Antarctic Meteorite Newsletter

Volume 36, Number 2 August 2013

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

This newsletter reports 238 new meteorites from the 2010 and 2012 ANSMET seasons from the Buckley Island (BUC10), Dominion Range (DOM10), La Paz Ice Field (LAP10), Graves Nunatak (GRA12) Larkman Nunatak (LAR12) and Szabo Bluff (SZA12) areas. There are some exciting samples many of which reflect the ongoing diversity of meteorites coming from the Larkman Nunatak area. Detailed descriptions are provided for three new shergottites (one likely paired with LAR 06319, and two others that are paired with each other), 9 HED meteorites, 10 carbonaceous chondrites (CK, CO, CR, and CV), one L3.5 chondrite, several impact melt breccias (L and LL). We also have updated descriptions for 6 shock blackened L chondrites from Buckley Island previously announced in AMN 36,1.

New rules for PIs: loan agreements and annual inventories

This summer we will start two new policies regarding the loans of Antarctic meteorites from the US collection at NASA-JSC. We will start with annual inventories for all scientists holding samples from our collection. Following the release of the Fall 2013 newsletter, all scientists currently holding or wishing to request samples from our collection will need to have a valid loan agreement on file.

First, we will be initiating an annual inventory of samples that are on loan. The inventory will be emailed to each scientist. We will require an update for every sample that is on loan; for example, if a thin section has been loaned, we would like verification that that section is still held in the possession of the scientist. If a chip is on loan, we would like verification that that chip is still held by the scientist. If there are any changes to that status, such as a chip has been dissolved or consumed for chemical analysis, we require that information to be filled out on the inventory. The inventories are designed to be brief and non-intrusive, and **anyone who does not return an inventory summary to the JSC curation office cannot continue to receive meteorite samples.** This is also a good opportunity to return any meteorite samples on loan that are no longer being used, or for which the loan period has expired. When you receive your Antarctic meteorite inventory by email, please fill it out and return it to us (by email) as soon as you can. Delays on your end will just cause delays in getting samples out to you.

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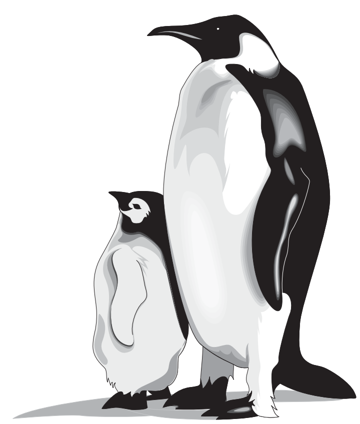
Inside this Issue



Sample Request Deadline
September 13, 2013

MWG Meets
October 3-4,2013

Second, we will be requiring loan agreements to be completed for each scientist currently holding or requesting meteorites on loan from us. The loan agreements will last five years and must be renewed and kept current as long as the scientist wishes to continue to study samples from our collection. Any scientist who does not have a valid/current loan agreement filed with us at JSC cannot receive meteorite samples. Loan Agreements can be downloaded from our website (http://curator.jsc.nasa.gov/antmet/forms/), and once filled out and signed by the PI and an institution official (department chair, dean, provost, etc.) can be scanned and emailed, or mailed to us. You may do this anytime starting immediately.

These two new policies are explained in detail in our new Antarctic Meteorite Sample Investigators Guidebook, available online:
http://curator.jsc.nasa.gov/antmet/forms/

If you have any questions please contact Dr. Kevin Righter (kevin.righter-1@nasa.gov) or Cecilia Satterwhite (cecilia.e.satterwhite@nasa.gov).

Meteorite reclassifications / corrections

In light of new information collected and published recently by D.W. Mittlefehldt, the following samples are reclassified:

LEW 87002: LEW 87002, initially classified as a Eucrite, Mg-rich (Antarctic Meteorite Newsletter 11(2), page 29, 1988), is a fragmental breccia containing mm-sized clasts of low-Ca pyroxene, a mafic clast with subophitic texture, and a matrix composed mostly of low-Ca pyroxene and plagioclase. Low-Ca pyroxenes in the matrix, the margins of orthopyroxene clasts and from the margin of the mafic clast are relatively uniform in Fe/Mg and have compositions of $Wo_{2.5-3.5}En_{64.4-66.3}Fs_{31.0-32.1}$. High-Ca pyroxene compositions in the same petrologic settings are $Wo_{40.4-42.0}En_{43.4-45.4}Fs_{14.3-15.3}$. The most magnesian orthopyroxene in the core of a mm-sized clast is $Wo_{0.8}En_{77.0}Fs_{22.2}$, the most ferroan low-Ca and high-Ca pyroxenes from the mafic clast core are $Wo_{2.5}En_{58.1}Fs_{39.4}$ and $Wo_{43.0}En_{41.2}Fs_{15.8}$. Olivine compositions are $Fo_{60.6}$, plagioclase compositions range from $An_{94.6}Ab_{5.2}Or_{0.2}$ to $An_{87.0}Ab_{12.4}Or_{0.6}$. The bulk rock composition determined by Warren et al. (2009; GCA 73:5918) has a subchondritic Eu/Sm and major element composition consistent with a mixture of diogenite:basaltic eucrite of ~65:35. LEW 87002 is a howardite exhibiting an exceptional degree of post-assembly metamorphism that caused large-scale Fe-Mg exchange.

QUE 97002: QUE 97002, initially classified as a howardite, (Antarctic Meteorite Newsletter 21(2), page 18, 1998), is a fragmental breccia with a matrix composed mostly of ferroan low-Ca pyroxene and plagioclase, and containing mm-sized mafic clasts with subophitic/ophitic textures. The most magnesian pyroxene given in the initial description has a composition of $Wo_2En_{44}Fs_{54}$, within the range of cumulate eucrites. The most magnesian pyroxene in section ,34 is $Wo_{5.4}En_{62.0}Fs_{32.6}$ which is just within the ranges of the most ferroan diogenites and the most magnesian cumulate eucrites. Other coarse pyroxene fragments have compositions of $Wo_{16.5-22.0}En_{30.5-35.1}Fs_{46.5-48.8}$, within the ranges of basaltic eucrites. Five whole rock samples have compositions consistent with mixtures of >90 wt% basaltic eucrite. QUE 97002 is a polymict eucrite.

Report from the Smithsonian

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

This newsletter announces the classification of 238 meteorites from the 2010 and 2012 ANSMET seasons. Since the last newsletter, we have said goodbye to Sheri Singerling. Sheri has moved to Albuquerque, New Mexico to begin a Ph.D. with Dr. Adrian Brearley at the University of New Mexico. We wish her all the best and thank her for all of her hard work over the past year! We have recently welcomed a new volunteer, Norman Burr, who will be helping us in the meteorite collection, and have also welcomed post doc Dr. Kathryn Gardner-Vandy (Ph.D. 2012, University of Arizona).

Fieldwork news for Fall, 2013: Same Great Products at the Same Great Price!

Ralph Harvey, Case Western Reserve University

The Antarctic Search for Meteorites program (ANSMET) is now officially " Under New Management ". Many of you are aware that in 2012 NSF decided they would no longer directly fund ANSMET fieldwork. NASA immediately began working with us to continue the Antarctic meteorite recovery efforts, and I'm happy to announce a successful transition. Just a few days after NSF funding officially expired at the end of July, NASA approved support for the 2013-2014 and 2014-2015 field seasons, ensuring continuity for the near term.

Our plans for the 2013-2014 field season include a return to the icefields of the Miller Range in the central Transantarctic Mountains, high on the polar plateau and situated between the drainages of the Beardmore and Nimrod glaciers. Four previous seasons of systematic searching (2005-2006, 2007-2008, 2009-2010 and 2011-2012 as well as several shorter reconnaissance visits (in 1985, 1999 and 2003) have resulted in the recovery of nearly 2400 meteorite specimens from these icefields, including many rare meteorites such as martian and lunar samples. The MIL meteorites come from a variety of icefields in different settings distributed across almost 60 km of the Miller Range, and the areas remaining to be searched sit at both ends. Some of our plans for the current season are recycled from the 2011-2012 season, when an overabundance of snow made us less productive than we had hoped. We'll start at the northern end of the range where a few small blue ice patches in valleys facing out on the Nimrod yielded surprising numbers of specimens. When that work is done, we'll traverse southward (into the wind and uphill) to the other end of the Miller Range where a large icefield represents the last major challenge to completion of our work in the region. Seven seasons in the Miller Range have taught us that the weather can vary dramatically from season to season so we know better than to predict how things will go; but if good conditions prevail we hope to complete a large part of the searching that remains.

As in previous seasons, we plan to update our weblog daily; visit us at ***http://Case.edu/ansmet*** to see how we're doing.

Systematic searching on the southern Miller Range icefield (courtesy Anne Peslier, JSC / ANSMET).

New Meteorites

2010 and 2012 Collection

Pages 5-19 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 36(1), March 2013. 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, Sheri Singerling, Andrew Beck, 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
BUC — Buckley Island
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
SZA — Szabo Bluff
TEN — Tentacle Ridge
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting

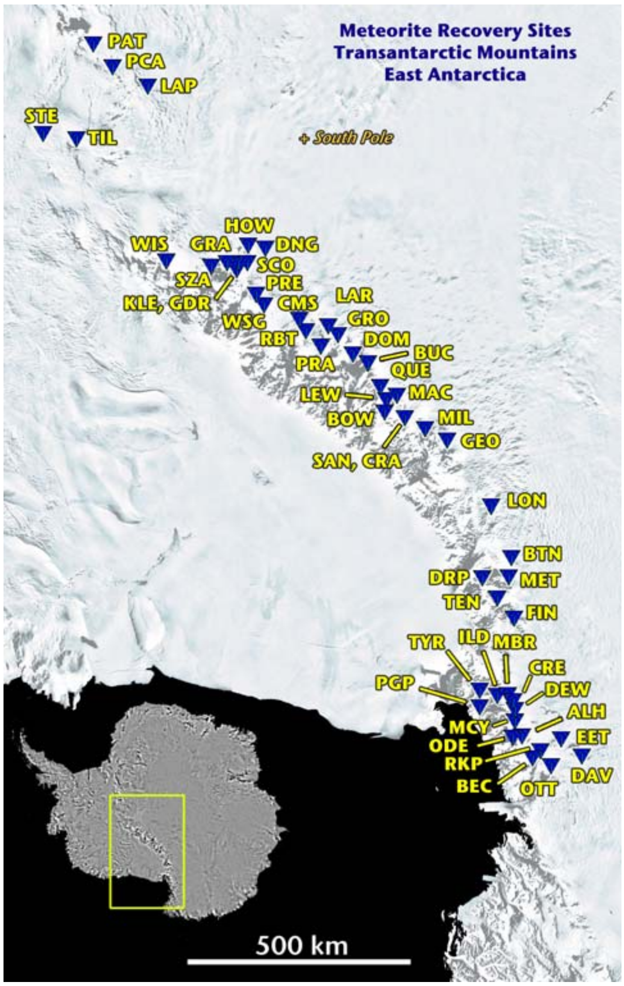


Table 1

List of Newly Classified Antarctic Meteorites **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DOM 10001 ~	3343.2	H6 CHONDRITE	C	A		
DOM 10002 ~	1621.5	LL5 CHONDRITE	B/C	A/B		
DOM 10003 ~	1104.2	LL5 CHONDRITE	Ce	B		
DOM 10004 ~	898.5	L5 CHONDRITE	B/C	A		
DOM 10006 ~	821.7	LL5 CHONDRITE	B/C	A		
DOM 10028	18.1	L6 CHONDRITE	B/C	A/B	24-25	20
DOM 10123 ~	31.4	LL5 CHONDRITE	A/B	A/B		
DOM 10124 ~	22.5	L6 CHONDRITE	B/C	A		
DOM 10125 ~	26.1	LL5 CHONDRITE	A/B	A/B		
DOM 10126 ~	22.3	LL5 CHONDRITE	B/C	A		
DOM 10127 ~	19.3	LL5 CHONDRITE	B/C	A		
DOM 10128 ~	26.0	LL5 CHONDRITE	B/C	A		
DOM 10129 ~	30.2	LL5 CHONDRITE	B/C	A		
DOM 10170 ~	49.5	LL5 CHONDRITE	B	B		
DOM 10171 ~	66.8	LL5 CHONDRITE	B	B		
DOM 10172 ~	33.2	LL6 CHONDRITE	B	A/B		
DOM 10173 ~	32.7	LL5 CHONDRITE	B/C	B		
DOM 10174 ~	35.9	L6 CHONDRITE	B/C	B		
DOM 10175 ~	24.6	LL5 CHONDRITE	B/C	B		
DOM 10176 ~	18.8	L5 CHONDRITE	C	B		
DOM 10177 ~	17.0	H6 CHONDRITE	C	B		
DOM 10178 ~	19.0	L6 CHONDRITE	B/C	B		
DOM 10179 ~	25.6	LL6 CHONDRITE	B	B		
DOM 10210 ~	36.0	LL5 CHONDRITE	B/C	B/C		
DOM 10211 ~	24.2	L6 CHONDRITE	B/C	A/B		
DOM 10212 ~	25.4	LL5 CHONDRITE	B	A/B		
DOM 10213 ~	22.9	H6 CHONDRITE	C	B		
DOM 10214 ~	21.4	LL5 CHONDRITE	B/C	B		
DOM 10215 ~	18.9	L5 CHONDRITE	C	B		
DOM 10216 ~	33.7	LL5 CHONDRITE	B	A/B		
DOM 10217 ~	18.6	L5 CHONDRITE	C	B		
DOM 10218 ~	33.2	LL5 CHONDRITE	B	A/B		
DOM 10219 ~	11.2	LL5 CHONDRITE	C	B		
DOM 10250 ~	9.9	L6 CHONDRITE	B/C	A		
DOM 10251 ~	9.4	L6 CHONDRITE	B/C	A		
DOM 10252 ~	9.5	L6 CHONDRITE	B/C	A/B		
DOM 10253 ~	9.5	H6 CHONDRITE	B/C	A		
DOM 10254 ~	9.8	L6 CHONDRITE	B/C	A		
DOM 10255 ~	14.0	LL5 CHONDRITE	B/C	A		
DOM 10256 ~	13.9	LL5 CHONDRITE	B	A		
DOM 10258 ~	6.6	L6 CHONDRITE	B/C	A		
DOM 10259 ~	9.7	H5 CHONDRITE	B/C	A		
DOM 10270 ~	2.1	L6 CHONDRITE	C	A/B		
DOM 10271 ~	2.5	L6 CHONDRITE	C	A		
DOM 10272 ~	5.6	LL5 CHONDRITE	B/C	A/B		
DOM 10273 ~	2.7	L6 CHONDRITE	C	B		
DOM 10274 ~	7.9	LL5 CHONDRITE	B/C	B		
DOM 10275 ~	9.2	LL5 CHONDRITE	C	B		
DOM 10276 ~	9.4	LL5 CHONDRITE	B/C	A/B		
DOM 10277 ~	12.4	LL5 CHONDRITE	B	B		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DOM 10278 ~	9.5	H6 CHONDRITE	C	A/B		
DOM 10279 ~	4.7	LL5 CHONDRITE	B/C	B		
DOM 10280 ~	23.9	LL5 CHONDRITE	B/C	A		
DOM 10281 ~	33.6	LL5 CHONDRITE	A/B	A		
DOM 10282 ~	33.7	LL6 CHONDRITE	B/C	A		
DOM 10284 ~	23.2	LL5 CHONDRITE	A/B	A		
DOM 10285 ~	26.0	L5 CHONDRITE	B/C	A		
DOM 10286 ~	26.3	L5 CHONDRITE	B/C	A		
DOM 10287 ~	16.1	L5 CHONDRITE	C	A		
DOM 10288 ~	47.5	LL5 CHONDRITE	A/B	A		
DOM 10289 ~	33.6	LL5 CHONDRITE	A/B	A		
DOM 10400 ~	35.5	LL5 CHONDRITE	B	A/B		
DOM 10401 ~	40.8	LL5 CHONDRITE	A/B	A/B		
DOM 10402 ~	37.0	LL5 CHONDRITE	A/B	A/B		
DOM 10403 ~	38.0	LL5 CHONDRITE	A/B	A/B		
DOM 10404	38.8	H5 CHONDRITE	C	B	18-19	15
DOM 10405	23.8	H5-6 CHONDRITE	C	B	17	15-17
DOM 10406 ~	10.6	LL5 CHONDRITE	B	B		
DOM 10407 ~	12.0	H6 CHONDRITE	C	B		
DOM 10408 ~	14.3	LL5 CHONDRITE	B	B		
DOM 10409 ~	13.3	H6 CHONDRITE	C	B		
DOM 10410	5.6	CR2 CHONDRITE	B	A/B	1-31	3-6
DOM 10411 ~	9.6	H5 CHONDRITE	C	B		
DOM 10412 ~	7.8	LL5 CHONDRITE	B	B		
DOM 10413 ~	11.6	LL6 CHONDRITE	B	B		
DOM 10414 ~	9.7	LL5 CHONDRITE	B	B		
DOM 10415 ~	12.5	H5 CHONDRITE	C	B		
DOM 10416 ~	9.0	LL5 CHONDRITE	B	B		
DOM 10417 ~	2.9	H5 CHONDRITE	C	B		
DOM 10418 ~	10.6	H6 CHONDRITE	C	B		
DOM 10419 ~	15.1	LL6 CHONDRITE	C	B		
DOM 10430 ~	5.6	LL6 CHONDRITE	A/B	A/B		
DOM 10431 ~	10.9	L6 CHONDRITE	C	A/B		
DOM 10432 ~	8.8	LL6 CHONDRITE	B	B		
DOM 10434	8.0	H6 CHONDRITE	C	B		
DOM 10435 ~	9.3	H4 CHONDRITE	C	B	7-31	
DOM 10436 ~	14.0	LL5 CHONDRITE	B	B		
DOM 10437 ~	15.9	LL5 CHONDRITE	B	B		
DOM 10438 ~	23.4	LL5 CHONDRITE	B	B		
DOM 10440	22.6	L CHONDRITE (IMPT MELT)	C	B	24-29	20
DOM 10441 ~	17.8	H5 CHONDRITE	C	B		
DOM 10442 ~	38.1	LL5 CHONDRITE	B/C	B		
DOM 10443 ~	46.1	LL5 CHONDRITE	B/C	B		
DOM 10444 ~	42.3	LL6 CHONDRITE	B	A/B		
DOM 10445 ~	42.0	L5 CHONDRITE	C	B		
DOM 10446 ~	35.4	LL5 CHONDRITE	A/B	A/B		
DOM 10447 ~	78.5	LL5 CHONDRITE	A/B	B		
DOM 10448 ~	55.7	LL6 CHONDRITE	A/B	A/B		
DOM 10449 ~	89.6	LL5 CHONDRITE	A/B	A/B		
DOM 10455 ~	45.9	L5 CHONDRITE	B	A/B		
DOM 10456 ~	59.8	L5 CHONDRITE	B/C	B		
DOM 10457 ~	62.3	LL5 CHONDRITE	B	A/B		
DOM 10458 ~	84.6	L5 CHONDRITE	B	A/B		
DOM 10459 ~	42.4	H5 CHONDRITE	C	A/B		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAP 10001	6473.6	H4 CHONDRITE	A/B	A/B	17-21	14-16
LAP 10002 ~	9530.0	LL5 CHONDRITE	B	A/B		
LAP 10003 ~	1831.7	LL5 CHONDRITE	A/B	A		
LAP 10004 ~	2249.6	LL5 CHONDRITE	A/B	A		
LAP 10005 ~	2314.6	LL5 CHONDRITE	B/C	A		
LAP 10006 ~	3250.7	LL5 CHONDRITE	A/B	A		
LAP 10007 ~	1692.2	LL5 CHONDRITE	A	B		
LAP 10008 ~	2276.7	LL5 CHONDRITE	A/B	B		
LAP 10009	1327.9	LL6 CHONDRITE	A/B	A/B	29-30	23
LAP 10010 ~	1138.4	LL5 CHONDRITE	A/B	A		
LAP 10011 ~	797.2	L6 CHONDRITE	B/C	A		
LAP 10012 ~	5115.8	LL5 CHONDRITE	A/B	A		
LAP 10013 ~	1274.4	LL5 CHONDRITE	A/B	A/B		
LAP 10015 ~	511.5	LL5 CHONDRITE	B/C	A/B		
LAP 10016 ~	530.5	LL5 CHONDRITE	A	A		
LAP 10017 ~	236.8	L5 CHONDRITE	B/C	B/C		
LAP 10018	254.8	HOWARDITE	A	A/B	29-45	13-53
LAP 10019 ~	358.8	LL5 CHONDRITE	B/C	A/B		
LAP 10025 ~	73.3	L6 CHONDRITE	B/C	B		
LAP 10026 ~	122.0	L5 CHONDRITE	B	B		
LAP 10027 ~	62.9	LL5 CHONDRITE	B	A/B		
LAP 10028 ~	77.3	L6 CHONDRITE	B	B		
LAP 10029 ~	122.2	LL6 CHONDRITE	B	B		
LAP 10034 ~	145.5	LL5 CHONDRITE	B	A		
LAP 10035 ~	87.6	LL5 CHONDRITE	B	B		
LAP 10036 ~	49.4	L5 CHONDRITE	B	B		
LAP 10037 ~	114.5	LL5 CHONDRITE	B/C	B		
LAP 10038	40.5	H6 CHONDRITE	B	B	18	16
LAP 10039 ~	57.6	LL6 CHONDRITE	B	B		
LAP 10040 ~	73.9	LL5 CHONDRITE	B	B		
LAP 10041 ~	37.8	LL5 CHONDRITE	A/B	B		
LAP 10042 ~	95.9	LL5 CHONDRITE	B	B		
LAP 10043 ~	79.5	L5 CHONDRITE	B	B		
LAP 10044 ~	46.3	LL5 CHONDRITE	B	B		
LAP 10045	83.4	H5 CHONDRITE	B	B	18	15-16
LAP 10046 ~	106.2	LL5 CHONDRITE	A/B	A/B		
LAP 10047 ~	62.0	L5 CHONDRITE	B	B		
LAP 10048 ~	43.0	L6 CHONDRITE	B/C	B		
LAP 10049 ~	81.0	LL5 CHONDRITE	B	B		
LAP 10050 ~	31.1	LL6 CHONDRITE	A	A/B		
LAP 10051 ~	19.3	L6 CHONDRITE	B/C	B		
LAP 10052 ~	22.3	LL5 CHONDRITE	A/B	A/B		
LAP 10053 ~	21.1	LL6 CHONDRITE	B	A/B		
LAP 10054 ~	19.1	LL5 CHONDRITE	B	B		
LAP 10055 ~	11.3	LL6 CHONDRITE	B	A/B		
LAP 10056 ~	15.0	L6 CHONDRITE	C	B		
LAP 10057 ~	46.8	H6 CHONDRITE	C	B		
LAP 10058 ~	44.2	LL5 CHONDRITE	B	B		
LAP 10059 ~	72.7	LL5 CHONDRITE	B	B		
LAP 10070 ~	22.2	LL5 CHONDRITE	B/C	A		
LAP 10071 ~	28.1	LL5 CHONDRITE	B/C	A		
LAP 10072 ~	28.0	L5 CHONDRITE	B/C	A		
LAP 10073 ~	13.4	L5 CHONDRITE	B/C	A		
LAP 10074 ~	8.9	LL5 CHONDRITE	B/C	A		
LAP 10075 ~	6.3	L5 CHONDRITE	A/B	A/B		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAP 10076 ~	17.3	LL5 CHONDRITE	A	A		
LAP 10077 ~	29.7	LL5 CHONDRITE	A	A		
LAP 10078 ~	38.6	LL6 CHONDRITE	A	A		
LAP 10079 ~	39.8	LL5 CHONDRITE	A	A		
LAP 10080 ~	2.6	L6 CHONDRITE	B/C	A		
LAP 10081 ~	2.5	L6 CHONDRITE	B	A/B		
LAP 10082	0.8	H6 CHONDRITE	A/B	A	18	16
LAP 10083 ~	2.1	L5 CHONDRITE	A/B	A		
LAP 10084 ~	1.2	L6 CHONDRITE	C	A/B		
LAP 10085 ~	1.4	L6 CHONDRITE	C	B		
LAP 10086 ~	6.0	L6 CHONDRITE	C	B		
LAP 10087 ~	4.2	LL6 CHONDRITE	A/B	A/B		
LAP 10088 ~	1.7	H5 CHONDRITE	C	B		
LAP 10089 ~	4.9	LL6 CHONDRITE	B/C	B		
LAP 10101	15.4	HOWARDITE	A/B	A/B	34-41	15-56
LAP 10106	9.7	H4 CHONDRITE	B/C	A	18-19	16
LAP 10109	7.4	L3.5 CHONDRITE	A/B	A	3-35	21-28
LAP 10110 ~	16.0	L5 CHONDRITE	B/C	B		
LAP 10111 ~	17.5	LL5 CHONDRITE	B	B		
LAP 10112 ~	5.4	L5 CHONDRITE	C	B		
LAP 10113 ~	6.1	LL6 CHONDRITE	B/C	B		
LAP 10114 ~	5.0	LL5 CHONDRITE	B	B		
LAP 10115	41.0	L6 CHONDRITE	B	B	24	20
LAP 10116 ~	13.3	LL6 CHONDRITE	B/C	B		
LAP 10117 ~	21.3	H5 CHONDRITE	C	B		
LAP 10118 ~	2.7	LL6 CHONDRITE	B/C	B		
LAP 10119 ~	3.6	LL6 CHONDRITE	B/C	B		
LAP 10140 ~	67.0	LL5 CHONDRITE	A/B	A		
LAP 10141 ~	124.8	LL5 CHONDRITE	B/C	A		
LAP 10142 ~	102.3	LL5 CHONDRITE	A/B	A		
LAP 10143 ~	52.1	LL5 CHONDRITE	B/Ce	A		
LAP 10144 ~	43.7	LL5 CHONDRITE	B/C	A		
LAP 10145 ~	47.4	LL5 CHONDRITE	A/B	A		
LAP 10146 ~	76.6	LL5 CHONDRITE	A/B	A		
LAP 10147 ~	188.3	LL6 CHONDRITE	B/C	A		
LAP 10148 ~	106.1	L5 CHONDRITE	B/C	A		
LAP 10149 ~	193.8	LL5 CHONDRITE	B/C	A		
LAP 10150 ~	35.7	LL6 CHONDRITE	A/B	A		
LAP 10151 ~	52.6	LL5 CHONDRITE	B/C	A/B		
LAP 10152 ~	104.9	LL5 CHONDRITE	B/C	A		
LAP 10153 ~	46.6	LL6 CHONDRITE	B/C	A		
LAP 10154 ~	54.4	L5 CHONDRITE	B/C	A		
LAP 10155 ~	80.9	LL5 CHONDRITE	B/C	A		
LAP 10156 ~	41.3	LL5 CHONDRITE	A/B	A/B		
LAP 10157 ~	19.1	LL5 CHONDRITE	A/B	A		
LAP 10158 ~	30.8	LL5 CHONDRITE	A/B	A		
LAP 10159 ~	56.7	LL6 CHONDRITE	B/C	A		
LAP 10160 ~	42.6	LL6 CHONDRITE	B/C	B		
LAP 10161 ~	30.5	LL5 CHONDRITE	B	B		
LAP 10162 ~	13.5	L5 CHONDRITE	B	B		
LAP 10163 ~	12.5	LL5 CHONDRITE	B	B		
LAP 10164 ~	36.2	LL5 CHONDRITE	B	B		
LAP 10165 ~	18.6	LL6 CHONDRITE	B	B		
LAP 10166 ~	8.7	LL6 CHONDRITE	B	B		
LAP 10167 ~	16.2	LL5 CHONDRITE	B	B		

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LAP 10168 ~	33.6	L5 CHONDRITE	B	B		
LAP 10169 ~	58.2	L5 CHONDRITE	B	B		
LAP 10170	13.3	H5 CHONDRITE	A/B	A/B	19	
LAP 10171	278.6	LL6 CHONDRITE	A	A	30	23
GRA 12512	21.6	CO3 CHONDRITE	A/B	B	1-74	1
LAR 12002	4855.0	CV3 CHONDRITE	A/B	A/B	0-34	
LAR 12010	409.6	DIOGENITE	B/C	A/B		25
LAR 12011	701.2	SHERGOTTITE	A	A	23-58	24-44
LAR 12049	23.1	CV3 CHONDRITE	B	A/B	1-32	
LAR 12060	17.9	EUCRITE	A/B	A/B		27-63
LAR 12095	133.1	SHERGOTTITE	A/Be	A/B	31-42	26-31
LAR 12099	7.0	CO3 CHONDRITE	A/Be	A/B	0-52	
LAR 12100	24.6	CV3 CHONDRITE	B/C	A/B	1-25	
LAR 12139	11.5	HOWARDITE	B	B	42	18-61
LAR 12240	57.6	SHERGOTTITE	A/B	A	28-42	25-31
LAR 12246	22.1	CO3 CHONDRITE	A/B	B/C	0-50	1
LAR 12248	113.5	DIOGENITE	B	A/B		29
LAR 12249	80.1	HOWARDITE	A/B	A/B		20-56
LAR 12320	120.1	DIOGENITE	B/C	B		14-31
LAR 12325	263.9	LL CHONDRITE (IMPT MELT)	B	A/B	29	9-23
LAR 12326	10445.0	HOWARDITE	B	B		32-52
SZA 12430	412.1	CK4 CHONDRITE	Be	A/B	28--29	17-28
SZA 12431	443.1	CO3 CHONDRITE	Ce	B/C	0-40	2
SZA 12432	163.3	CO3 CHONDRITE	Ce	C	0-73	1

Table 2

Newly Classified Specimens Listed By Type

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
LAR 12010	409.6	DIOGENITE	B/C	A/B		25
LAR 12248	113.5	DIOGENITE	B	A/B		29
LAR 12320	120.1	DIOGENITE	B/C	B		14-31
LAR 12060	17.9	EUCRITE	A/B	A/B		27-63
LAP 10018	254.8	HOWARDITE	A	A/B	29-45	13-53
LAP 10101	15.4	HOWARDITE	A/B	A/B	34-41	15-56
LAR 12139	11.5	HOWARDITE	B	B	42	18-61
LAR 12249	80.1	HOWARDITE	A/B	A/B		20-56
LAR 12326	10445.0	HOWARDITE	B	B		32-52
LAR 12011	701.2	SHERGOTTITE	A	A	23-58	24-44
LAR 12095	133.1	SHERGOTTITE	A/Be	A/B	31-42	26-31
LAR 12240	57.6	SHERGOTTITE	A/B	A	28-42	25-31
		Carbonaceous Chondrites				
SZA 12430	412.1	CK4 CHONDRITE	Be	A/B	28--29	17-28
GRA 12512	21.6	CO3 CHONDRITE	A/B	B	1-74	1
LAR 12099	7.0	CO3 CHONDRITE	A/Be	A/B	0-52	
LAR 12246	22.1	CO3 CHONDRITE	A/B	B/C	0-50	1
SZA 12431	443.1	CO3 CHONDRITE	Ce	B/C	0-40	2
SZA 12432	163.3	CO3 CHONDRITE	Ce	C	0-73	1
DOM 10410	5.6	CR2 CHONDRITE	B	A/B	1-31	3-6
LAR 12002	4855.0	CV3 CHONDRITE	A/B	A/B	0-34	
LAR 12049	23.1	CV3 CHONDRITE	B	A/B	1-32	
LAR 12100	24.6	CV3 CHONDRITE	B/C	A/B	1-25	
		Chondrites - Type 3				
LAP 10109	7.4	L3.5 CHONDRITE	A/B	A	3-35	21-28
		L Chondrite				
DOM 10440	22.6	L CHONDRITE (IMPT MELT)	C	B	24-29	20
LAR 12325	263.9	LL CHONDRITE(IMPT MELT)	B	A/B	29	9-23

**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 the Antarctic Meteorite Newsletter vol. 9 (no. 2) (June 1986). Possible pairings were updated in Meteoritical Bulletins 76, 79, 82 through 102, which are available online from the Meteoritical Society webpage:

http://www.lpi.usra.edu/meteor/metbull.php

DIOGENITE

LAR 12320 with LAR 12248

L5 CHONDRITE

BUC 10935, BUC 10937, BUC 10939, BUC 10948, and BUC 10951 with BUC 10934

SHERGOTTITE

LAR 12240 with LAR 12095

Petrographic Descriptions

These samples were previously announced in AMN 36,1 - following is a petrographic description update

Sample No.	**Location**	**Field No.**	**Dimensions (cm)**	**Weight (g)**	**Classification**
BUC 10934	Buckley Island	21437	4.0 x 3.5 x 3.3	472.2	L6 chondrite
BUC 10935		21446	4.0 x 2.9 x 2.0	362.4	
BUC 10937		21409	7.0 x 6.0 x 3.0	234.59	
BUC 10939		21448	6.0 x 4.5 x 3.5	143.9	
BUC 10948		21413	4.6 x 2.5 x 3.2	41.649	
BUC 10951		21421	4.0 x 1.5 x 1.75	26.050	

Macroscopic Description: Kathleen McBride and Cecilia Satterwhite
All of the exteriors of these chondrites have shiny brown/black weathered fusion crust with oxidation haloes, rust and fractures. The interiors have a rusty black/brown matrix with oxidation, fractures and metal.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
These sections consist of chondrules and chondrule fragments. Many of the silicates are mosaicized. In some, clasts are obvious (up to 1 cm), with melt veins present only in some sections. One obvious area of the section exhibits metal sulfide melt textures and some sections (BUC 10934, for example) exhibit metal and sulfides that appear slightly aligned into a petrofabric, with obvious fracturing in a direction perpendicular to the alignment of metal/sulfide. BUC 10939 shows sulfide mobility along abundant small fractures, with immiscibility textures evident in those veins. Olivine compositions are Fa_{23-24}, pyroxene $Fs_{20}Wo_1$. These meteorites are similar enough to warrant initial pairing. The meteorites are shock blackened L6 chondrites.

Sample No.	**Location**	**Field No.**	**Dimensions (cm)**	**Weight (g)**	**Classification**
DOM 10410	Dominion Range	20398	2.0 x 1.5 x 1.25	5.620	CR2 chondrite

Macroscopic Description: Kathleen McBride
50% of the exterior has brown/black fusion crust with oxidation haloes. The interior matrix is dark gray with 1-2 mm sized multicolor chondrules.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section exhibits well-defined, metal-rich chondrules (100-300 microns) and a few CAIs in a dark matrix of FeO-rich phyllosilicate. Polysynthetically twinned pyroxene is abundant. Silicates are unequilibrated; olivines range from $Fa_{1-31,}$ with most Fa_{0-2}, and pyroxenes from $Fs_{3-6}Wo_{0-1}$. The meteorite is probably a CR2 chondrite.

Sample No.	**Location**	**Field No.**	**Dimensions (cm)**	**Weight (g)**	**Classification**
DOM 10440	Dominion Range	20909	2.75 x 1.75 x 2.5	22.610	L Chondrite (Impact Melt)

Macroscopic Description: Kathleen McBride
The exterior is covered with 80% black/brown fusion crust. The interior is a rusty black, fine grained matrix with high metal content.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section consists dominantly of individual clasts containing shocked chondrules, as well as chondrule fragments. Clasts exhibit moderate shock effects. Metal sulfide melt textures are present, with most of the metal found within the veins between clasts. Veins are, for the most part, completely opaque. Olivine compositions are Fa_{24-29} and pyroxene is Fs_{20}. The meteorite is an impact melt breccia of an L chondrite precursor.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAP 10018	LaPaz Icefield	22327	6.5 x 5.0 x 4.5	254.79	Howardite

Macroscopic Description: Kathleen McBride

Shiny patches of brown/black fusion crust covers 60% of the exterior with some oxidation haloes and vugs. The interior is a gray matrix with no metal. Many angular multi-colored clasts of various sizes are visible.

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

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with a few fine- to coarse-grained basaltic clasts ranging up to 5 mm and one large diogenitic clast approaching 1 cm. Olivines are Fa_{29-45}. Most of the pyroxene is orthopyroxene with compositions ranging from $Fs_{22-53}Wo_{2-11}$, a single augite of $Fs_{13}Wo_{39}$. Fe/Mn ratio is 21-36. The meteorite is a howardite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAP 10101	LaPaz Icefield	22972	3.5 x 2.2 x 1.5	15.428	Howardite

Macroscopic Description: Cecilia Satterwhite

The exterior has 15% black fusion crust with oxidation haloes. Exposed interior is gray in color. The interior is light gray matrix with some oxidation. Inclusions of various sizes and color are visible.

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

This meteorite is dominated by fine-grained (~100-200 micron average grain size) basaltic material which occurs as both the matrix and larger individual pyroxene clasts within the meteorite. Two composite clasts are present in the section; one appears to be a melt clast with pyroxene grains with reaction rims, and the other looks like a multi-domained pyroxene that may have been recrystallized. Pyroxene compositions range from $Fs_{15-56}Wo_{1-5}$, and plagioclase is $An_{64-99}Or_{0-3}$. Two olivine analyses of Fa_{34} and Fa_{41} were obtained. The Fe/Mn ratio of the pyroxene is ~27-35. The meteorite is a howardite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAP 10109	LaPaz Icefield	22966	2.9 x 1.5 x 1.5	7.407	L3.5 chondrite

Macroscopic Description: Cecilia Satterwhite

30% of the exterior is covered with black/brown fusion crust. Oxidation haloes and brown weathering are visible on some surfaces. The interior is gray matrix with some large inclusions. Oxidation is scattered throughout and minor metal is visible.

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

The section exhibits numerous small to medium, well-defined chondrules (though one fragment is up to 5 mm) in a black matrix of fine-grained silicates, metal and troilite. Weak shock effects are present. Polysynthetically twinned pyroxene is extremely abundant. Silicates are unequilibrated; Olivines are Fa_{3-35}. Pyroxenes are $Fs_{21-28}Wo_{2-6}$. The meteorite is an L3 chondrite (estimated subtype 3.5).

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
GRA 12512	Graves Nunataks	24351	2.9 x 2.5 x 2.3	21.601	CO3 chondrite

Macroscopic Description: Cecilia Satterwhite

The exterior is covered with fractured, brown/black fusion crust. Exposed areas are pitted and weathered a rusty brown color. The interior is a dark gray to black matrix with abundant inclusions of various sizes; most are white or rusty in color. Some oxidation and rusty areas are visible.

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

The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and has mineral grains in a dark matrix. Metal and sulfide occur within and rimming the chondrules. Olivine ranges in composition from Fa_{1-74}, with a continuous range of intermediate compositions and a slight peak at Fa_{1-5}. One pyroxene analysis is Fs_1Wo_3. The matrix appears to consist largely of Fe-rich olivine. The meteorite is a CO3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12002	Larkman Nunatak	22620	17.5 x 12.7 x 12.6	4855.0	CV3 chondrite

Macroscopic Description: Cecilia Satterwhite

The exterior has a rough texture with patches of brown/black fractured fusion crust with abundant white, greenish-blue evaporites. The areas without fusion crust are dark gray to black color with abundant chondrules and CAIs visible. The interior is a dark gray to black matrix with abundant white and rusty inclusions, chondrules and CAIs of various sizes. Some oxidation is present.

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

The section exhibits large chondrules (up to 3 mm) and CAIs in a dark matrix. Olivines range from Fa_{0-34}. The meteorite is an unequilibrated CV3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12010	Larkman Nunatak	23955	7.5 x 5.0 x 5.0	409.63	Diogenite

Macroscopic Description: Kathleen McBride

50% of the exterior is a patchy, dark brown fusion crust exhibiting polygonal fractures. The matrix is yellow in color and has visible olivine crystals.

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

This heavily weathered section shows a groundmass of coarse (generally 200 microns, with larger clasts up to 2 mm) comminuted pyroxene, with minor plagioclase and SiO_2. Orthopyroxene has a composition of $Fs_{25}Wo_{2-3}$ and plagioclase is $An_{87-90}Or_{0-3}$. The Fe/Mn ratio of the pyroxene is ~28-32. The meteorite is a brecciated diogenite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12011	Larkman Nunatak	23233	14.5 x 6.0 x 6.0	701.170	Shergottite

Macroscopic Description: Kathleen McBride

95% of the exterior surface has shiny black fusion crust with a rough, ropey texture. The interior matrix is a gray with black, white and transparent mineral grains. This shergottite is very similar in appearance to LAR 06319.

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

This meteorite is composed of a fine-grained assemblage of pyroxene, olivine and maskelynite. Olivine occurs as phenocrysts with grain sizes up to 1 mm (smaller and more abundant than 12095 and 12240). Olivines have a brown staining probably due to shock. Pyroxene and maskelynite in the matrix are 200-400 microns in size. The maskelynites appear foliated in this section. Olivine is Fa_{23-58}; pyroxenes exhibit a range of compositions from pigeonite to subcalcic augite (Fs_{24}-$_{44}Wo_{3-27}$; Fe/Mn 26-35); plagioclase feldspar is intermediate in composition ($An_{49-52}Or_3$). This meteorite is an olivine-phyric shergottite but is different enough from LAR 12095 and LAR 12240 that it is not being paired here. It does, however, look very similar to LAR 06319.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12049	Larkman Nunatak	23979	4.0 x 2.1 x 1.5	23.134	CV3 chondrite

Macroscopic Description: Cecilia Satterwhite

The exterior is covered with fractured brown/black fusion crust with a rough texture. Exposed areas without fusion crust are dark gray to black in color with some oxidation. The interior is a dull gray to black matrix with a few lighter inclusions and oxidation.

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

The section exhibits large chondrules (up to 3 mm) and CAIs in a dark matrix. Olivines range from Fa_{1-32}. The meteorite is an unequilibrated CV3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12060	Larkman Nunatak	22263	3.5 x 2.5 x 2.0	17.870	Eucrite

Macroscopic Description: Kathleen McBride

Exterior has a rough, black fusion crust over 50% of its surface. The interior of this eucrite has a black and white granular texture with an occasional rust halo.

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

This meteorite is dominated by fine-grained (~200 micron average) basaltic material which occurs as both the host and clasts within the meteorite. Occasional coarser-grained clasts, with grain sizes up to 0.5 mm, are observed. Mineral compositions include orthopyroxene ($Fs_{63}Wo_2$), with lamellae of augite ($Fs_{27-29}Wo_{41-44}$), and plagioclase ($An_{75-97}Or_{0-1}$). The Fe/Mn ratio of the pyroxene is ~29-32. The meteorite is a brecciated eucrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12095	Larkman Nunatak	22629	5.5 x 3.8 x 3.4	133.132	Shergottite
LAR 12240		23250	5.0 x 3.0 x 3.0	57.596	

Macroscopic Description: Cecilia Satterwhite

The exteriors are a rough, fractured texture with brown/black fusion crust and some evaporites. Areas without fusion crust show tan matrix with some olivine grains. The interiors are greyish tan with abundant green mineral grains and some darker grains visible. Minor oxidation is present.

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

These meteorites are similar enough that one description will suffice. Each section is composed of a coarse-grained assemblage of pyroxene, olivine and maskelynite. Olivine occurs as phenocrysts with grain sizes up to 3 mm. Olivines have a brown staining probably due to shock. Pyroxene and maskelynite in the matrix are finer grained, typically reaching 0.5 mm. Sulfides and oxides are present, as is one shock melt vein in each section. Olivine is Fa_{28-42}; pyroxenes exhibit a range of compositions from pigeonite to subcalcic augite ($Fs_{25-31}Wo_{8-18}$; Fe/Mn_{27-32}); feldspar is intermediate in composition ($An_{54-64}Or_{0-1}$). These meteorites are olivine-phyric shergottites.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12099	Larkman Nunatak	22610	2.5 x 1.8 x 1.0	7.011	CO3 chondrite

Macroscopic Description: Cecilia Satterwhite

Black/brown fusion crust covers the exterior with some evaporites present. Some brown rusty areas are visible as are fractures. Interior is a black matrix with abundant lighter inclusions, some with minor oxidation.

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

The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and mineral grains in a dark matrix. Very little metal is present and only minor sulfides occur within the matrix. Olivine ranges in composition from Fa_{0-52}, with a continuous range of intermediate compositions and a slight peak at Fa_{1-2}. The matrix appears to consist largely of Fe-rich olivine. The meteorite is a CO3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12100	Larkman Nunatak	22603	3.8 x 2.9 x 1.5	24.572	CV3 chondrite

Macroscopic Description: Cecilia Satterwhite

Exterior has a black fusion crust with brown oxidation. Exposed interior reveals inclusions/chondrules with some rust and oxidation. Grayish brown interior is weathered with some rusty oxidation. Clast and inclusions are gray, white and weathered .

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

The section exhibits large chondrules (up to 3 mm) and CAIs in a dark matrix. Olivines range from Fa_{1-25}. The meteorite is an unequilibrated CV3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12139	Larkman Nunatak	23150	2.5 x 2.5 x 1.5	11.460	Howardite

Macroscopic Description: Kathleen McBride
Smooth brown/black fusion crust covers 50% of the exterior surface. The fine grained interior is tan to gray in color with black and white inclusions.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with fine- to coarse-grained basaltic clasts ranging up to 5 mm. One large diogenitic clast (~1 cm) takes up much of the section. Most of the pyroxene is orthopyroxene with compositions ranging from $Fs_{24-61}Wo_{1-4}$ (most Fs_{24-30}), a single augite of $Fs_{18}Wo_{42}$ and an olivine of Fa_{42}. Fe/Mn is 27-32. The meteorite is a howardite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12246	Larkman Nunatak	23935	3.5 x 3.0 x 2.0	22.148	CO3 chondrite

Macroscopic Description: Cecilia Satterwhite
This heavily fractured carbonaceous chondrite has black fusion crust on the exterior with some frothy areas. Exposed surfaces are weathered. The dark gray to black interior has abundant small white and rusty inclusion/chondrules. Some areas are heavy oxidized and rusty.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and mineral grains in a dark matrix. Metal and sulfide occur in the matrix. Olivine ranges in composition from Fa_{0-50}. One pyroxene analyses shows Fs_1Wo_3. The matrix appears to consist largely of Fe-rich olivine. The meteorite is a CO3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12248	Larkman Nunatak	23937	5.0 x 4.5 x 3.0	113.451	Diogenite
LAR 12320		23903	3.5 x 3.5 x 5.5	120.050	

Macroscopic Description: Kathleen McBride and Cecilia Satterwhite
The exterior surfaces have black/brown patches of fusion crust with polygonal fractures. Exposed areas without fusion crust are yellow to crème colored matrix with some gray patches. The interior matrices are fine grained, tan to weathered yellow-ochre in color, with a few darker inclusions.

Thin Section (,2) Description: Cari Corrigan and Linda Welzenbach
These sections are similar enough that one description will suffice. The sections show a groundmass of coarse (up to 1.5 mm) comminuted pyroxene, with minor plagioclase and SiO_2. Plagioclase also exists as individual rounded grains. Both sections contain a pervasive porosity that gives them a strange, mottled appearance. In some areas, large relict pyroxene grains (up to 1 cm) are present (some still exhibiting exsolution), but are still mosaicized and overprinted by porosity. This gives the sections the appearance of being brecciated but without strong clast boundaries. All silicates are mosaicized. Pyroxenes are Fs_{14-31}. Feldspars are $An_{92-94}Or_{0.1.}$ The Fe/Mn ratio of the pyroxene is ~27-28. The meteorites appear to be diogenites.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12249	Larkman Nunatak	23958	5.0 x 5.0 x 2.5	80.071	Howardite

Macroscopic Description: Cecilia Satterwhite

30% of the rough textured exterior has pitted, black fractured fusion crust. Exposed areas without fusion crust are gray in color with light and weathered inclusions. The coarse grained, gray interior has numerous light, dark and weathered inclusions. Some oxidation is present.

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

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with fine- to coarse-grained basaltic and diogenitic clasts ranging up to 5 mm. Pyroxene compositions range from $Fs_{20-56}Wo_{1-45.}$ Fe/Mn is 27-32. The meteorite is a howardite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12325	Larkman Nunatak	23967	7.4 x 6.0 x 3.0	263.9	LL Chondrite (Impact Melt)

Macroscopic Description: Cecilia Satterwhite

The rough, uneven exterior is black in color. Some of the smoother areas are lighter or more grayish in color than the rougher areas. Very small patches of rough, black fusion crust are present. The interior matrix is dark gray with heavily weathered rusty areas and visible metal grains.

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

The section consists dominantly of clasts with a fine-grained, melt-textured matrix of olivine and pyroxene (1-10 microns) with irregular blebs of metal, sulfide and fragments of mineral grains (200-300 micron grain size.) Clasts exhibit shock effects. Clasts of this texture exist throughout the section, with melt veins in between. One large sulfide bleb is about 2.5 mm. The mineral compositions are homogenous; olivine is Fa_{29} and pyroxene is Fs_{23}. The meteorite is an impact melt breccia of an LL chondrite precursor.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
LAR 12326	Larkman Nunatak	23915	25.0 x 20.0 x 15.0	10445.0	Howardite

Macroscopic Description: Kathleen McBride

The exterior of this breccia has a coarse to fined grained texture with multiple types of clasts, ranging in color from white to dark gray. Approximately 40% of the exterior surface has brown/black fusion crust and visible shock veins. The interior looks the same as the exterior but is less weathered.

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

The section shows a groundmass of comminuted pyroxene and plagioclase (up to 0.5 mm) with coarse-grained diogenitic clasts up to 5 mm. Groundmass is heavily shocked. Pyroxene compositions range from $Fs_{32-52}Wo_{2-25.}$ No olivine grains were found. This section is from a large, very brecciated howardite and this description may not be representative of the whole (since compositions here are essentially eucritic).

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
SZA 12430	Szabo Bluff	24330	12.0 x 3.0 x 7.0	412.12	CK4 Chondrite

Macroscopic Description: Kathleen McBride

50% of the exterior surface has rough, dark brown to black fusion crust. The exposed interior is dark gray with visible chondrules. Evaporites and polygonal fractures are present. The interior matrix is medium gray color with vague gray chondrules and inclusions.

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

The section consists of large (up to 2 mm), well-defined chondrules in a matrix of finer-grained silicates, sulfides and abundant magnetite. The meteorite is lightly weathered, but extensively shock blackened. Silicates are homogeneous. Olivine is Fa_{28-29} and orthopyroxene is $Fs_{17-28}Wo_{1-22}$. Feldspars are $An_{25-51}Wo_{1-4.}$ The meteorite appears to be a CK4 chondrite

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
SZA 12431	Szabo Bluff	24328	9.5 x 6.5 x 5.5	443.130	CO3 Chondrite

Macroscopic Description: Kathleen McBride

The exterior is a very dark, rusty brown color with vugs and evaporites and has no fusion crust. The interior of this carbonaceous chondrite is very weathered with a brown oxidation rind. The center of the meteorite is less weathered and reveals a black matrix.

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

The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments and mineral grains in a dark matrix. Rare metal and sulfide occur in the matrix. Olivine ranges in composition from Fa_{0-40}, with a continuous range of intermediate compositions and a slight peak at Fa_{1-5}. One pyroxene analyses shows from Fs_2Wo_1. The matrix appears to consist largely of Fe-rich olivine. The meteorite is a CO3 chondrite.

Sample No.	Location	Field No.	Dimensions (cm)	Weight (g)	Classification
SZA 12432	Szabo Bluff	24327	7.0 x 5.0 x 3.5	163.310	CO3 Chondrite

Macroscopic Description: Kathleen McBride

40% of the surface has a black fusion crust and exhibits both dull and shiny areas. The fusion crust has polygonal fractures and evaporites. The interior matrix is brown and weathered with vague appearing chondrules.

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

The section consists of abundant small (up to 1 mm) chondrules, chondrule fragments, a few CAIs (up to 2 mm) and mineral grains in a dark matrix. Metal and sulfide occur within the chondrules and in the matrix. Olivine ranges in composition from Fa_{0-73}. One pyroxene analysis is Fs_1Wo_{43}. The matrix appears to consist largely of Fe-rich olivine. Terrestrial weathering effects are moderate. The meteorite is a CO3 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 **Sept. 13, 2013 deadline** will be reviewed at the MWG meeting on **Oct. 3-4 in Washington, D.C**. Requests that are received after the deadline may be delayed for review until MWG meets again in the Spring of 2014. 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 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/antmet/statistics.cfm

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

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

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**

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Meteorites On-Line

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

JSC Curator, Antarctic meteorites	http://curator.jsc.nasa.gov/antmet/
JSC Curator, HED Compendium	http://curator.jsc.nasa.gov/antmet/hed/
JSC Curator, Lunar Meteorite Compendium	http://curator.jsc.nasa.gov/antmet/lmc/
JSC Curator, Mars Meteorite Compendium	http://curator.jsc.nasa.gov/antmet/mmc/
ANSMET	www.case.edu/ansme
Smithsonian Institution	http://mineralsciences.si.edu/
Lunar Planetary Institute	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://www.meteoritemag.org/
Geochemical Society	http://www.geochemsoc.org
Washington Univ. Lunar Meteorite	http://meteorites.wustl.edu/lunar/moon_meteorites.htm
Washington Univ. "meteor-wrong"	http://meteorites.wustl.edu/meteorwrongs/meteorwrongs.htm
Portland State Univ. Meteorite Lab	http://meteorites.pdx.edu/

Other Websites of Interest

OSIRIS-REx	http://osiris-rex.lpl.arizona.edu/
Mars Exploration	http://mars.jpl.nasa.gov
Rovers	http://marsrovers.jpl.nasa.gov/home/
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://curator.jsc.nasa.gov/