19454	
Dimensions (cm):	3.0 x 2.5 x 1.0; 3.5 x 2.5 x 2.25; 3.5 x 2.5 x 2.5	
Weight (g):	15.367; 25.721; 42.215	
Meteorite Type:	CK5 Chondrite	

Sample No.:	LAR 06869, LAR 06872, LAR 06873	Macroscopic Description: Kathleen McBride The exteriors of these meteorites range from rough brown/black fusion crust to smooth black exterior. The interiors have dark gray to black matrix with evaporites, some are rusty and very hard and have small light colored inclusions.
Location:	Larkman Nunatak	
Field No.:	19740, 19419, 19978	
Dimensions (cm):	3.0 x 2.5 x 1.5; 3.0 x 2.5 x 2.5; 3.0 x 2.5 x 1.5	
Weight (g):	18.258; 31.012; 15.492	
Meteorite Type:	CK6 Chondrite	

Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan

The sections exhibit a mixture of fine-grained mixture of olivine, calcic pyroxene and plagioclase with individual grains reaching a few hundred microns, but most grains of apparently finer grain size, perhaps owing to shock. Shock veins cross cut the sections forming a network. Vesicular, melted fusion crust was only present on one of the sections examined. Oxides and sulfide are relatively common to abundant. Olivine is Fa_{34}, pyroxene is an Al-bearing (2-4 wt.% Al_2O_3) augite of $Fs_{12}Wo_{50}$, and a small number of plagioclase analyses suggest considerable heterogeneity $An_{43-88}Or_{0-8}$. Iron oxide is abundant and appears to be magnetite with significant Fe^{3+} present (based on low totals), as well as 5 wt.% Cr_2O_3 and 2 wt.% Al_2O_3. Sulfide is an Fe,Ni sulfide, likely pentlandite. The meteorites are strongly shocked and metamorphosed chondrites, probably CK6.

Analysis by D. Rumble, Geophysical Laboratory, Carnegie Institution of Washington

Magnetic fractions (magnetite) were analyzed (after ultrasonication in dilute HCl), which is important because an analysis of silicates will almost certainly give heavier small delta values.

Oxygen isotopic analyses of two small (2-5 mg) pieces yielded the following results:

$\delta^{17}O = -5.87$, $\delta^{18}O = -2.44$, $\Delta^{17}O = -4.587$
$\delta^{17}O = -5.98$, $\delta^{18}O = -2.46$, $\Delta^{17}O = -4.692$
[where $\Delta^{17}O = \delta^{17}O - 0.526 \times \delta^{18}O$]

Sample No.:	SCO 06012, SCO 06013, SCO 06014, SCO 06042	Macroscopic Description: Kathleen McBride The exteriors are brown/black and have a rough, lumpy texture. The interiors are a fine grained black matrix with oxidation rinds.
Location:	Scott Glacier	Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan
Field No.:	17730, 17717, 17731, 17732	The sections consist of a few small chondrules (up to 0.5 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Extensive pre-terrestrial alteration is present in many of the chondrules, some of which are completely altered. Olivine compositions are Fa_{0-39}. The matrix consists dominantly of an Fe-rich serpentine. The meteorites are CM2 chondrites.
Dimensions (cm):	4.5 x 2.0 x 2.0; 4.0 x 2.5 x 3.0; 5.0 x 4.5 x 3.0; 2.5 x 2.25 x 1.25	
Weight (g):	14.3; 20.678; 48.189; 6.375	
Meteorite Type:	CM2 Chondrite	

Sample No.:	SCO 06043	Macroscopic Description: Kathleen McBride Exterior has 10% purple-black fusion crust with bubbles. The interior is a black matrix with a “shale like” fracture pattern with evaporites and oxidation rind.
Location:	Scott Glacier	
Field No.:	17744	
Dimensions (cm):	5.0 x 2.75 x 1.75	
Weight (g):	27.559	
Meteorite Type:	CM1 Chondrite	Thin Section (,2) Description: Tim McCoy, Linda Welzenbach and Cari Corrigan The section consists of abundant small chondrules (up to 0.5 mm) that have been completely replaced by phyllosilicate set in an Fe-rich serpentine matrix. A marked linear fabric is apparent in the section. No isolated mineral grains or CAIs are apparent; sulfide grains and carbonates are present. Unaltered olivine or pyroxene grains of sufficient size for microprobe analyses were not found. The meteorite is a highly altered CM1 chondrite.

Sample Request Guidelines

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 **February 29, 2008 deadline** will be reviewed at the MWG meeting **March 14-15, 2008 in Houston, Tx**. Requests that are received after the deadline may be delayed for review until MWG meets again in the Fall of 2008. Please submit your requests on time. Questions pertaining to sample requests can be directed to the MWG secretary by e-mail, fax or phone.

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. Sample requests that do not meet the curatorial allocation guidelines will be reviewed by the Meteorite Working Group (MWG). 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 an 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 August 2006 have been published in the Meteoritical Bulletins 76, 79, and 82-90 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, A189-A248; 39, A215-A272; 40, A201-263; 41,1383-1418; 42, 1647-1692; 43, in press. 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://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.satterwhite@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.

Antarctic Meteorite Laboratory Contact Numbers

Kevin Righter
Curator
Mail code KT
NASA Johnson Space Center
Houston, Texas 77058
(281) 483-5125
kevin.righter-1@nasa.gov

Cecilia Satterwhite
Lab Manager/MWG Secretary
Mail code KT
NASA Johnson Space Center
Houston, Texas 77058
(281) 483-6776
cecilia.e.satterwhite@nasa.gov

FAX: 281-483-5347

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/antmet/index.cfm
JSC Curator, Lunar Meteorite Compendium	http://www-curator.jsc.nasa.gov/antmet/lmc/index.cfm
JSC Curator, martian meteorites	http://www-curator.jsc.nasa.gov/antmet/marsmets/index.cfm
JSC Curator, Mars Meteorite Compendium	http://www-curator.jsc.nasa.gov/antmet/mmc/index.cfm
Antarctic collection	http://geology.cwru.edu/~ansmet/
Smithsonian Institution	http://www.minerals.si.edu/
LPI martian meteorites	http://www.lpi.usra.edu
NIPR Antarctic meteorites	http://www.nipr.ac.jp/
Museo Nazionale dell'Antartide	http://www.mna.it/english/Collections/collezioni_set.htm
BMNH general meteorites	http://www.nhm.ac.uk/research-curation/departments/mineralogy/research-groups/meteoritics/index.html
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://meteoritemag.uark.edu
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

Mars Exploration	http://mars.jpl.nasa.gov
Rovers	http://marsrovers.jpl.nasa.gov/home/index.html
Near Earth Asteroid Rendezvous	http://near.jhuapl.edu/
Stardust Mission	http://stardust.jpl.nasa.gov
Genesis Mission	http://genesismission.jpl.nasa.gov
ARES	http://ares.jsc.nasa.gov/