Antarctic Meteorite Newsletter

Volume 33, Number 2 September 2010

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, *NASA-JSC*

New meteorites

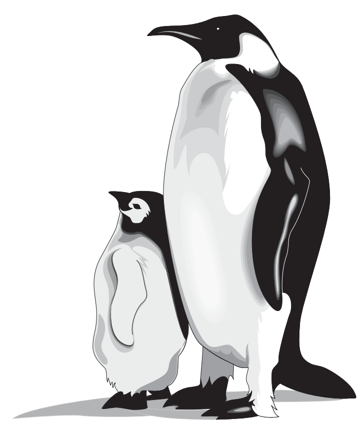
This newsletter reports 255 new meteorites from the 2007, 2008 and 2009 ANSMET seasons from the Miller Range (MIL), Dominion Range (DOM) and the Allan Hills (ALH) regions. The first new samples from the 2009-2010 ANSMET season at the Miller Range are reported here and the region is continuing to yield many interesting and diverse samples. Included are four new lunar meteorites – two of which are paired – and three additional masses paired with the MIL 03346 nakhlite, bringing the combined total of MIL nakhlite material to 1.87 kg. Other achondrites in this newsletter are a howardite, a eucrite, 3 diogenites (2 paired) an acapulcoite/lodranite and a ureilite. There is also a large pairing group of CO3 chondrites from the Miller Range 2007 and 2009 seasons. Other carbonaceous chondrites include a CB chondrite (paired with two other previous MIL CBs), two CK chondrites, a CM chondrite, a CR chondrite, and 5 CV3 chondrites. One of the CV3 chondrites is a 6.29 kg sample bestowed with the number MIL 090001.

A reminder about guidelines for destructive analysis on thin sections

Several recent incidents have compelled us to write a reminder to all PIs who have thin sections on loan from our collection. With the advent of new techniques that utilize thin sections for micro-analytical techniques, we have many more requests for thin and thick sections. On the other hand, some of our samples are small and rare, and protected by the Meteorite Working Group guidelines. One of those guidelines is to reserve only a few sections for destructive analysis so that as much sample as possible is preserved for study and observations. As a result, any destructive analyses that a scientist would like to perform on a thin section must first be approved by the meteorite working group. Destructive analyses include (but are not limited to) laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), focused ion beam extractions (FIB), secondary ion mass spectrometry or ion probe (SIMS), microdrilling or micro-coring, and high sample current techniques used for some imaging such as x-ray mapping with field emission guns (FEG). If you have not been specifically approved to carry out analysis on a thin or thick section with one of these techniques you must first contact the meteorite curation group for permission. Requests are usually handled faster (between meetings) if the section(s) in question is (are) already in the possession of a PI.

continued on p.2

Inside this Issue



Sample Request Deadline
Sept. 17, 2010

MWG Meets
Sept. 30- Oct. 01, 2010

Free publication available at: **http://curator.jsc.nasa.gov/antmet/amn/amn.cfm**

If you have completed your destructive analysis and are ready to return the section to us, please fill out a short form that allows us to understand what techniques were used on the section and what the extent of damage has been:

http://curator.jsc.nasa.gov/antmet/returns.cfm

This form does not need to be filled out if you have undertaken standard SEM or electron microprobe analysis.

We oversee one of the largest research collections in the world, which has grown every year for over thirty years, so we thank you in advance for your cooperation in helping to maintain the integrity of the collection.

Lunar Meteorite Compendium

The Lunar meteorite compendium was initially completed in May 2007 by the Antarctic meteorite group. The number of lunar meteorites was 42 then, and now it has grown to 62. The compendium has now been updated (for a third version) and includes research published up to January 2010. The web pages has also been given a new design and look, thanks to the efforts of Judy Reustle and Nancy Todd:
http://curator.jsc.nasa.gov/antmet/lmc/index.cfm

If you know of research that is not mentioned or covered in the chapters, please let us know:
kevin.righter-1@nasa.gov. Kevin is updating them as frequently as he can.

HED (Howardite-Eucrite-Diogenite) Meteorite Compendium

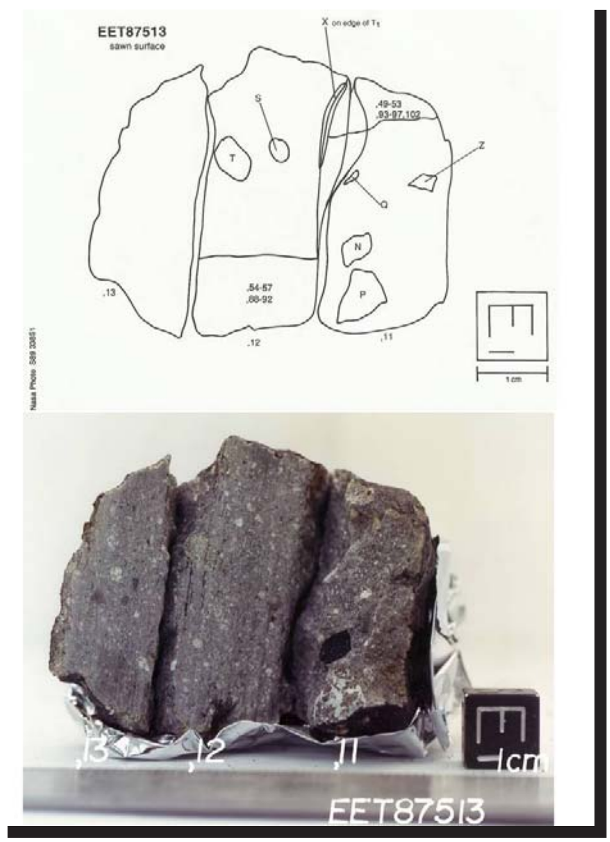
We are working on an HED meteorite compendium given the anticipated interest in the DAWN mission encounter with 4 Vesta in 2011. As part of the compendium we will feature some samples that have been in the collection for some time and analyzed more extensively than others. For example the paired howardites EET 87503 and EET 87513 were slabbed and studied extensively. The photos have not been available online, but we will include as much information as possible.

We would also remind people studying HEDs that we have many howardites and polymict eucrites that are large (> 200 g) and relatively unstudied, especially those recovered since 1991. Please check our database if you are interested in finding out which samples those are.

Report from the Smithsonian

Cari Corrigan, Geologist (Dept. of Mineral Sci.)

This newsletter announces the classification of all but ~150 of the '07 meteorites and continues working through the newly received ALH and MIL '09's. Things continue to look up here in the Division of Meteorites at the Smithsonian. We have a new post doc, Karen Stockstill-Cahill, who began in January, and another, Yulia Goreva, who began in August. Karen comes to us from the University of Hawaii and Yulia from the University of Arizona. Both Karen and Yulia will be assisting in the Antarctic meteorite classification process. Jonathon Cooper survived his first year at the museum, and has picked up the fine art of thin section making very quickly, making well over half of the thin sections we probed for this newsletter, including dozens of carbonaceous chondrites, which are tricky to make. One sad bit of news this past year was the passing of Brian Mason, the first curator of Antarctic Meteorites. Among other significant career achievements, Brian secured the Smithsonian's role in the classification and curation of the Antarctic collection. While we mourn the loss of such an esteemed colleague as Brian, we are extremely pleased to welcome Karen and Yulia, and will continue to make sure the high level of service that you have come to expect from the Smithsonian continues.



2010-2011 ANSMET Field Season Report

Ralph Harvey, Principal Investigator, ANSMET

One of our sayings in the Antarctic Search for Meteorites (ANSMET) program is that a successful ANSMET field team member has five distinct qualities:

1) Incredible stamina
2) A high tolerance for pain
3) A poor memory
4) ....And I forget the other three..........

This comes to mind because as I started writing this piece, I couldn't think of anything new to say - yet in hindsight it's been a very active summer. The ANSMET program remains healthy and active, and we're about one year away from the program's 35th anniversary. Through the last decade we've often had two parties in the field during each austral summer; we took a break from that for a few years recently, but for the the 2010-2011 field season we'll once again have two field teams, courtesy of an infusion of funding from NASA. Our 8-person systematic searching team will travel to the icefields surrounding the Davis Nunataks and Mt. Ward (affectionately known as Davis-Ward), the home of many of the DOM meteorites. One previous season of systematic searching and two shorter reconnaissance visits have recovered more than 600 meteorite specimens from these icefields. A large region of blue ice remains unsearched, and the 10-11 ANSMET field team will attempt to cover as much of this as possible through overlapping systematic transects. A second research objective for this team will be short first ever visits to two icefields in the central Transantarctic Mountains (near Buckley Island and Moody Nunatak) using helicopter support from the CTAM camp located at the old Beardmore South site this season. Attempts to reach these two icefields in past seasons have been unsuccessful using fixed-wing aircraft, so the helicopter-based support available this season is a unique opportunity. The four-person reconnaissance team has an ambitious schedule that includes visits to a number of promising sites in the "Atlantic" parts of the East Antarctic plateau. The expedition will start at some icefields a few km off the eastern extremities of the LaPaz icefields and later visit two or three other sites spread out all the way to the Omega nunataks (so named because it was the last rock seen for 2000 miles by an early traverse of the continent). Many of these distant sites were located by careful perusal of abundantly-available satellite imagery on the internet, but in spite of the digital era we live in, in the end it takes boots on the ground to establish whether or not meteorites are present. As we have done on a number of previous expeditions, we plan to update a weblog on the ANSMET website, so if you're interested, please tune in!

weather conditions experienced at the Davis-Ward icefields
photo courtesy of Joe Boyce

New Meteorites

2007, 2008 and 2009 Collections

Pages 5-20 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 33(1), March 2010. 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, Roger Harrington and Cecilia Satterwhite
Antarctic Meteorite Laboratory
NASA Johnson Space Center
Houston, Texas

Cari Corrigan and Linda Welzenbach
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

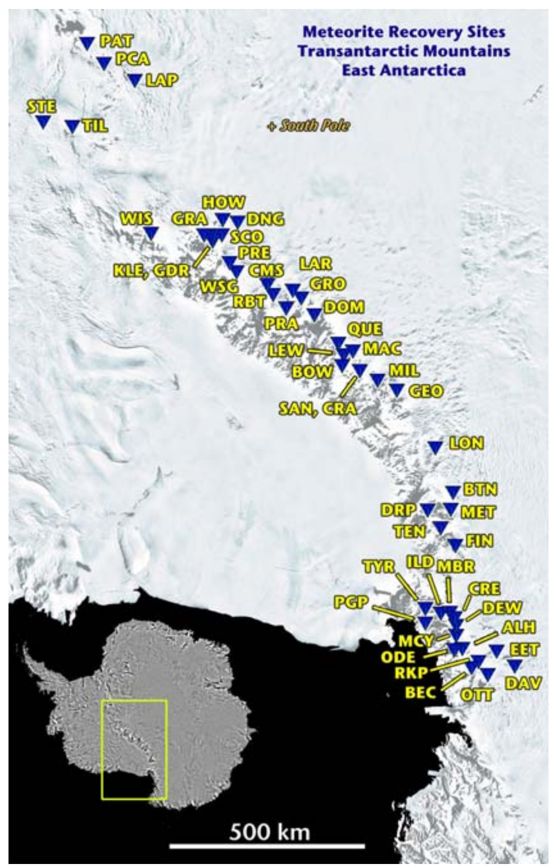


Table 1

List of Newly Classified Antarctic Meteorites **

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 07065	~	1.1	LL6 CHONDRITE	C	C		
MIL 07099		13.1	CO3 CHONDRITE	B	A	32-53	0-27
MIL 07193		67.7	CO3 CHONDRITE	A	B	29-60	1-5
MIL 07200	~	88.6	L6 CHONDRITE	B/C	A		
MIL 07201	~	59.8	L5 CHONDRITE	B	A		
MIL 07202	~	99.1	LL5 CHONDRITE	A/Be	A/B		
MIL 07203	~	100.7	L6 CHONDRITE	B/C	A		
MIL 07204	~	244.9	H5 CHONDRITE	B/C	A		
MIL 07205	~	117.2	LL5 CHONDRITE	A/B	A/B		
MIL 07206	~	119.5	H5 CHONDRITE	B/C	A/B		
MIL 07207	~	84.4	L5 CHONDRITE	B/C	A		
MIL 07208	~	191.9	LL5 CHONDRITE	A/B	A/B		
MIL 07209	~	122.6	LL5 CHONDRITE	A/B	A/B		
MIL 07210	~	32.4	H6 CHONDRITE	B/C	A		
MIL 07211	~	38.2	L6 CHONDRITE	B/C	A/B		
MIL 07212	~	32.2	LL6 CHONDRITE	A/B	A		
MIL 07213	~	11.5	L6 CHONDRITE	B/C	A		
MIL 07214	~	20.3	LL5 CHONDRITE	A/B	A		
MIL 07215	~	9.9	H6 CHONDRITE	B/Ce	A		
MIL 07217	~	8.0	H5 CHONDRITE	B/C	A		
MIL 07219	~	15.4	H6 CHONDRITE	B/C	A/B		
MIL 07230	~	21.0	H6 CHONDRITE	B/C	A		
MIL 07231	~	7.0	LL5 CHONDRITE	A/B	A/B		
MIL 07232	~	27.8	L5 CHONDRITE	A/B	A/B		
MIL 07233	~	33.1	L6 CHONDRITE	A/B	A/B		
MIL 07234	~	29.2	L5 CHONDRITE	B/C	A/B		
MIL 07235	~	62.9	H6 CHONDRITE	B/C	A/B		
MIL 07237	~	9.6	LL6 CHONDRITE	A/B	A		
MIL 07238	~	13.2	H6 CHONDRITE	B/C	A		
MIL 07239	~	11.2	L5 CHONDRITE	B/C	A		
MIL 07280	~	18.4	L5 CHONDRITE	A/B	A/B		
MIL 07281	~	38.9	L5 CHONDRITE	A/B	A/B		
MIL 07282	~	14.2	L6 CHONDRITE	B	A		
MIL 07283	~	14.2	L6 CHONDRITE	B/C	A		
MIL 07284	~	22.1	L6 CHONDRITE	B/C	A/B		
MIL 07285	~	3.0	H5 CHONDRITE	B/C	A		
MIL 07286	~	2.4	L6 CHONDRITE	B/C	A		
MIL 07287	~	18.7	L6 CHONDRITE	A/B	A		
MIL 07288	~	47.9	H6 CHONDRITE	C	A/B		
MIL 07289	~	42.1	L6 CHONDRITE	B/Ce	A/B		
MIL 07290	~	32.7	L6 CHONDRITE	B/C	B/C		
MIL 07291	~	12.3	H6 CHONDRITE	C	C		
MIL 07292		15.3	CO3 CHONDRITE	A/B	B	17-41	0-2

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 07293		16.7	CO3 CHONDRITE	A/B	B	15-28	0-4
MIL 07294	~	28.3	LL6 CHONDRITE	B/C	B		
MIL 07295		15.0	CO3 CHONDRITE	A/B	B	18-80	0-5
MIL 07296	~	28.6	H6 CHONDRITE	B/C	A/B		
MIL 07297	~	28.0	H6 CHONDRITE	B/C	C		
MIL 07298		16	CO3 CHONDRITE	A/B	A	23-55	2
MIL 07299	~	31.5	H6 CHONDRITE	B/C	B		
MIL 07300		7.1	CO3 CHONDRITE	B	A/B	14-36	0-6
MIL 07302		5.2	CO3 CHONDRITE	B	A/B	16-56	0-4
MIL 07303		1.6	CO3 CHONDRITE	B	A/B	13-62	0-3
MIL 07304		10.7	CO3 CHONDRITE	B	A/B	28-57	1-4
MIL 07305		2.5	CK5 CHONDRITE	A/B	A/B	30-31	8-20
MIL 07306		5.8	CO3 CHONDRITE	B	B	29-51	0-13
MIL 07311		0.7	CO3 CHONDRITE	B	B	26-53	0-4
MIL 07313		1.3	CO3 CHONDRITE	B/C	A	30-73	0-34
MIL 07336		3.7	CO3 CHONDRITE	B/Ce	A/B	31-43	1-10
MIL 07338		4.9	CO3 CHONDRITE	B	A/B	19-52	0-3
MIL 07340	~	63.7	LL6 CHONDRITE	B/C	A/B		
MIL 07341		32.0	CO3 CHONDRITE	A	A	23-40	0-2
MIL 07343		25.4	CO3 CHONDRITE	A	A/B	17-46	0-26
MIL 07344	~	13.2	LL6 CHONDRITE	C	B		
MIL 07345	~	28.6	H6 CHONDRITE	C	B/C		
MIL 07346		39.7	CO3 CHONDRITE	A	A	26-46	0-18
MIL 07347	~	37.2	H5 CHONDRITE	C	C		
MIL 07348	~	23.1	H5 CHONDRITE	C	C		
MIL 07349	~	30.1	L5 CHONDRITE	C	A		
MIL 07350		7.4	CO3 CHONDRITE	B	A/B	20-38	0-10
MIL 07351	~	9.5	LL5 CHONDRITE	B/C	A/B		
MIL 07352	~	28.5	LL6 CHONDRITE	A/B	A		
MIL 07353	~	50.1	H6 CHONDRITE	B/C	A		
MIL 07354	~	31.9	H5 CHONDRITE	B/C	A		
MIL 07355	~	9.6	L5 CHONDRITE	B/C	A		
MIL 07356		12.3	CO3 CHONDRITE	B	A	14-24	0-1
MIL 07357		10.5	CO3 CHONDRITE	B	A	26-54	1-43
MIL 07359	~	2.8	H5 CHONDRITE	B/C	A		
MIL 07380	~	22.3	H5 CHONDRITE	B/C	A/B		
MIL 07381	~	21.3	H6 CHONDRITE	B/C	A/B		
MIL 07382	~	15.9	L6 CHONDRITE	B/C	A/B		
MIL 07384		28.6	CO3 CHONDRITE	B	A	30-50	1-13
MIL 07386	~	6.7	H6 CHONDRITE	B/C	A		
MIL 07387	~	15.9	LL6 CHONDRITE	A/B	A/B		
MIL 07388	~	40.7	LL6 CHONDRITE	B/C	A/B		
MIL 07389		14.4	CO3 CHONDRITE	B	A/B	14-43	0-2
MIL 07403		0.5	CV3 CHONDRITE	B	B	1-43	1
MIL 07407		1.3	CO3 CHONDRITE	B	B/C	15-60	1
MIL 07409		2.7	ACAPUL/LODRAN	C	B/C	12-13	4, 11
MIL 07411		14.5	CB CHONDRITE	B/C	B	18	1-4

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 07421		1.1	CO3 CHONDRITE	B/C	A	26-61	0-1
MIL 07422	~	1.3	LL6 CHONDRITE	A/B	A		
MIL 07423	~	1.7	H6 CHONDRITE	B/C	A		
MIL 07426	~	7.1	H6 CHONDRITE	B/C	A/B		
MIL 07427	~	6.1	LL6 CHONDRITE	B/C	A/B		
MIL 07428	~	0.4	H6 CHONDRITE	B/C	A/B		
MIL 07429	~	1.4	LL6 CHONDRITE	A/B	A		
MIL 07430	~	0.8	LL5 CHONDRITE	B	A		
MIL 07431	~	9.5	L6 CHONDRITE	B/C	A/B		
MIL 07432	~	0.6	L6 CHONDRITE	B	A		
MIL 07434	~	1.1	L6 CHONDRITE	B/C	A		
MIL 07435	~	9.0	LL5 CHONDRITE	B/C	A		
MIL 07436	~	9.3	LL5 CHONDRITE	B	A		
MIL 07437	~	9.7	LL5 CHONDRITE	B	A		
MIL 07438	~	2.5	L5 CHONDRITE	B/C	A		
MIL 07441	~	36.3	L6 CHONDRITE	B/C	A		
MIL 07442	~	31.1	L5 CHONDRITE	B/C	A/B		
MIL 07443	~	27.7	LL5 CHONDRITE	B/C	A		
MIL 07446	~	17.8	L5 CHONDRITE	B/C	A/B		
MIL 07449	~	32.0	LL6 CHONDRITE	B	A		
MIL 07450	~	16.4	L5 CHONDRITE	B/C	B/C		
MIL 07452	~	21.9	L6 CHONDRITE	C	A		
MIL 07453	~	11.8	H6 CHONDRITE	B	A		
MIL 07454	~	16.0	LL6 CHONDRITE	C	B/C		
MIL 07455	~	16.2	LL6 CHONDRITE	C	C		
MIL 07457	~	28.5	LL6 CHONDRITE	B/C	B/C		
MIL 07458	~	12.2	H6 CHONDRITE	C	B/C		
MIL 07461	~	12.6	L6 CHONDRITE	B/C	A/B		
MIL 07462	~	36.9	L5 CHONDRITE	B/C	A/B		
MIL 07463	~	54.6	L6 CHONDRITE	B/C	B		
MIL 07464	~	9.6	H5 CHONDRITE	C	A/B		
MIL 07465	~	17.8	H5 CHONDRITE	C	B		
MIL 07466	~	11.6	H6 CHONDRITE	C	B		
MIL 07467	~	10.9	LL6 CHONDRITE	B/C	B		
MIL 07468	~	14.4	H5 CHONDRITE	C	B		
MIL 07469	~	11.1	H6 CHONDRITE	C	B		
MIL 07470	~	12.4	LL5 CHONDRITE	A/B	A/B		
MIL 07471	~	28.5	L5 CHONDRITE	B/C	A		
MIL 07472	~	16.1	L6 CHONDRITE	A/B	A/B		
MIL 07474	~	23.0	H5 CHONDRITE	B/C	A/B		
MIL 07475	~	14.8	LL5 CHONDRITE	A/B	A		
MIL 07476	~	7.1	H5 CHONDRITE	B/C	A		
MIL 07477	~	2.3	LL6 CHONDRITE	A/B	A		
MIL 07478	~	21.5	L5 CHONDRITE	B/C	A		
MIL 07479	~	23.0	LL6 CHONDRITE	A/B	A/B		
MIL 07480	~	1.6	H6 CHONDRITE	C	A		
MIL 07481	~	17.3	H5 CHONDRITE	C	B		

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 07482	~	9.3	L5 CHONDRITE	B/C	B		
MIL 07483	~	2.8	L6 CHONDRITE	B/C	B		
MIL 07484	~	1.4	L6 CHONDRITE	C	A/B		
MIL 07491	~	0.4	L6 CHONDRITE	B	B		
MIL 07493	~	1.4	LL5 CHONDRITE	B	A/B		
MIL 07494	~	8.9	L5 CHONDRITE	B/C	B		
MIL 07495	~	2.9	H5 CHONDRITE	C	A/B		
MIL 07496	~	8.5	H6 CHONDRITE	Ce	B		
MIL 07498	~	18.8	L5 CHONDRITE	B/C	B		
MIL 07499	~	6.6	H6 CHONDRITE	C	A/B		
MIL 07505		1.8	CO3 CHONDRITE	B/C	A	0-54	
MIL 07506		5.2	CO3 CHONDRITE	B/C	A	22-60	0-39
MIL 07513		10.5	CR2 CHONDRITE	B	A	1	0-1
MIL 07530	~	2.5	H5 CHONDRITE	C	B/C		
MIL 07533	~	2.4	L6 CHONDRITE	C	B		
MIL 07534	~	2.7	L5 CHONDRITE	C	B/C		
MIL 07535	~	4.8	H6 CHONDRITE	C	B/C		
MIL 07536	~	16.2	H6 CHONDRITE	C	B		
MIL 07537	~	20.8	H6 CHONDRITE	C	B		
MIL 07538	~	6.1	LL5 CHONDRITE	B	A/B		
MIL 07539	~	8.0	H6 CHONDRITE	C	B		
MIL 07540	~	5.0	L6 CHONDRITE	C	B		
MIL 07541	~	17.0	L5 CHONDRITE	C	B		
MIL 07542	~	3.0	H6 CHONDRITE	C	B		
MIL 07543	~	8.4	LL6 CHONDRITE	B	B		
MIL 07545	~	7.4	L6 CHONDRITE	C	B		
MIL 07547	~	18.8	L6 CHONDRITE	B/C	B		
MIL 07548	~	4.2	LL6 CHONDRITE	B/C	B		
MIL 07549	~	5.1	L6 CHONDRITE	C	B		
MIL 07550	~	0.3	L5 CHONDRITE	B	B		
MIL 07551	~	1.3	L6 CHONDRITE	C	B		
MIL 07553	~	0.6	L5 CHONDRITE	C	B		
MIL 07554	~	0.9	H5 CHONDRITE	B	B		
MIL 07556	~	5.6	L6 CHONDRITE	B/C	A/B		
MIL 07557	~	0.2	H6 CHONDRITE	C	B		
MIL 07559	~	3.1	H5 CHONDRITE	C	B		
MIL 07610	~	7.1	LL6 CHONDRITE	C	B/C		
MIL 07611	~	9.8	L6 CHONDRITE	B	B/C		
MIL 07612	~	6.1	H6 CHONDRITE	B	B/C		
MIL 07614	~	1.3	H5 CHONDRITE	B	B/C		
MIL 07615	~	2.9	L6 CHONDRITE	B	B/C		
MIL 07617	~	4.3	H5 CHONDRITE	C	B/C		
MIL 07618	~	11.4	L5 CHONDRITE	C	B/C		
MIL 07619	~	8.8	L6 CHONDRITE	C	C		
MIL 07694		12.7	CV3 CHONDRITE	Be	B	0-30	
MIL 07710		147.1	L4 CHONDRITE	B/C	A/B	23	17-19

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DOM 08330 ~	18.0	L6 CHONDRITE	B/C	A/B		
DOM 08331 ~	21.0	H6 CHONDRITE	C	B		
DOM 08332 ~	24.0	L6 CHONDRITE	B/C	A/B		
DOM 08333 ~	35.6	LL6 CHONDRITE	B	B		
DOM 08336 ~	26.1	LL6 CHONDRITE	A/B	A/B		
DOM 08338 ~	19.0	L6 CHONDRITE	C	B		
DOM 08339 ~	34.8	LL6 CHONDRITE	B	B		
DOM 08350 ~	7.2	H6 CHONDRITE	C	B		
DOM 08352 ~	14.6	H6 CHONDRITE	C	B		
DOM 08354 ~	6.8	L6 CHONDRITE	C	B		
DOM 08355 ~	8.0	L6 CHONDRITE	B/C	B		
DOM 08356 ~	11.0	LL6 CHONDRITE	A/B	A		
DOM 08357 ~	8.9	L6 CHONDRITE	C	B		
DOM 08358 ~	9.5	L6 CHONDRITE	C	B		
DOM 08359 ~	21.4	LL6 CHONDRITE	B/C	B		
DOM 08370 ~	4.4	L6 CHONDRITE	C	A/B		
DOM 08371 ~	5.2	H6 CHONDRITE	C	A		
DOM 08373 ~	4.1	H6 CHONDRITE	C	B		
DOM 08374 ~	4.3	H6 CHONDRITE	C	B		
DOM 08375 ~	1.9	LL6 CHONDRITE	B	A/B		
DOM 08376 ~	9.1	L6 CHONDRITE	B	A/B		
DOM 08379 ~	1.2	L6 CHONDRITE	C	A/B		
DOM 08391 ~	80.6	H6 CHONDRITE	C	A/B		
DOM 08393 ~	34.2	LL6 CHONDRITE	B	A/B		
DOM 08394 ~	42.4	LL6 CHONDRITE	B	A/B		
DOM 08395 ~	53.2	LL6 CHONDRITE	B	A/B		
DOM 08396 ~	44.8	LL5 CHONDRITE	B	A		
DOM 08398 ~	59.7	LL5 CHONDRITE	B	A/B		
DOM 08399 ~	85.5	L6 CHONDRITE	C	A/B		
DOM 08411 ~	47.4	LL5 CHONDRITE	B	A/B		
DOM 08412 ~	37.7	LL5 CHONDRITE	B	A/B		
DOM 08413 ~	32.5	LL5 CHONDRITE	B	A/B		
DOM 08414 ~	42.0	H6 CHONDRITE	C	A/B		
DOM 08415 ~	42.0	L6 CHONDRITE	B/C	B		
DOM 08416 ~	82.0	LL5 CHONDRITE	A/B	A/B		
DOM 08417 ~	31.5	L6 CHONDRITE	C	B		
DOM 08418 ~	29.6	L6 CHONDRITE	C	B		
DOM 08419 ~	93.0	L5 CHONDRITE	B/C	B		
DOM 08430 ~	108.7	LL5 CHONDRITE	B/C	A		
DOM 08431 ~	128.9	LL6 CHONDRITE	B/C	A		
DOM 08432 ~	59.8	LL5 CHONDRITE	B/C	A/B		
DOM 08433 ~	65.9	LL5 CHONDRITE	B/C	A/B		
DOM 08434 ~	85.6	LL6 CHONDRITE	B	A/B		
DOM 08435 ~	60.5	H6 CHONDRITE	C	B/C		
DOM 08436 ~	147.3	LL5 CHONDRITE	B	C		
DOM 08437 ~	45.5	LL6 CHONDRITE	C	B		
DOM 08438 ~	113.1	LL6 CHONDRITE	C	C		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DOM 08439 ~	106.2	LL6 CHONDRITE	B/C	B/C		
DOM 08510 ~	166.5	LL6 CHONDRITE	B/C	B		
DOM 08511 ~	124.9	LL6 CHONDRITE	C	B/C		
DOM 08512 ~	208.3	LL5 CHONDRITE	B/C	A/B		
DOM 08513 ~	102.2	LL5 CHONDRITE	B/C	B		
DOM 08514 ~	67.1	LL6 CHONDRITE	C	B		
ALH 090004	221.7	HOWARDITE	B/C	A/B		30-64
MIL 090001	6290.0	CV3 CHONDRITE	B	B/C	2-24	1-12
MIL 090030	452.6	NAKHLITE	B	A/B	57-89	22-47
MIL 090032	532.2	NAKHLITE	B	A/B	58-78	22-50
MIL 090034	195.6	LUNAR-ANORTH. BRECCIA	A	B	36-41	22-52
MIL 090036	244.8	LUNAR-ANORTH. BRECCIA	B	B	16-47	22-52
MIL 090070	137.5	LUNAR-ANORTH. BRECCIA	A	B	37-42	20-38
MIL 090072	281.5	CV3 CHONDRITE	B/C	B/C	4-23	1
MIL 090073	255.5	CO3 CHONDRITE	B/C	C	26-44	0-10
MIL 090074	136.7	LL6 CHONDRITE	A/B	A/B	31	10-15
MIL 090075	143.5	LUNAR-ANORTH. BRECCIA	Ae	B	39	9-43
MIL 090076	377.7	UREILITE	B/C	A/B	22	11-18
MIL 090103	52.6	CK5-6 CHONDRITE	B	B	32	8-10
MIL 090105	119.4	DIOGENITE	A/B	A	39-34	14
MIL 090106	115.5	DIOGENITE	A/B	A		29-51
MIL 090107	405.2	DIOGENITE	A/B	A/B		29-53
MIL 090136	171.0	NAKHLITE	B	A/B	58-84	22-56
MIL 090995	9.8	DIOGENITE	A/B	A		23
MIL 091010	51.7	CV3 CHONDRITE	B	B	0-41	1

Table 2

Newly Classified Specimens Listed By Type

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
MIL 07409	2.7	ACAPUL/LODRAN	C	B/C	12-13	4, 11
MIL 090105	119.4	DIOGENITE	A/B	A	39-34	14
MIL 090106	115.5	DIOGENITE	A/B	A		29-51
MIL 090107	405.2	DIOGENITE	A/B	A/B		29-53
MIL 090995	9.8	DIOGENITE	A/B	A		23
ALH 090004	221.7	HOWARDITE	B/C	A/B		30-64
MIL 090034	195.6	LUNAR-ANORTH. BRECCIA	A	B	36-41	22-52
MIL 090036	244.8	LUNAR-ANORTH. BRECCIA	B	B	16-47	22-52
MIL 090070	137.5	LUNAR-ANORTH. BRECCIA	A	B	37-42	20-38
MIL 090075	143.5	LUNAR-ANORTH. BRECCIA	Ae	B	39	9-43
MIL 090030	452.6	NAKHLITE	B	A/B	57-89	22-47
MIL 090032	532.2	NAKHLITE	B	A/B	58-78	22-50
MIL 090136	171.0	NAKHLITE	B	A/B	58-84	22-56
MIL 090076	377.7	UREILITE	B/C	A/B	22	11-18
		Carbonaceous Chondrites				
MIL 07411	14.5	CB CHONDRITE	B/C	B	18	1-4
MIL 07305	2.5	CK5 CHONDRITE	A/B	A/B	30-31	8-20
MIL 090103	52.6	CK5-6 CHONDRITE	B	B	32	8-10
MIL 07099	13.1	CO3 CHONDRITE	B	A	32-53	0-27
MIL 07193	67.7	CO3 CHONDRITE	A	B	29-60	1-5
MIL 07292	15.3	CO3 CHONDRITE	A/B	B	17-41	0-2
MIL 07293	16.7	CO3 CHONDRITE	A/B	B	15-28	0-4
MIL 07295	15.0	CO3 CHONDRITE	A/B	B	18-80	0-5
MIL 07298	16.0	CO3 CHONDRITE	A/B	A	23-55	2
MIL 07300	7.1	CO3 CHONDRITE	B	A/B	14-36	0-6
MIL 07302	5.2	CO3 CHONDRITE	B	A/B	16-56	0-4
MIL 07303	1.6	CO3 CHONDRITE	B	A/B	13-62	0-3
MIL 07304	10.7	CO3 CHONDRITE	B	A/B	28-57	1-4
MIL 07306	5.8	CO3 CHONDRITE	B	B	29-51	0-13
MIL 07311	0.7	CO3 CHONDRITE	B	B	26-53	0-4
MIL 07313	1.3	CO3 CHONDRITE	B/C	A	30-73	0-34
MIL 07336	3.7	CO3 CHONDRITE	B/Ce	A/B	31-43	1-10

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 07338	4.9	CO3 CHONDRITE	B	A/B	19-52	0-3
MIL 07341	32.0	CO3 CHONDRITE	A	A	23-40	0-2
MIL 07343	25.4	CO3 CHONDRITE	A	A/B	17-46	0-26
MIL 07346	39.7	CO3 CHONDRITE	A	A	26-46	0-18
MIL 07350	7.4	CO3 CHONDRITE	B	A/B	20-38	0-10
MIL 07356	12.3	CO3 CHONDRITE	B	A	14-24	0-1
MIL 07357	10.5	CO3 CHONDRITE	B	A	26-54	1-43
MIL 07384	28.6	CO3 CHONDRITE	B	A	30-50	1-13
MIL 07389	14.4	CO3 CHONDRITE	B	A/B	14-43	0-2
MIL 07407	1.3	CO3 CHONDRITE	B	B/C	15-60	1
MIL 07421	1.1	CO3 CHONDRITE	B/C	A	26-61	0-1
MIL 07505	1.8	CO3 CHONDRITE	B/C	A	0-80	0-44
MIL 07506	5.2	CO3 CHONDRITE	B/C	A	22-60	0-39
MIL 090073	255.5	CO3 CHONDRITE	B/C	C	26-44	0-10
MIL 07513	10.5	CR2 CHONDRITE	B	A	1	0-1
MIL 07403	0.5	CV3 CHONDRITE	B	B	1-43	1
MIL 07694	12.7	CV3 CHONDRITE	Be	B	0-30	
MIL 090001	6290.0	CV3 CHONDRITE	B	B/C	2-24	1-12
MIL 090072	281.5	CV3 CHONDRITE	B/C	B/C	4-23	1
MIL 091010	51.7	CV3 CHONDRITE	B	B	0-41	1

**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), No. 93 (Meteoritics and Planetary Science 43, 571-632), No. 94 (Meteoritics and Planetary Science 43, 1551–1588), No. 95 (Meteoritics and Planetary Science 44, 429–462), No. 96 (Meteoritics and Planetary Science 44, 1355-1397), and No. 97 (Meteoritics and Planetary Science 45, 449-493.

CB CHONDRITE

MIL 07411 with MIL 05082

CO3 CHONDRITE

MIL 07099, MIL 07193, MIL 07292, MIL 07293, MIL 07295, MIL 07298, MIL 07300, ML 07302, MIL 07303, MIL 07304, MIL 07306, MIL 07311, MIL 07313, MIL 07336, MIL 07338, MIL 07341, MIL 07343, MIL 07346, MIL 07350, MIL 07356, MIL 07357, MIL 07384, MIL 07389, MIL 07407, MIL 07421, MIL 07505, MIL 07506 and MIL 090073 with MIL 07182

CV3 CHONDRITE

MIL 07403, MIL 07694, MIL 090072 and MIL 091010 with MIL 07590

DIOGENITE

MIL 090105, MIL 090106 and MIL 090107 with MIL 07613

LUNAR-ANORTH. BRECCIA

MIL 090075 with MIL 090070

NAKHLITE

MIL 090030, MIL 090032, and MIL 090136 with MIL 03346

Petrographic Descriptions

Sample No.: MIL 07065
Location: Miller Range
Field No.: 14762
Dimensions (cm): 1.25 x 0.75 x 0.5
Weight (g): 1.080
Classification: LL6 Chondrite

Macroscopic Description: Kathleen McBride
This meteorite has a rusty brown exterior with no visible fusion crust on the surface. It is extremely fractured.

Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach
This meteorite is an LL6 chondrite. Olivine values are Fa_{30-31}. Pyroxene values are $Fs_{25}Wo_{2}$. Feldspar values are $An_{10}Or_{4-6}$. It exhibits numerous linear fractures, perhaps indicative of shock. This section contains a semi-circular, 1 mm diameter isotropic grain with a skeletal internal morphology. Incomplete analyses suggest it may be a spinel.

Sample No.: MIL 07099; 07193; 07292; 097293; 07295; 07298; 07300; 07302; 07303; 07304; 07306; 07311; 07313; 07336; 07338; 07341; 07343; 07346; 07350; 07356; 07357; 07384; 07389; 07407; 07421; 07505; 07506; MIL 090073
Location: Miller Range
Field No.: 19311; 17874; 19533; 19007; 19522; 19412; 19521; 19053; 19806; 19460; 19508; 19462; 19083; 17850; 17863; 17852; 17870; 17890; 17871; 17873; 17878; 18607; 18614; 18642; 18685;18616; 18620; 20877
Dimensions (cm): 2.0 x 2.0 x 1.25; 5.5 x 3.5 x 2.5; 2.5 x 3.0 x 2.0; 2.0 x 2.0 x 2.0; 2.5 x 1.5 x 2.5; 3.0 x 2.0 x 1.5; 2.5 x 1.5 x 1.5; 1.75 x 1.75 x 1.25; 1.5 x 0.75 x 0.75; 2.0 x 2.0 x 1.25; 2.5 x 1.5 x 1.0; 1.0 x 0.75 x 0.5; 1.25 x 0.75 x 0.75; 1.75 x 1.0 x 1.0; 2.0 x 1.0 x 1.0; 3.0 x 3.5 x 2.5; 3.0 x 2.5 x 2.0; 2.5 x 2.5 x 3.0; 1.7 x 1.8 x 1.2; 2.5 x 1.8 x 1.2; 2.0 x 1.8 x 1.2; 2.8 x 2.5 x 2.0; 2.7 x 2.2 x 1.5; 1.5 x 1.25 x 0.5; 1.2 x 0.8 x 0.7; 2.0 x 1.5 x 0.5; 1.7 x 1.5 x 1.0; 9.0 x 4.5 x 6.0
Weight (g): 13.080; 67.655; 15.327; 16.672; 14.965; 16.039; 7.110; 5.200; 1.610;10.650; 5.750; 0.720; 1.320; 3.680; 4.880; 32.021; 25.408; 39.671; 7.396; 12.310; 10.52; 28.602; 14.439; 1.250; 1.118; 1.786; 5.171; 255.5
Classification: CO3 Chondrite

Macroscopic Description: Roger Harrington, Kathleen McBride, and Cecilia Satterwhite
All of these carbonaceous chondrites possess dull, black fusion crust with surface areas ranging from 10 to 100%. The matrices of these meteorites are fine grained and range in color from dark gray to brown to black. Inclusions are visible in most of them and vary in color from white to gray.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
These meteorites are so similar that a single description suffices. The sections consist 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. Glass within chondrules appears to be very clear/fresh. CAIs are abundant in many sections (mostly Type A), and range in size up to 1 mm, many containing blue hibonite grains. At least one compound CAI was found. AOAs up to 1 mm exist, as well. Olivine ranges in composition from Fa_{0-80}. Pyroxene analyses range from Fs_{0-44} (most from Fs_{0-13}). These meteorites are somewhat terrestrially altered CO3 chondrites (likely type 3.0-3.2) and are probably members of the MIL 07182 pairing group.

Sample No.:	MIL 07305
Location:	Miller Range
Field No.:	19892
Dimensions (cm):	1.5 x 1.25 x 0.5
Weight (g):	2.450
Classification:	CK5 Chondrite

Macroscopic Description: Kathleen McBride
90% of the exterior has rough brown/black fusion crust. The interior matrix is medium gray in color with <mm size light colored chondrules.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section consists of chondrules (up to 2 mm) in a matrix of finer-grained silicates, sulfides and abundant magnetite. The meteorite is shock-blackened. Olivine is Fa_{30-31} and orthopyroxene is Fs_{8-20}. The meteorite is a CK5 chondrite.

Sample No.:	MIL 07403; 07694; 090072; 091010
Location:	Miller Range
Field No.:	18627; 18399; 20145; 20249
Dimensions (cm):	1.0 x 0.5 x 0.75; 3.5 x 2.5 x 1.0; 8.0 x 7.0 x 4.5; 3.0 x 2.0 x 5.75
Weight (g):	0.530; 12.738; 281.5; 51.660
Classification:	CV3 Chondrite

Macroscopic Description: Roger Harrington and Kathleen McBride
30% to 50% of the exteriors of these meteorites are covered with dull black fusion crust. The remaining broken surfaces consist of dark gray fine-grained matrix with 1-2 mm CAI's scattered throughout. The interiors of these samples are dark to medium gray, fine grained matrix with visible chondrules and numerous 1-2 mm light gray CAI's.

Thin Section (,2) Description: Cari Corrigan and 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. Olivines range from Fa_{0-43} and low-Ca pyroxene is Fs_{0-1}. The meteorites are unequilibrated carbonaceous chondrites, probably reduced CV3s. These are likely paired with the MIL 07590 pairing group previously reported.

Sample No.:	MIL 07409
Location:	Miller Range
Field No.:	18670
Dimensions (cm):	1.5 x 1.5 x 1.0
Weight (g):	2.720
Classification:	Acapulcoite-Lodranite

Macroscopic Description: Kathleen McBride
40% of the exterior is covered with brown/black fusion crust with oxidation haloes. The interior matrix is friable, rusty and reveals rust-stained yellow inclusions.

Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach
The section consists of an equigranular aggregate of olivine, pyroxene, plagioclase, and metal with minor sulfide and chromite, with an average grain size of 0.5 mm. Olivine (Fa_{12}) and pyroxene (Fs_{11}) are homogeneous. Six calcic pyroxene grains were analyzed (Fs_4). Feldspars are also homogeneous (AN_{12}). This section is moderately weathered. The meteorite is probably a transitional acapulcoite-lodranite similar to, e.g., GRA 95209.

Sample No.:	MIL 07411
Location:	Miller Range
Field No.:	18661
Dimensions (cm):	3.0 x 1.5 x 1.0
Weight (g):	14.52
Classification:	CB Chondrite

Macroscopic Description: Kathleen McBride
This meteorite is very friable and consists mainly of large (>5mm) rusty chondrules and lesser amounts of rusting gray matrix.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section consists of one 2.5 mm metal chondrule and chondrule fragments. Chondrule fragments up to 0.5 mm are dominated by radiating pyroxene textures with olivine present. Silicates are magnesian (Fa_{1-18}, $Fs_{1-4}Wo_{0.1-7}$). The meteorite is a CB chondrite and may be paired with MIL 05082 and MIL 07588.

Sample No.:	MIL 07513
Location:	Miller Range
Field No.:	18717
Dimensions (cm):	2.7 x 2.5 x 1.0
Weight (g):	10.463
Classification:	CR2 Chondrite

Macroscopic Description: Cecilia Satterwhite

The exterior has black fusion crust, frothy on one surface and rusty areas on others. The interior is a dark gray to black matrix with some rusty areas. Abundant inclusions of various sizes and colors.

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

The section exhibits large (up to 1 mm), well-defined, metal-rich chondrules and CAI's in a dark matrix of FeO-rich phyllosilicate. Silicates are unequilibrated with olivines Fa_{0-2}, and orthopyroxenes $Fs_{0-1}Wo_{1}$. The meteorite is probably a CR2 chondrite.

Sample No.:	ALH 090004
Location:	Allan Hills
Field No.:	18480
Dimensions (cm):	7.5 x 5.5 x 3.5
Weight (g):	221.714
Classification:	Howardite

Macroscopic Description: Roger Harrington

90% of the exterior of this sample is covered with a shiny black fusion crust which exhibits flow lines on the bottom surface. The remaining 10% is broken surface consisting of gray fine-grained matrix with <1 mm white inclusions. The interior of this sample is a gray fine-grained matrix with <1 mm white inclusions.

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

The heavily altered section shows a very dense, fine-grained groundmass with comminuted pyroxene and plagioclase grains (up to 0.5 mm). Fine- to coarse-grained basaltic clasts range up to 1 mm. One diogenitic clast was found with a long dimension of 2mm. A few dark clasts are present (some of which are chondritic but not all of which appear to be carbonaceous) and range in size up to 0.5 mm. Most of the pyroxene is orthopyroxene with compositions ranging from $Fs_{30-64}Wo_{5-40}$(most Fs_{20-30}), Few feldspars were found, those that were analyzed had a composition of $An_{86-92}Or_{0.2-0.4}$. The meteorite is a howardite.

Sample No.:	MIL 090001
Location:	Miller Range
Field No.:	20895
Dimensions (cm):	19.0 x 16.0 x 12.5
Weight (g):	6290.0
Classification:	CV3 Chondrite

Macroscopic Description: Roger Harrington

40% of the exterior of this sample is covered with a dull black fusion crust. The remaining 60% is a broken surface which consists of dark brown fine-grained matrix with scattered 1-3 mm tan to orangish tan chondrules. The interior is a dark brown fine-grained matrix with scattered 1-3 mm tan to orangish tan chondrules.

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

This section exhibits large chondrules (up to 3 mm) and CAIs in a brownish-green matrix that appears to be extensively aqueously altered. Alteration extends into the chondrules. Olivines range from Fa_{2-24} and low-Ca pyroxene is Fs_{1-12}. The meteorite is an unequilibrated carbonaceous chondrite, probably a reduced CV3.

Sample No.:	MIL 090030; 090032; 090136
Location:	Miller Range
Field No.:	20196; 20176; 20610
Dimensions (cm):	8.0 x 7.5 x 4.0; 8.0 x 6.5 x 7.5; 6.0 x 4.5 x 4.0
Weight (g):	452.630; 532.190; 170.980
Classification:	Nakhlite

Macroscopic Description: Kathleen McBride

The exterior surfaces of all three nakhlites have patches of black, wrinkled fusion crust. Areas without fusion crust have vugs. The interior broken faces are coarse grained and possess a crystalline, granular texture ranging from green to black.

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

The sections are dominated by lathy to equant clinopyroxene that reaches 2 mm in maximum dimension. Mesostases occupies approximately 20% of the rocks and contains skeletal iron-titanium oxides. Clinopyroxenes have core compositions of $Fs_{22}Wo_{43}$ with rims reaching Fs_{49} $Wo_{34.}$ Olivines were observed in all three sections, are equant to subequant, and have slight alteration/oxidation along fractures. Olivine grains, which range between 0.5 and 1 mm, have core compositions of Fa_{57} and rim compositions of Fa_{89}. Many olivines contain inclusions of mesostasis. Rare feldspars exist with compositions of An_{20-28} and Or_{11-14}. These meteorites are nakhlites. These meteorites are similar enough that one description will suffice. They are also similar to and likely paired with, MIL 03346.

Sample No.:	MIL 090034
Location:	Miller Range
Field No.:	20315
Dimensions (cm):	9.0 x 5.0 x 4.5
Weight (g):	195.565
Classification:	Lunar-Anorth. Breccia

Macroscopic Description: Roger Harrington

35% of the exterior of this sample is covered with a dull olive green fusion crust. The remaining 65% is broken surface which consists of gray to olive green fine-grained matrix with fine cracks throughout. Features visible in the matrix include four white clasts that range in size from 2-5 mm, several 1-2 mm white clasts, and two 15-20 mm orangish-tan areas. The interior of this sample consists of a gray, fine-grained matrix with 1-2 mm white clasts throughout.

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

The section consists of an extremely fine-grained matrix with isolated, large (up to mm-sized) mineral grains and fine- to coarse-grained anorthosite and basaltic clasts in all size ranges up to 3 mm. Microprobe analyses reveal olivine of Fa_{36-43}, pyroxene in a wide range of compositions from pigeonite $Fs_{23-41}Wo_{4-6}$ with intermediate and more FeO-rich compositions, and plagioclase of An_{97}. The Fe/Mn ratio of the pyroxene averages ~58. The meteorite is a basalt-bearing anorthositic regolith breccia.

Sample No.:	MIL 090036
Location:	Miller Range
Field No.:	20047
Dimensions (cm):	9.0 x 6.5 x 3.0
Weight (g):	244.830
Classification:	Lunar-Anorth. Breccia

Macroscopic Description: Kathleen McBride

The exterior of this meteorite is smooth with no obvious fusion crust. There is a thin yellow ochre film on two surfaces, possibly weathered fusion crust. The meteorite is obviously brecciated and one face also has penetrating fractures. The interior reveals gray clasts in a matrix of dark material that has within it smaller <mm sized white and gray clasts. This lunar breccia is moderately hard, with softer gray clasts.

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

The section consists of an extremely fine-grained matrix with isolated mineral grains and fine- to coarse-grained basaltic clasts in all size ranges up to 1 mm. Dark/opaque clasts exist in this meteorite that do not appear in MIL 090034. Microprobe analyses reveal olivine of Fa_{16-46}, pyroxene in a wide range of compositions from pigeonite $Fs_{19-30}Wo_{4-7}$ with intermediate and more FeO-rich compositions (one pyroxene of Fs_{51}), and plagioclase of An_{86-96}. The Fe/Mn ratio of the pyroxene averages ~62. This meteorite is a basalt-bearing anorthositic regolith breccia.

Sample No.:	MIL 090070; 090075	**Macroscopic Description: Roger Harrington** 40% of the exteriors of these samples are covered with a shiny olive green fusion crust. The remaining 60% is broken surfaces which consist of dark green to gray fine-grained matrix with elongate and equant pale green clasts that range in size from 2-7 mm. White clasts ranging in size from 1-2 mm are present within the pale green clasts. Some evaporite material is encrusted on the broken surface. The interiors consists of a dark green, fine-grained matrix with 3-5 mm gray clasts throughout. **Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach** The sections consist of an extremely fine-grained 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_{37-42}, pyroxene in a wide range of compositions from pigeonite $Fs_{20-43}Wo_{6-19}$ to augite of Fs_9Wo_{43} with intermediate and more FeO-rich compositions, and plagioclase of An_{89-98}. The Fe/Mn ratio of the pyroxene averages ~59. These meteorites were found 10 cm apart in the field and are similar enough that only one description is necessary. They are likely paired. The meteorites are basalt-bearing anorthositic regolith breccia.
Location:	Miller Range	
Field No.:	20890; 20886	
Dimensions (cm):	7.0 x5.5 x 3.5; 6.5 x 5.5 x 4.0	
Weight (g):	137.461; 143.523	
Classification:	Lunar-Anorth. Breccia	

Sample No.:	MIL 090076	**Macroscopic Description: Cecilia Satterwhite** The exterior has fractured brown/black fusion crust with evaporites. Flow lines are visible on one surface. Areas without fusion crust are weathered brown with some gray/black matrix visible. Some rusty areas are visible. The interior is a dark gray to black matrix with heavy oxidation and rusty areas. Metal is visible and this ureilite was very difficult to break. **Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach** The section consists of an aggregate of large (up to 2.5 mm) olivine grains. Individual olivine grains are rimmed by carbon-rich material containing traces of metal. Metal forms veins between olivines. Olivine has cores of Fa_{22}. Pigeonite grains have compositions of Fs_{11-18} and Wo_{5-11}. The meteorite is a ureilite.
Location:	Miller Range	
Field No.:	20559	
Dimensions (cm):	7.5 x 6.3 x 4.5	
Weight (g):	377.7	
Classification:	Ureilite	

Sample No.:	MIL 090103	**Macroscopic Description: Roger Harrington** 3% of the exterior of this sample is covered with a shiny dark brown fusion crust. The remaining 97% is broken surface consisting of dark gray fine-grained matrix with four 1-2 mm gray clasts on the one surface. The interior of this sample is a medium gray fine-grained matrix. **Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach** The section consists of poorly-defined chondrules (up to 1 mm) in a matrix of finer-grained silicates, sulfides and abundant magnetite. Silicates are homogeneous. Olivine is Fa_{32} and orthopyroxene is Fs_{8-10}. The meteorite is a CK5-6 chondrite.
Location:	Miller Range	
Field No.:	20757	
Dimensions (cm):	4.0 x 3.5 x 2.5	
Weight (g):	52.580	
Classification:	CK5-6 Chondrite	

Sample No.: MIL 090105; 090106; 090107 Location: Miller Range Field No.: 20371; 20808; 20816 Dimensions (cm): 4.9 x 4.8 x 3.5; 4.2 x 4.0 x 3.0; 8.8 x 7.0 x 3.2 Weight (g): 119.429; 115.499; 405.2 Classification: Diogenite	Macroscopic Description: Cecilia Satterwhite Dull black fractured fusion crust covers about 70% of the exteriors. Areas without fusion crust are tannish gray. Some white/lighter inclusions visible. 107 has some evaporites on the surface. The interiors are a crème colored/tan matrix with some dark and light clasts/inclusions. A few larger yellowish clasts are visible. Thin Section (,2) Description: Cari Corrigan, Tim McCoy and Linda Welzenbach The section shows coarse (up to 5 mm) comminuted pyroxene with minor interstitial plagioclase and SiO_2. Pyroxenes exhibit blebby exsolution, with low-Ca pyroxene hosts of compositions $Fs_{29-53}Wo_{1-11}$ and high-Ca pyroxene exsolution of composition $Fs_{14}Wo_{40}$. Fe/Mn ratios of the pyroxenes are ~30. Feldspars are $An_{82-91}Or_{0.2-0.5}$. These meteorites are diogenites, although the pyroxene is on the FeO-rich end of diogenites towards cumulate eucrites. These are likely paired with MIL 07613.

Sample No.: MIL 090995 Location: Miller Range Field No.: 20114 Dimensions (cm): 2.25 x 1.25 x 2.0 Weight (g): 9.840 Classification: Diogenite	Macroscopic Description: Kathleen McBride The exterior surface has two small patches of brown/black fusion crust. The exposed interior is off white to dark gray in color. The interior is a very fine grained off white to medium gray matrix. Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach The section shows a very fine-grained, dense, groundmass of comminuted pyroxene with few coarse (up to 1 mm) pyroxene grains. Orthopyroxene compositions are homogeneous at $Fs_{23}Wo_2$. The Fe/Mn ratio of the pyroxene is ~30. The meteorite is a diogenite.

MIL 07701 was announced in the last newsletter, here is the description which was missing. Sample No.: MIL 07701 Location: Miller Range Field No.: 17560 Dimensions (cm): 2.5 x 2.0 x 1.0 Weight (g): 5.741 Classification: CM2 Chondrite	Macroscopic Description: Roger Harrington 20% of the exterior is covered by dull black fusion crust. The interior is a fine-grained black matrix with trace amounts of <1mm chondrules. Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach The section consists 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. Olivine compositions are Fa_{1-39}, orthopyroxene is Fs_1. Aqueous alteration of the matrix is substantial, but the chondrules are only modestly altered. This meteorite is a CM2 chondrite, probably part of the MIL 07497 pairing group.

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 **Sept. 17, 2010 deadline** will be reviewed at the MWG meeting **Sept. 30- Oct. 1, 2010 in Arlington, Va**. Requests that are received after the deadline may be delayed for review until MWG meets again in the Spring of 2011. 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 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 and *Meteoritics* and *Meteoritics and Planetary Science* (these are listed in Table 3 of this newsletter. 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:

JSC-ARES-MeteoriteRequest@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

Please submit request to: **JSC-ARES-MeteoriteRequest@nasa.gov**

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://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/
Meteoritical Bulletin online Database	http://tin.er.usgs.gov/meteor/metbull.php
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
Chinese Antarctic meteorite collection	http://birds.chinare.org.cn/en/yunshiku/
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/
Astromaterials Curation	http://www-curator.jsc.nasa.gov/