Antarctic Meteorite Newsletter

Volume 21, Number 2 August 1998

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 Marilyn Lindstrom, Code SN2, NASA Johnson Space Center, Houston, Texas 77058

Inside this Issue

Curator's Comments

by Marilyn Lindstrom

New Meteorites

This newsletter contains classifications of 322 new meteorites from the 1996-1997 ANSMET collections. These include the first 7 of 1100 from the 1997 field season. Descriptions are given for 36 meteorites of special petrologic type, the most notable of which is EET96238, a CH chondrite. Others include 9 achondrites (6 ureilites, 3 HEDs); 8 carbonaceous chondrites (7 C2, C3V); 9 enstatite chondrites; and 9 unequilibrated or unusual ordinary chondrites.

Martian Meteorites

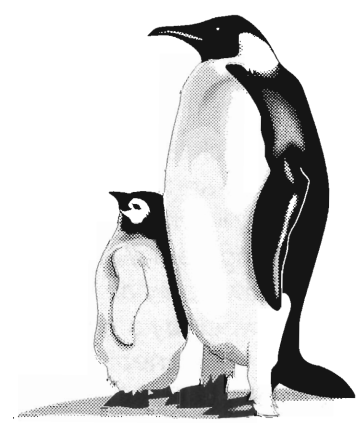
Our new project this year was processing and allocating a fully fusion-crusted piece of martian meteorite Nakhla, made available to investigators by the British Museum. In March, Monica Grady brought the sample to JSC where she oversaw the process of splitting the meteorite into two pieces in the nitrogen glove box. (It sure is great to see such a beautiful fresh specimen!) She collected requests and approved an allocations list. Kathleen McBride processed and documented the allocations of 61 chips to 37 investigators. Any further requests for the sample should be directed to Monica.

Meanwhile, we continue to allocate samples of our five Antarctic martian meteorites to investigators approved by MWG for studies of Mars geology, chemistry and life. For an overview of published results on martian meteorites, keep an eye on the LPI web page "On the Question of the Martian Meteorites" at http://cass.jsc.nasa.gov/lpi/meteorites/mars_meteorite.html. Also, plan to attend the HQ sponsored workshop on martian meteorites to be held in Houston, November 2-4, 1998. For more information look up http://cass.jsc.nasa.gov/meetings/marsmet98/.

Meteorite Teachers' Guide and Educational Materials

NASA has recently published ***Exploring Meteorite Mysteries***, a teachers' guide with classroom activities. The book contains an overview on meteorites and 19 lessons dealing with questions about meteorites, asteroids and impacts such as 'what are they? where did they come from? how did they form? or what good are

continued on page 2



Sample Request Deadline
Sept. 11, 1998

MWG Meets
Sept. 25-26, 1998

The Mars Meteorite Compendium — 1998 is now online!

The Mars Meteorite Compendium — 1998 is currently at the printer, but you don't have to wait for the printed copy. Check it out now at:

www-curator.jsc.nasa.gov/curator/antmet/marsmets/mmc.htm

This compendium includes twelve known meteorites from Mars. Get the lastest facts about the mineralogy, petrology, geochronology and isotopic studies of each. The author, Chuck Meyer, has included an extensive bibliography at the end of this publication.

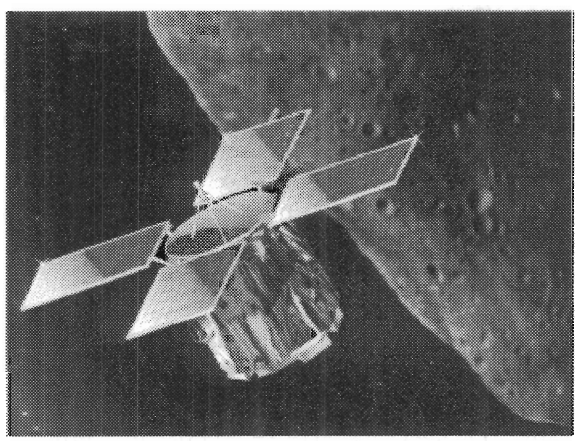
Thirteenth Martian Meteorite Discovered in Desert

A ~2 kg rock found in the Sahara Desert has been positively identified as originating from Mars. The rock known only as "Lucky 13" is owned by a private citizen. It reportedly resembles EETA79001 lithology A. It is claimed to have a space exposure age ~1 Ma older than EETA79001.

continued from page 1

they?' The book was written by a team of scientists and educators led by the JSC meteorite curator. Also available are lucite disks containing 6 meteorite chips. A set of 48 captioned slides is available to assist with telling the meteorite story. A companion lunar volume, ***Exploring the Moon***, written by a team led by Jeff Taylor, has recently been revised and reissued. Scientists may request copies of the teachers' guides or loan of sample disks and slides from the curators' office. Teachers should request materials from the NASA Educator Resource Centers around the country.

Asteroids, Comets and Meteorites in the News



1998-1999 is the year of small bodies (NASA's shorthand for asteroids, comets and meteorites). Summer 1998 began with two blockbuster movies, Deep Impact and Armageddon, about small body impacts on Earth. They have heightened public awareness of impact hazards and led Congress to increase funding for searches for near Earth objects (NEOs).

The news coverage will continue as three NASA missions launch or encounter their small body targets in October 1998 to February 1999. Deep Space 1, a New Millennium technology mission, will launch in October 1998 to flyby and map asteroid 1992 KD and comet Borrelly. The NEAR Discovery mission will encounter its prime target asteroid Eros in January 1999, go into orbit, and begin a 1-year mapping mission. STARDUST, another Discovery mission, will launch in February 1999 on a sample return mission to comet Wild 2. Keep your eyes on the sky and the news headlines.

New Meteorites

From 1996-1997 Collections

Pages 4-19 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 21(1), February 1998. Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrological type are also recast in Table 2.

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

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

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

Brian Mason 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
DAV — David Glacier
DEW — Mt. DeWitt
DOM — Dominion Range
DRP — Derrick Peak
EET — Elephant Moraine
GEO — Geologists Range
GRA — Graves Nunataks
GRO — Grosvenor Mountains
HOW — Mt. Howe
ILD — Inland Forts
LAP — LaPaz Ice Field
LEW — Lewis Cliff
LON — Lonewolf Nunataks
MAC — MacAlpine Hills
MBR — Mount Baldr
MCY — MacKay Glacier
MET — Meteorite Hills
MIL — Miller Range
OTT — Outpost Nunatak
PAT — Patuxent Range
PCA — Pecora Escarpment
PGP — Purgatory Peak
PRE — Mt. Prestrud
QUE — Queen Alexandra Range
RKP — Reckling Peak
STE — Stewart Hills
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting

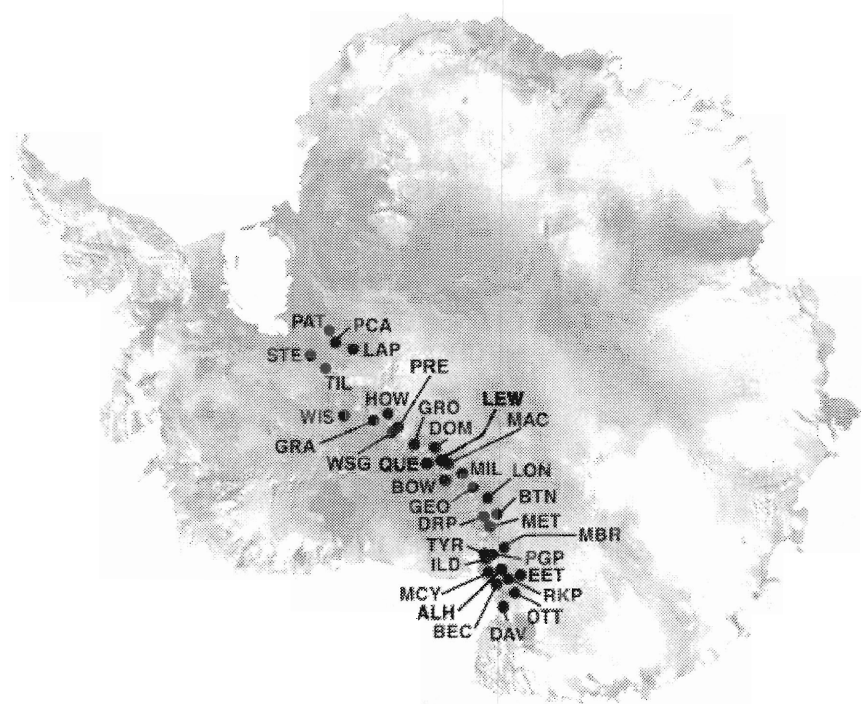


Table 1: List of Newly Classified Antarctic Meteorites**

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
DEW 96600		1644.4	H6 CHONDRITE	Be	B	19	17
DEW 96601		17.4	H3.8 CHONDRITE	B/Ce	A/B	14-21	3-17
EET 96021	~	898.5	L6 CHONDRITE	C	B		
EET 96055	~	205.5	H5 CHONDRITE	B/C	A		
EET 96058	~	185.0	H5 CHONDRITE	B/C	B		
EET 96059	~	4.2	H5 CHONDRITE	B/C	A		
EET 96065	~	3.3	H6 CHONDRITE	A/B	A		
EET 96067	~	8.5	H6 CHONDRITE	A/B	A		
EET 96068	~	8.4	L6 CHONDRITE	B	A/B		
EET 96069	~	5.0	H6 CHONDRITE	A/B	A/B		
EET 96074	~	25.3	LL5 CHONDRITE	A/B	A/B		
EET 96077		0.2	EH3 CHONDRITE	C	B		0-6
EET 96080		28.1	LL6 CHONDRITE	A/B	A/B	31	25
EET 96081	~	4.4	H6 CHONDRITE	B/C	A		
EET 96084		4.6	L4 CHONDRITE	B/C	A	24	21
EET 96085	~	3.4	L6 CHONDRITE	B	A		
EET 96086	~	4.6	H5 CHONDRITE	B/C	A		
EET 96087	~	13.4	H6 CHONDRITE	B/C	A		
EET 96088	~	40.4	L6 CHONDRITE	A/B	A		
EET 96089	~	8.9	L6 CHONDRITE	B	A		
EET 96090	~	40.0	LL6 CHONDRITE	B	B		
EET 96091	~	3.0	L6 CHONDRITE	Be	B		
EET 96092	~	57.1	L6 CHONDRITE	B/C	B		
EET 96093	~	128.1	H5 CHONDRITE	C	B		
EET 96094	~	72.5	L6 CHONDRITE	B	B		
EET 96095	~	31.6	L5 CHONDRITE	A	A/B		
EET 96096		12.7	C2 CHONDRITE	B	B/C	0-32	4
EET 96097		12.9	C2 CHONDRITE	B	B/C	0-31	1
EET 96098		15.3	C2 CHONDRITE	B	B/C	0-30	1-6
EET 96099	~	5.9	H6 CHONDRITE	C	B		
EET 96100	~	30.0	L6 CHONDRITE	B/C	B		
EET 96101	~	75.4	L6 CHONDRITE	B/C	A/B		
EET 96102	~	76.8	L6 CHONDRITE	B	B		
EET 96103		4.3	EH4 CHONDRITE	C	B/C		0-2
EET 96104		26.5	L4 CHONDRITE	B	A/B	25	10-18
EET 96105	~	21.9	H5 CHONDRITE	B/C	B		
EET 96106		21.1	L4 CHONDRITE	B	A/B	24-29	12-21
EET 96107	~	1.5	L6 CHONDRITE	B/C	A/B		
EET 96108	~	1.4	H6 CHONDRITE	C	B		
EET 96109		0.9	LL3.4 CHONDRITE	A/B	A/B	0-19	3-26
EET 96110	~	2.2	L6 CHONDRITE	B	A		
EET 96111	~	46.3	L6 CHONDRITE	B	B		
EET 96112	~	0.6	H6 CHONDRITE	B/C	A		
EET 96113	~	0.7	H6 CHONDRITE	B/C	A		
EET 96114	~	0.5	H6 CHONDRITE	B/Ce	A		
EET 96115	~	4.4	H5 CHONDRITE	A/B	A		
EET 96116	~	1.5	L6 CHONDRITE	B/C	A/B		
EET 96117		19.0	L4 CHONDRITE	B/C	A	25	20-23

~Classified by using refractive indices.

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 96118	~	6.3	L6 CHONDRITE	B/Ce	A/B		
EET 96120	~	0.9	L6 CHONDRITE	B	A/B		
EET 96122	~	28.9	L6 CHONDRITE	Be	B		
EET 96123		8.5	H4 CHONDRITE	C	B	16	14
EET 96124		5.9	L5 CHONDRITE	A/B	A/B	24	20
EET 96125	~	0.9	H6 CHONDRITE	C	A		
EET 96126	~	2.4	L6 CHONDRITE	B	A		
EET 96127	~	44.2	L6 CHONDRITE	B	A/B		
EET 96128	~	6.9	H6 CHONDRITE	C	A		
EET 96129	~	66.7	L6 CHONDRITE	C	B/C		
EET 96130	~	34.0	L6 CHONDRITE	B	B		
EET 96131	~	1.8	L6 CHONDRITE	B/C	B		
EET 96132	~	97.7	L6 CHONDRITE	B	B		
EET 96133	~	13.8	H5 CHONDRITE	C	C		
EET 96134	~	97.7	H5 CHONDRITE	A/B	A/B		
EET 96135		95.7	EH4-5 CHONDRITE	B	A		0-1
EET 96136	~	67.7	L6 CHONDRITE	B	B		
EET 96137		37.0	LL6 CHONDRITE	A/B	B	30	25
EET 96138	~	49.6	L6 CHONDRITE	B/C	A		
EET 96139	~	122.2	H6 CHONDRITE	B	B		
EET 96140	~	45.6	L6 CHONDRITE	A/B	B		
EET 96141		13.9	LL4 CHONDRITE	A/B	A/B	29	10-24
EET 96142	~	1.9	H6 CHONDRITE	B/C	A		
EET 96143	~	35.7	H6 CHONDRITE	B/C	A		
EET 96144		3.0	LL6 CHONDRITE	A/B	A	30	24
EET 96145	~	4.0	L6 CHONDRITE	B/C	A		
EET 96146	~	2.2	L6 CHONDRITE	B/C	A		
EET 96147	~	2.0	H6 CHONDRITE	B/C	A		
EET 96148	~	0.7	L6 CHONDRITE	C	A		
EET 96149	~	0.4	L6 CHONDRITE	C	A		
EET 96150	~	2.1	L6 CHONDRITE	A	A		
EET 96151	~	1.4	H6 CHONDRITE	B/C	A		
EET 96152	~	63.4	L6 CHONDRITE	B	A		
EET 96153	~	5.3	L6 CHONDRITE	B	A		
EET 96154	~	3.7	H6 CHONDRITE	B	A/B		
EET 96155	~	17.5	L6 CHONDRITE	B/C	A		
EET 96156	~	74.3	L6 CHONDRITE	B	A		
EET 96157	~	33.2	L6 CHONDRITE	B/C	A		
EET 96158	~	15.3	L6 CHONDRITE	B	A		
EET 96159		4.5	H4 CHONDRITE	B	A	19	17
EET 96160		0.9	L3.6 CHONDRITE	C	A/B	4-22	13-16
EET 96161	~	2.3	L6 CHONDRITE	A/B	A/B		
EET 96162	~	16.1	H6 CHONDRITE	B/C	A		
EET 96163	~	0.6	H6 CHONDRITE	B/C	B		
EET 96164	~	2.2	H6 CHONDRITE	B/C	B		
EET 96165	~	25.0	H6 CHONDRITE	B/C	B/C		
EET 96166	~	3.9	L6 CHONDRITE	B	B/C		
EET 96167	~	40.4	L6 CHONDRITE	B	B/C		
EET 96168		2.6	H5 CHONDRITE	B	A/B		16
EET 96169	~	10.3	L6 CHONDRITE	B	B/C		
EET 96170	~	11.2	H5 CHONDRITE	B/C	B		
EET 96171	~	27.6	L6 CHONDRITE	A/B	A/B		

~Classified by using refractive indices.

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 96172	~	3.8	L6 CHONDRITE	B/C	B		
EET 96173	~	0.6	L6 CHONDRITE	B	A		
EET 96174	~	14.5	L6 CHONDRITE	B/C	B		
EET 96175	~	1.4	H6 CHONDRITE	B/C	A/B		
EET 96176	~	19.3	L6 CHONDRITE	A	A/B		
EET 96177	~	7.8	L6 CHONDRITE	C	B		
EET 96178	~	21.4	H6 CHONDRITE	C	A		
EET 96179	~	5.3	L6 CHONDRITE	A/B	B		
EET 96180	~	8.4	H6 CHONDRITE	C	A		
EET 96181	~	29.1	H5 CHONDRITE	B	A/B		
EET 96182	~	4.1	H5 CHONDRITE	B/C	A/B		
EET 96183	~	1.0	L6 CHONDRITE	C	B		
EET 96184	~	15.2	L6 CHONDRITE	B	B		
EET 96185	~	4.5	L6 CHONDRITE	C	B		
EET 96186	~	101.3	H6 CHONDRITE	C	A/B		
EET 96187	~	0.6	H6 CHONDRITE	C	A/B		
EET 96188		16.4	L/LL3.2 CHONDRITE	A/B	B	2-62	7-22
EET 96189		31.0	H5 CHONDRITE	A/B	A/B	19	17
EET 96190	~	60.8	H5 CHONDRITE	B	A		
EET 96191	~	0.7	H6 CHONDRITE	C	A		
EET 96192	~	57.3	H5 CHONDRITE	B/C	A		
EET 96194	~	1.1	H6 CHONDRITE	B	A		
EET 96195	~	1.7	L6 CHONDRITE	A/B	A		
EET 96196	~	0.5	L6 CHONDRITE	C	A		
EET 96197	~	3.2	L6 CHONDRITE	A/B	A		
EET 96198	~	0.3	H6 CHONDRITE	C	B/C		
EET 96199	~	4.9	H6 CHONDRITE	C	A/B		
EET 96200	~	65.0	L6 CHONDRITE	B/C	A		
EET 96201	~	8.4	H5 CHONDRITE	B/C	A		
EET 96202		3.7	EH4-5 CHONDRITE	B/Ce	B/C		0-1
EET 96203	~	0.3	L6 CHONDRITE	B/Ce	A		
EET 96204		12.1	H5 CHONDRITE	B	B	19	16
EET 96205	~	18.8	L6 CHONDRITE	B	A/B		
EET 96206	~	3.1	L6 CHONDRITE	B/C	A		
EET 96207	~	2.6	L6 CHONDRITE	B	A/B		
EET 96208	~	14.7	L5 CHONDRITE	B/Ce	B		
EET 96209	~	1.0	H6 CHONDRITE	B/C	B		
EET 96210	~	1.7	L6 CHONDRITE	C	A		
EET 96211	~	113.9	L6 CHONDRITE	C	A		
EET 96212	~	107.1	H5 CHONDRITE	C	A		
EET 96213		19.9	LL4 CHONDRITE	B	C	30	11-25
EET 96214		5.9	LL4 CHONDRITE	B	C	30	9-24
EET 96215	~	15.6	L6 CHONDRITE	C	A		
EET 96216		0.9	L3.8 CHONDRITE	Ce	B	8-28	2-21
EET 96217		10.1	EH4-5 CHONDRITE	C	B/C		0-2
EET 96218	~	16.6	L5 CHONDRITE	A/B	A		
EET 96219	~	18.3	L6 CHONDRITE	B/C	B		
EET 96220	~	2.9	H6 CHONDRITE	B/C	A		
EET 96221	~	24.3	L6 CHONDRITE	B/C	A		
EET 96222	~	8.3	L5 CHONDRITE	A/B	A		
EET 96223		2.7	EH4-5 CHONDRITE	B/C	A/B		0-3
EET 96224		0.6	L5 CHONDRITE	B	A	25	21

~Classified by using refractive indices.

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 96225	~	1.3	L5 CHONDRITE	B/C	A		
EET 96226		2.1	C2 CHONDRITE	B	A/B	0-42	
EET 96227	~	4.9	L5 CHONDRITE	B/C	A/B		
EET 96228	~	1.2	H6 CHONDRITE	B/C	A		
EET 96229	~	4.1	L6 CHONDRITE	B/C	A		
EET 96230	~	31.7	L6 CHONDRITE	C	A		
EET 96231	~	73.9	H6 CHONDRITE	C	B		
EET 96232	~	14.3	L6 CHONDRITE	B/C	A/B		
EET 96233	~	0.9	L6 CHONDRITE	B/C	A		
EET 96234		2.3	L4 CHONDRITE	B	A/B	25	22-26
EET 96235	~	5.7	L6 CHONDRITE	A/B	A/B		
EET 96236	~	0.3	L6 CHONDRITE	B/C	A/B		
EET 96237	~	0.4	H6 CHONDRITE	Be	B		
EET 96238		0.4	CH3 CHONDRITE	A	A	0-40	0-4
EET 96239	~	1.0	L5 CHONDRITE	B	B		
EET 96240		11.6	L4 CHONDRITE	B	A	25	7-21
EET 96241		31.2	LL6 CHONDRITE	A/B	A/B	30	24
EET 96242	~	23.0	H6 CHONDRITE	B/C	A		
EET 96243		14.7	L4 CHONDRITE	B/C	A/B	25	21
EET 96244	~	20.0	H5 CHONDRITE	C	A		
EET 96245	~	14.4	H5 CHONDRITE	B	A		
EET 96246	~	44.5	H5 CHONDRITE	B/C	A		
EET 96247	~	86.1	H5 CHONDRITE	B/C	A		
EET 96248	~	44.9	H5 CHONDRITE	B/C	B		
EET 96249	~	40.3	H6 CHONDRITE	B/C	A/B		
EET 96250	~	50.5	H6 CHONDRITE	C	B		
EET 96251	~	100.8	H6 CHONDRITE	C	C		
EET 96252	~	48.9	L6 CHONDRITE	C	C		
EET 96253		15.4	H4 CHONDRITE	A/B	A	19	16
EET 96254	~	6.9	H5 CHONDRITE	B/C	A/B		
EET 96255	~	17.0	L6 CHONDRITE	C	C		
EET 96256	~	1.2	L6 CHONDRITE	C	C		
EET 96257		10.8	H5 CHONDRITE	B	B	18	16
EET 96258	~	26.6	L6 CHONDRITE	C	A/B		
EET 96259		12.1	CR2 CHONDRITE	B/C	C	0-4	1-4
EET 96260	~	7.6	H5 CHONDRITE	A/B	A		
EET 96261	~	62.5	L6 CHONDRITE	A/B	A		
EET 96262		54.2	UREILITE	B	A/B	14-15	
EET 96263		8.6	H5 CHONDRITE	A/B	A	19	17
EET 96264		3.6	H6 CHONDRITE	A/B	A	19	16
EET 96265	~	1.0	H6 CHONDRITE	A	A		
EET 96266	~	4.7	L6 CHONDRITE	B	A/B		
EET 96267	~	106.4	L6 CHONDRITE	B	B		
EET 96268	~	13.1	L6 CHONDRITE	A/B	A/B		
EET 96269	~	5.9	H6 CHONDRITE	A	A		
EET 96270	~	65.4	L6 CHONDRITE	A/B	A		
EET 96271	~	94.8	L6 CHONDRITE	C	B		
EET 96272	~	13.6	L6 CHONDRITE	A	A		
EET 96273	~	147.2	L6 CHONDRITE	A/B	A/B		
EET 96274	~	128.1	L6 CHONDRITE	B	B		
EET 96275	~	9.5	L6 CHONDRITE	B	A/B		

~Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 96276 ~	8.3	L6 CHONDRITE	B	A/B		
EET 96277 ~	15.8	L6 CHONDRITE	A	A		
EET 96278 ~	22.7	H6 CHONDRITE	C	B/C		
EET 96279	45.3	LL6 CHONDRITE	Ce	B/C	28	24
EET 96280 ~	4.4	H6 CHONDRITE	B/C	A		
EET 96281 ~	2.4	L6 CHONDRITE	B	A/B		
EET 96282 ~	0.7	L5 CHONDRITE	B	B		
EET 96283 ~	19.4	H6 CHONDRITE	B/C	A/B		
EET 96284 ~	7.6	L6 CHONDRITE	B	A		
EET 96285 ~	2.9	L6 CHONDRITE	B/C	A		
EET 96286	12.9	CV3 CHONDRITE	B/C	B	1-2	1-4
EET 96287 ~	4.6	L6 CHONDRITE	B	B		
EET 96288	33.3	H4 CHONDRITE	B	A	19	16
EET 96289 ~	5.7	L6 CHONDRITE	B	A		
EET 96290	28.7	L4 CHONDRITE	A/B	A/B	26	11-20
EET 96291 ~	0.8	H6 CHONDRITE	B/C	A		
EET 96292 ~	13.8	L4 CHONDRITE	B	A/B		
EET 96293	100.6	UREILITE	B	A	6-13	11
EET 96294 ~	10.4	L6 CHONDRITE	B	B		
EET 96295 ~	11.9	L6 CHONDRITE	B	B		
EET 96296 ~	2.6	H6 CHONDRITE	B/C	A		
EET 96297 ~	2.9	H5 CHONDRITE	C	B		
EET 96298 ~	20.7	L6 CHONDRITE	B	A/B		
EET 96299	50.5	EH4-5 CHONDRITE	B	B		0-1
EET 96300 ~	4.8	H6 CHONDRITE	C	A		
EET 96301 ~	0.7	H6 CHONDRITE	C	A		
EET 96302 ~	15.3	H6 CHONDRITE	C	A		
EET 96303	28.3	LL5 CHONDRITE	A/B	A/B	30	25
EET 96304 ~	15.7	L6 CHONDRITE	B/C	A		
EET 96305 ~	17.0	L6 CHONDRITE	B	B		
EET 96306 ~	1.3	H6 CHONDRITE	C	A		
EET 96307 ~	2.4	H6 CHONDRITE	C	A		
EET 96308	14.7	LL6 CHONDRITE	A	A/B	30	25
EET 96309	7.9	EH4-5 CHONDRITE	C	A		1-4
EET 96310	6.8	H4 CHONDRITE	B	A	19	17
EET 96311	13.1	LL6 CHONDRITE	A	A	30	25
EET 96312 ~	1.1	L6 CHONDRITE	B	A		
EET 96313 ~	126.6	L6 CHONDRITE	A/B	A		
EET 96314	80.3	UREILITE	B	A	2-13	11
EET 96315 ~	46.6	H6 CHONDRITE	C	A/B		
EET 96316 ~	75.3	L6 CHONDRITE	A/B	A/B		
EET 96317 ~	99.9	L6 CHONDRITE	B	B		
EET 96318 ~	2.5	H6 CHONDRITE	C	A/B		
EET 96320 ~	36.6	L6 CHONDRITE	B/C	B/C		
EET 96321	6.3	LL5 CHONDRITE	B	B	29	
EET 96322	17.1	UREILITE	B/C	B	11-15	13
EET 96323 ~	1.2	L6 CHONDRITE	B	A/B		
EET 96324 ~	66.8	L6 CHONDRITE	C	A/B		
EET 96325 ~	2.1	L6 CHONDRITE	C	A/B		
EET 96326 ~	1.3	L6 CHONDRITE	B/C	B		
EET 96327 ~	1.5	L4 CHONDRITE	B	A/B		
EET 96328	7.1	UREILITE	B	B	12-15	13

~Classified by using refractive indices.

Sample Number		Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 96329	~	10.0	L6 CHONDRITE	B/C	B		
EET 96330	~	75.8	L6 CHONDRITE	A	A		
EET 96331		121.9	UREILITE	B	A/B	13	11
EET 96332	~	136.5	L6 CHONDRITE	B/C	B		
EET 96333	~	164.1	L6 CHONDRITE	B/C	B		
EET 96334	~	5.6	H6 CHONDRITE	C	B		
EET 96335	~	11.2	L5 CHONDRITE	B/C	B		
EET 96336	~	12.8	L6 CHONDRITE	A/B	A/B		
EET 96337	~	73.9	L6 CHONDRITE	B	A/B		
EET 96338	~	62.6	H6 CHONDRITE	B	A/B		
EET 96339	~	41.3	L5 CHONDRITE	B	A/B		
EET 96340	~	137.8	L6 CHONDRITE	B/C	A/B		
EET 96341		26.0	EH4-5 CHONDRITE	A	A		0-3
EET 96342	~	3.9	H6 CHONDRITE	B/C	A/B		
EET 96343	~	19.7	L6 CHONDRITE	B	A		
EET 96344	~	2.7	H6 CHONDRITE	B	A		
EET 96345	~	15.3	L4 CHONDRITE	A/B	A/B		
EET 96346	~	97.2	L6 CHONDRITE	B/C	A		
EET 96347		115.1	H5 CHONDRITE	B	C	19	16
EET 96348		86.9	H6 CHONDRITE	Ce	C	19	16
EET 96349	~	25.6	L6 CHONDRITE	B	A/B		
EET 96350	~	36.5	L6 CHONDRITE	A/B	A		
EET 96351	~	120.8	L6 CHONDRITE	B	A/B		
EET 96352		21.5	LL5 CHONDRITE	A	B	31	25
MET 96501	~	4939.3	L6 CHONDRITE	Be	B		
MET 96502	~	915.6	L6 CHONDRITE	Ce	C		
MET 96503		404.0	L3.6 CHONDRITE	B	A	7-32	
MET 96504	~	618.2	L5 CHONDRITE	B	B		
MET 96505	~	289.8	L6 CHONDRITE	C	C		
MET 96506		363.5	H6 CHONDRITE	B	B/C	19	17
MET 96507		443.1	L5 CHONDRITE	A	B	24	20
MET 96508	~	629.2	L6 CHONDRITE	A/B	A/B		
MET 96509	~	896.9	L6 CHONDRITE	B	B		
MET 96510		277.9	L5 CHONDRITE	A	A/B	24	21
MET 96511	~	303.4	L6 CHONDRITE	B/C	A		
MET 96512	~	2133.5	L6 CHONDRITE	A/Be	B		
MET 96513		153.4	L5 CHONDRITE	A	A/B	24	21
MET 96514	~	193.9	L6 CHONDRITE	A	A/B		
MET 96515		308.7	L3.5 CHONDRITE	A/B	A	1-30	3-16
MET 96516		108.4	H5 CHONDRITE	C	B	19	16
MET 96517	~	126.6	L5 CHONDRITE	B/C	A/B		
MET 96518	~	116.8	L6 CHONDRITE	B/C	A/B		
MET 96519	~	121.9	L6 CHONDRITE	B/C	A/B		
MET 96520		172.8	H6 CHONDRITE	B	B	20	17
MET 96521		131.9	H6 CHONDRITE	B	A/B	19	16
MET 96522	~	141.2	L5 CHONDRITE	B/C	A/B		
MET 96523	~	100.0	L6 CHONDRITE	B/C	A/B		
MET 96524	~	81.5	L6 CHONDRITE	B	A/B		
MET 96525		110.3	H4 CHONDRITE	A/B	A/B	20	16-21
MET 96526	~	63.5	L5 CHONDRITE	B	A		
MET 96527		15.2	H5 CHONDRITE	C	A	17	15

~Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MET 96528	14.1	H6 CHONDRITE	C	B/C	19	17
MET 96529	111.6	LL5 CHONDRITE	A	B	31	25
MET 96530	36.6	LL6 CHONDRITE	A	A/B	30	25
MET 96531	46.8	H5 CHONDRITE	B	B	19	16
MET 96532 ~	55.5	L5 CHONDRITE	B	A/B		
MET 96533 ~	3.2	L5 CHONDRITE	B	A/B		
MET 96534	51.5	H5 CHONDRITE	B	A/B	20	17
MET 96535	45.0	H6 CHONDRITE	C	B	19	16-18
MET 96536 ~	45.8	L6 CHONDRITE	A/B	B		
MET 96537 ~	31.5	L6 CHONDRITE	A/B	B		
QUE 97001	2358.3	HOWARDITE	A	A/B		17-54
QUE 97002	1384.3	HOWARDITE	B	A/B		54-60
QUE 97003	0.9	C2 CHONDRITE	B	A	0-32	1-2
QUE 97004	13.9	EUCRITE (BRECCIATED)	A	A		59
QUE 97005	0.7	C2 CHONDRITE	B	A	0-46	1-2
QUE 97006	4057.5	H5 CHONDRITE	C	C	18	16

~Classified by using refractive indices.

**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.

Table 2: Newly Classified Specimens Listed By Type **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
QUE 97004	13.9	EUCRITE (BRECCIATED)	A	A		59
QUE 97001	2358.3	HOWARDITE	A	A/B		17-54
QUE 97002	1384.3	HOWARDITE	B	A/B		54-60
EET 96262	54.2	UREILITE	B	A/B	14-15	
EET 96293	100.6	UREILITE	B	A	6-13	11
EET 96314	80.3	UREILITE	B	A	2-13	11
EET 96322	17.1	UREILITE	B/C	B	11-15	13
EET 96328	7.1	UREILITE	B	B	12-15	13
EET 96331	121.9	UREILITE	B	A/B	13	11
		Carbonaceous Chondrites				
EET 96096	12.7	C2 CHONDRITE	B	B/C	0-32	4
EET 96097	12.9	C2 CHONDRITE	B	B/C	0-31	1
EET 96098	15.3	C2 CHONDRITE	B	B/C	0-30	1-6
EET 96226	2.1	C2 CHONDRITE	B	A/B	0-42	
QUE 97003	0.9	C2 CHONDRITE	B	A	0-32	1-2
QUE 97005	0.7	C2 CHONDRITE	B	A	0-46	1-2
EET 96238	0.4	CH3 CHONDRITE	A	A	0-40	0-4
EET 96259	12.1	CR2 CHONDRITE	B/C	C	0-4	1-4
EET 96286	12.9	CV3 CHONDRITE	B/C	B	1-2	1-4
		Chondrites - Type 3				
DEW 96601	17.4	H3.8 CHONDRITE	B/Ce	A/B	14-21	3-17
EET 96188	16.4	L/LL3.2 CHONDRITE	A/B	B	2-62	7-22
MET 96515	308.7	L3.5 CHONDRITE	A/B	A	1-30	3-16
EET 96160	0.9	L3.6 CHONDRITE	C	A/B	4-22	13-16
MET 96503	404.0	L3.6 CHONDRITE	B	A	7-32	
EET 96216	0.9	L3.8 CHONDRITE	Ce	B	8-28	2-21
EET 96109	0.9	LL3.4 CHONDRITE	A/B	A/B	0-19	3-26

~Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		E Chondrites				
EET 96077	0.2	EH3 CHONDRITE	C	B		0-6
EET 96103	4.3	EH4 CHONDRITE	C	B/C		0-2
EET 96135	95.7	EH4-5 CHONDRITE	B	A		0-1
EET 96202	3.7	EH4-5 CHONDRITE	B/Ce	B/C		0-1
EET 96217	10.1	EH4-5 CHONDRITE	C	B/C		0-2
EET 96223	2.7	EH4-5 CHONDRITE	B/C	A/B		0-3
EET 96299	50.5	EH4-5 CHONDRITE	B	B		0-1
EET 96309	7.9	EH4-5 CHONDRITE	C	A		1-4
EET 96341	26.0	EH4-5 CHONDRITE	A	A		0-3

~Classified by using refractive indices.

Table 3: Tentative Pairings for New Specimens

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 Bulletin No. 76 (Meteoritics 29, 100-143) and Meteoritical Bulletin No. 79 (Meteoritics and Planetary Science 31, A161-174).

H4 CHONDRITES

EET 96123 with EET 96031

EH4-5 CHONDRITES

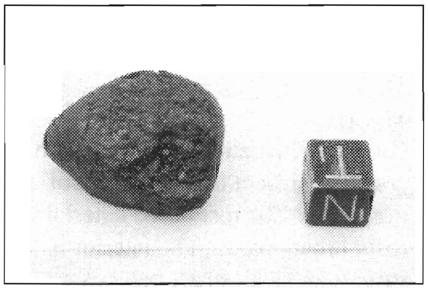
EET 96202, EET 96217, EET 96223, EET 96299, EET 96309, EET 96341 with EET 96135

UREILITES

EET 96314, EET 96331 with EET 96293
EET 96328 with EET 96322

C2 CHONDRITES

EET 96096, EET 96097, EET96098, EET96226 with EET 96005
QUE 97003, QUE97005 with QUE 93004



Sample No.: **DEW 96601**
Location: Mount DeWitt
Dimensions (cm): 2.5x2.0x2.0
Weight (g): 17.35
Meteorite Type: H3 Chondrite (estimated H3.8)

Macroscopic Description: Kathleen McBride
The exterior has brown/black fusion crust with oxidation halos and some evaporites. The interior has a sugary texture with rusty metal grains. Dark and light colored chondrules are visible and some rusty inclusions are present.

Thin Section (,2) Description: Tim McCoy
The section exhibits numerous small, well-defined chondrules (up to 1 mm) in a black matrix of fine-grained silicates, metal and troilite. Weak shock effects are present. Polysynthetically twinned pyroxene is extremely abundant. Weathering is pervasive. Silicates are unequilibrated; olivines range from Fa_{14-21} and pyroxenes from Fs_{3-17}. The meteorite is probably an H3 chondrite (estimated subtype 3.8).

Sample No.: **EET96077**
Location: Elephant Moraine
Dimensions (cm): 0.5x0.5x0.4
Weight (g): 0.18
Meteorite Type: EH3 Chondrite

Macroscopic Description: Kathleen McBride
The exterior of this meteorite is smooth and brown. The interior is a rusty, dark matrix with small (<0.5 mm) rusty yellow chondrules visible.

Thin Section (,2) Description: Tim McCoy
The section consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains set in a highly-weathered matrix of abundant troilite, with minor niningerite, metal and schreibersite. Enstatite compositions are somewhat variable (Fs_{0-6}), with most being Fs_{0-1}. Metal contains ~2.5 wt. % Si. The meteorite is an enstatite chondrite, probably EH3.

Sample No.: **EET96096; EET96097; EET96098; EET96226**
Location: Elephant Moraine
Dimensions (cm): 5.0x2.5x1.0; 2.5x1.5x1.5; 3.5x1.5x2.0; 1.9x1.5x0.5
Weight (g): 12.68; 12.91; 15.31; 2.05
Meteorite Type: C2 Chondrite

Macroscopic Description: Kathleen McBride and Cecilia Satterwhite
These carbonaceous chondrites have minor amounts of fusion crust on their black exteriors. The interiors reveal a dark black matrix with abundant white to tan colored inclusions/ chondrules. All are friable.

Thin Section (EET96096,2; 96097,2; 96226,2) Description: Tim McCoy
The sections consist of a few small chondrules (up to 0.5 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine shows a broad range of compositions (Fa_{0-42}) with most grains Fa_{0-2}. Pyroxene is Fs_{1-6}. The matrix consists dominantly of an Fe-rich serpentine. The meteorites are C2 chondrites that are paired with each other and quite possibly with the EET96005 pairing group.

Sample No.: **EET96103**
Location: Elephant Moraine
Dimensions (cm): 2.5x1.5x1.0
Weight (g): 4.26
Meteorite Type: EH4 Chondrite

Macroscopic Description: Kathleen McBride
This meteorite is a dull brown-black color with oxidation halos. The fusion crust covers 100% of the surface area. The interior is very weathered. It has a fine grained, sugary textured matrix with some metal. It is very rusty.

Thin Section (,2) Description: Tim McCoy
The section consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains with metal, troilite, daubreelite and niningerite. Weathering is extensive, including weathering veins. Enstatite is Fs_{0-2} One grain of free silica was analyzed and metal contains ~1.8 wt % Si. The meteorite is an EH4 chondrite.

Sample No.: **EET96109**
Location: Elephant Moraine
Dimensions (cm): 1.0x1.0x0.5
Weight (g): 0.93
Meteorite Type: LL3 Chondrite (estimated <L3.4)

Macroscopic Description: Kathleen McBride
Most of the fusion crust on this meteorite has weathered away. The little that remains is thin, rough, black patches with iridescent oxidation halos. The interior is a dark matrix with numerous, multicolored chondrules, gray, white, tan and yellow, some are larger than 1 mm. There are metal grains present and minor rust.

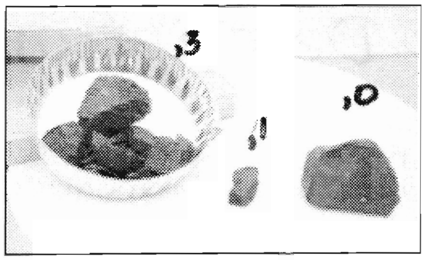
Thin Section (,2) Description: Tim McCoy
The section exhibits numerous large, well-defined chondrules (up to 1.6

mm) in a black matrix of fine-grained silicates, metal and troilite. Weak shock effects are present. Glass is present within chondrules, but rare. Polysynthetically twinned pyroxene is extremely abundant. Silicates are quite unequilibrated; olivines range from Fa_{0-19} and pyroxenes from Fs_{3-26}. The meteorite is probably an LL3 chondrite and may be of relatively low subtype (<3.4).

Sample No.:	**EET96123**
Location:	Elephant Moraine
Dimensions (cm):	2.5x2.0x1.0
Weight (g):	8.45
Meteorite Type:	H4 Chondrite

Macroscopic Description: Kathleen McBride
50% of the exterior of this ordinary chondrite has black, bubbly fusion crust with numerous vesicles and dull luster with iridescent oxidation halos. The matrix is very rusty and friable, with numerous yellowish and gray chondrules present. Abundant metal grains are visible.

Thin Section (,2) Description: Tim McCoy
The section is a close-packed aggregate of chondrules (usually less than 1 mm across), chondrule fragments and mineral grains in a dark matrix with abundant metal and troilite. The meteorite is moderately weathered and shocked. Polysynthetically twinned pyroxene is common. Olivine (Fa_{16}) and low Ca pyroxene compositions (Fs_{14}) are below the range typical for H chondrites and similar to a small group of chondrites such as Willaroy (1993, GCA 57, 1867). The meteorite is an unusual H4 chondrite and is almost certainly paired with the EET 96031 pairing group.



Sample No.:	**EET96135; EET96202; EET96217; EET96223; EET96299**
Location:	Elephant Moraine
Dimensions (cm):	5.0x4.0x2.5; 2.0x1.0x0.7; 1.5x2.5x1.5; 1.5x1.3x0.9; 3.5x2.5x2.0
Weight (g):	95.66; 3.74; 10.09; 2.71; 50.54
Meteorite Type:	EH4-5 Chondrites

Macroscopic Description: Kathleen McBride, Carol Schwarz, Cecilia Satterwhite
These meteorites have brownish black polygonally fractured fusion crust with iridescent oxidation haloes present. All samples had fractures that penetrated the surface and are very friable. The interiors are steel gray to black, fine-grained, sugary textured, with metal grains visible. Rusty colored oxidation rind is present. Minor rust is present. These meteorites smell like sulfur and have very small light colored chondrules.

Thin Section (EET96135,2; 96202,2; 96217,2; 96223,2; 96299,2) Description: Tim McCoy
The sections consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains with metal, troilite, daubreelite and niningerite. Weathering is relatively minor. Enstatite is Fs_{0-1}. One grain of free silica was analyzed and metal contains ~1.8 wt. % Si. The meteorite is an EH4-5 chondrite.

Sample No.:	**EET96160**
Location:	Elephant Moraine
Dimensions (cm):	1.2x1.0x0.5
Weight (g):	0.88
Meteorite Type:	L3 Chondrite (estimated L3.6)

Macroscopic Description: Kathleen McBride
Only small patches of black fusion crust are present on the surface of this meteorite. The rest of the exterior is a rusty brown color. The interior is rusty with small black patches of matrix and it has a sugary texture. Some gray colored chondrules are visible.

Thin Section (,2) Description: Tim McCoy
The section exhibits numerous well-defined chondrules (up to 1 mm), metal and troilite. Weak shock effects are present. Polysynthetically twinned pyroxene is abundant. Weathering is pervasive, with extensive staining. Silicates are unequilibrated; olivines range from Fa_{4-22} and pyroxenes from Fs_{13-16}. The meteorite is probably an L chondrite of subtype ~3.6.

Sample No.:	**EET96188**
Location:	Elephant Moraine
Dimensions (cm):	3.0x3.0x2.0
Weight (g):	16.38
Meteorite Type:	L or LL3 Chondrite (estimated L3.2)

Macroscopic Description: Kathleen McBride
Thin black patches of fusion crust and oxidation haloes are visible on the exterior of this ordinary chondrite. The interior has a dark matrix full of chondrules, metal grains and some rust. The chondrules are dark gray, white tan, yellow and some are rusty.

Thin Section (,2) Description: Tim McCoy
The section exhibits numerous large, well-defined chondrules (up to 2 mm) in a black matrix of fine-grained silicates, metal and troilite. Weak shock effects are present. Glass is present within chondrules, but rare. Polysynthetically twinned pyroxene is

extremely abundant. Silicates are quite unequilibrated; olivines range from Fa_{2-62} and pyroxenes from Fs_{7-22}. The meteorite is an L or LL3 chondrite of subtype ~3.2. It may be paired with EET96109.

Sample No.:	**EET96216**
Location:	Elephant Moraine
Dimensions (cm):	1.0x0.5x1.0
Weight (g):	0.87
Meteorite Type:	L3 Chondrite (estimated L3.8)

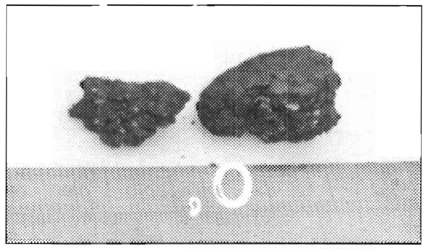
Macroscopic Description: Kathleen McBride
Fusion crust covers 25% of the exterior surface of this meteorite. It is dull and has a rough texture. The interior has a gray matrix with light colored, sub-mm-sized chondrules. The meteorite is very rusty in the center and evaporites are present.

Thin Section (,2) Description: Tim McCoy
The section exhibits numerous well-defined chondrules (up to 1.4 mm), metal and troilite. Weak shock effects are present. Polysynthetically twinned pyroxene is abundant. Silicates are unequilibrated; olivines range from Fa_{8-28} and pyroxenes from Fs_{2-21} The meteorite is probably an L chondrite of subtype ~3.8.

Sample No.:	**EET96238**
Location:	Elephant Moraine
Dimensions (cm):	1.0x0.5x0.5
Weight (g):	0.39
Meteorite Type:	CH3 Chondrite

Macroscopic Description: Kathleen McBride
The exterior of this meteorite has black patches of fusion crust. The interior is a fine grained, gray powdery matrix. It contains some rusty patches and small <1 mm chondrules of whitish color. Carbonaceous clasts are present within the matrix.

Thin Section (,2) Description: Tim McCoy
The section consists of an aggregate of very small chondrules (less than 0.2 mm), mineral fragments, and metal. Most olivine and pyroxene grains appear quite reduced (less than Fa_5 or Fs_4), although some FeO rich grains are present (up to Fa_{40}). Carbonaceous clasts are present. The metal is Si-free. The meteorite is a CH3 chondrite similar to ALH 85085 (1988, EPSL 91, 33-54).



Sample No.:	**EET96259**
Location:	Elephant Moraine
Dimensions (cm):	3.0x1.5x1.5
Weight (g):	12.12
Meteorite Type:	CR2 Chondrite

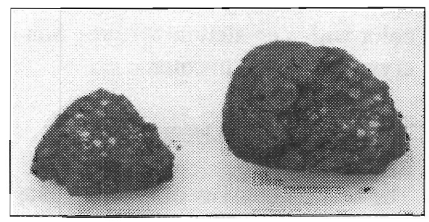
Macroscopic Description: Kathleen McBride
The exterior of this meteorite has a dull black fusion crust with iridescent oxidation halos covering about 70% of its surface area. It is heavily fractured and is friable. The interior consists of dull, black matrix with numerous dark inclusions and yellow, cream and white chondrules, some up to 2 mm in diameter. The meteorite is weathered in some areas.

Thin Section (,2) Description: Tim McCoy
The section exhibits large well-defined chondrules (up to 2 mm) and metal in a dark matrix. Clasts of C1-like material are present. Polysynthetically twinned pyroxene is abundant. Weathering is pervasive, with alteration of metal and extensive staining of silicates. Silicates are unequilibrated; olivines range from Fa_{0-4} and pyroxenes from Fs_{1-4}. The meteorite is probably a CR2 chondrite.

Sample No.:	**EET96262**
Location:	Elephant Moraine
Dimensions (cm):	5.5x3.0x2.0
Weight (g):	54.18
Meteorite Type:	Ureilite

Macroscopic Description: Kathleen McBride
The exterior of this ureilite has a black, rough fusion crust most of which has weathered. The interior is a dark crystalline sugary texture with some rust. Some metal grains are present. There are light colored inclusions with minor rust.

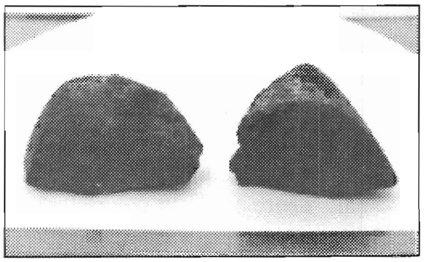
Thin Section (,2) Description: Tim McCoy
The section consists of an aggregate of olivine grains up to 2 mm across. Individual grains are rimmed by moderately weathered carbon-rich material containing traces of metal and troilite. Olivine grains exhibit undulatory extinction. Olivines, both cores and rims are relatively homogeneous at Fa_{14-15}. The meteorite is a ureilite.



Sample No.:	**EET96286**
Location:	Elephant Moraine
Dimensions (cm):	3.0x2.0x1.5
Weight (g):	12.88
Meteorite Type:	CV3 Chondrite

Macroscopic Description: Carol Schwarz
The exterior of this carbonaceous chondrite has 95% brown/black polished fusion crust. The interior has a black matrix with mm sized white and rusty inclusions. The meteorite is very fractured.

Thin Section (,2) Description: Tim McCoy
The section exhibits large chondrules (up to 3.5 mm), CAIs and metal in a dark matrix. Some clasts appear to have been aqueously altered. Olivines range from Fa_{1-2} and pyroxenes from Fs_{1-4}. The meteorite is an unequilibrated carbonaceous chondrite, probably a CV3.



Sample No.: **EET96293**
Location: Elephant Moraine
Dimensions (cm): 4.5x4.5x3.0
Weight (g): 100.56
Meteorite Type: Ureilite

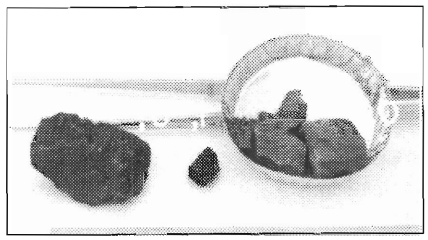
Macroscopic Description: Kathleen McBride
This achondrite has a dull black fusion crusted exterior with a few shiny glassy patches. Moderate weathering is visible on exterior surface. The interior is steel gray in color with a crystalline texture. Some crystals are dark in color.

Thin Section (,2) Description: Tim McCoy
The section consists of an aggregate of large olivine grains up to 1 mm across with numerous areas of finer-grained (~200 µm), equigranular olivine, pigeonite and augite with abundant 120° triple junctions. Individual grains are rimmed by carbon-rich material containing traces of metal. Shock effects are numerous, including undulatory extinction, polysynthetic twinning and kink banding. Olivines have cores of Fa_{12-13}, with rims reduced to Fa_6 Pigeonites(Fs_{11} Wo_5) and augites (Fs_7, Wo_{37}) are relatively homogeneous. The meteorite is a ureilite.

Sample No.: **EET96309**
Location: Elephant Moraine
Dimensions (cm): 2.5x2.0x1.0
Weight (g): 7.88
Meteorite Type: EH4-5 Chondrite

Macroscopic Description: Kathleen McBride
The exterior of this meteorite is dark in color with rust present. The interior is rusty with an oxidation rind visible. It has a fine grained texture.

Thin Section (,2) Description: Tim McCoy
This section consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains with metal and troilite. Weathering is relatively minor. Enstatite is Fs_{0-4}. One grain of free silica was analyzed and metal contains ~2.4 wt. % Si. The meteorite is an EH4-5 chondrite and may be paired with EET96135.



Sample No.: **EET96314; EET96331**
Location: Elephant Moraine
Dimensions (cm): 5.0x3.5x2.5; 5.0x4.5x2.5
Weight (g): 80.34; 121.93
Meteorite Type: Ureilites

Macroscopic Description: Kathleen McBride
This achondrite has a dull black fusion crusted exterior with a few shiny glassy patches. There is moderate weathering on the exterior surface. The interior is steel gray in color with a crystalline texture. Some crystals are dark in color.

Thin Section (EET96314,2; 96331,4) Description: Tim McCoy
The sections consist of an aggregate of large olivine grains up to 1 mm across with numerous areas of finer-grained (~200µm), equigranular olivine, pigeonite and augite with abundant 120° triple junctions. Individual grains are rimmed by carbon-rich material containing traces of metal. Shock effects are numerous, including undulatory extinction, polysynthetic twinning and kink banding. Olivines have cores of Fa_{12-13}, with rims reduced to Fa_2. Pigeonite (Fs_{11} Wo_4) and augite (Fs_7Wo_{29}) are relatively homogeneous. These meteorites are paired ureilites and may be paired with EET96293.

Sample No.: **EET96322; EET96328**
Location: Elephant Moraine
Dimensions (cm): 3.0x2.5x1.5; 2.5x1.5x1.0
Weight (g): 17.10; 7.11
Meteorite Type: Ureilites

Macroscopic Description: Kathleen McBride
The exterior has very small patches of rough vesicular black fusion crust. The interior is medium gray matrix containing dark gray to black inclusions with some minor rust and a sugary texture.

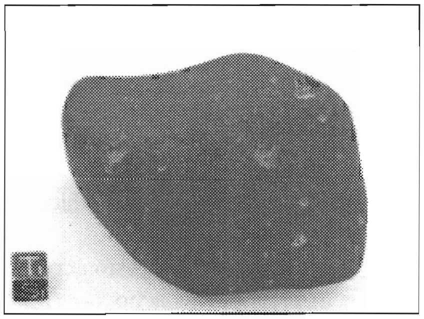
Thin Section (EET96322,2; 96328,2) Description: Tim McCoy
The sections consist of an aggregate of olivine (up to 1.5 mm) and orthopyroxene (up to 2.5 mm) grains. Carbonaceous material and traces of Fe, Ni metal bound the olivine grains. The meteorite is only very lightly weathered. Undulatory extinction is common. Olivine has cores of Fa_{15} with rims reduced to Fa_{12} Pyroxene is $Fs_{13}Wo_3$ The meteorites are ureilites.

Sample No. **EET96341**
Location: Elephant Moraine
Dimensions (cm): 2.5x2.5x3.5
Weight (g): 25.99
Meteorite Type: EH4-5 Chondrite

Macroscopic Description: Kathleen McBride
The exterior of this meteorite has black polygonal fractured fusion crust over its entire surface. Oxidation halos are present. The interior is steel gray, fined grained matrix with a sugary texture. There is a minor amount of rust and metal visible. Dark mm sized inclusions are present. This meteorite was very hard.

Thin Section (,2) Description: Tim

McCoy
This section consists of an aggregate of small chondrules (most less than 0.5 mm), chondrule fragments and pyroxene grains with metal and troilite. Weathering is relatively minor. Enstatite is Fs_{0-4}. One grain of free silica was analyzed and metal contains ~2.4 wt. % Si. The meteorite is an EH4-5 chondrites and may be paired with EET96135.

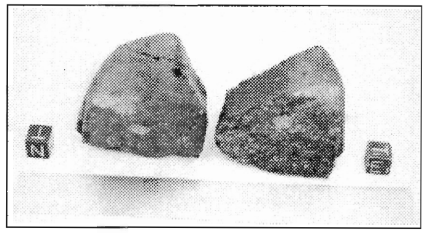


Sample No.:	**MET96503**
Location:	Meteorite Hills
Dimensions (cm):	7.5x5.0x5.5
Weight (g):	404.0
Meteorite Type:	L3 Chondrite (estimated L3.6)

Macroscopic Description: Kathleen McBride
100% of the exterior of this ordinary chondrite is covered with brown/black fusion crust and a rough surface with polygonal fractures. The exterior is striated in some areas. The interior is a dark gray matrix with numerous rusty chondrules up to 2 mm in diameter. Metal grains are present. There are also small irregular shaped dark inclusions.

Thin Section (,2) Description: Tim McCoy
The section exhibits numerous large, well-defined chondrules (up to 2 mm) in a black matrix of fine-grained silicates and weathered metal and troilite. Weak shock effects are present. Polysynthetically twinned pyroxene is extremely abundant. Silicates are unequilibrated; olivines range from Fa_{7-32}. The meteorite is probably an L3 chondrite (estimated subtype 3.6).

Sample No.: **MET 96515**



Location:	Meteorite Hills
Dimensions (cm):	10.0x5.0x4.5
Weight (g):	308.7
Meteorite Type:	L3 Chondrite (estimated L3.5)

Macroscopic Description: Kathleen McBride
The exterior of this ordinary chondrite has brown/black fusion crust with striations. The surface is smooth and slightly shiny with some pits. The interior has a dark matrix with some rust and numerous chondrules (1 cm in diameter). The chondrules are cream, white and tan, some are rusty in color. Metal is present and inclusions are irregularly shaped.

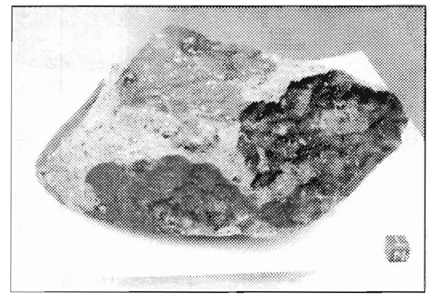
Thin Section (,2) Description: Tim McCoy
The section exhibits numerous large, well-defined chondrules (up to 2 mm) in a black matrix of fine-grained silicates, metal and troilite. Only weak shock effects are present. Polysynthetically twinned pyroxene is extremely abundant. Silicates are unequilibrated; olivines range from Fa_{1-30} and pyroxenes from Fs_{3-16}. Weathering is pervasive. The meteorite is probably an L3 chondrite and of moderate subtype (3.5).

Sample No.:	**MET 96535**
Location:	Meteorite Hills
Dimensions (cm):	4.0x2.5x2.0
Weight (g):	44.96
Meteorite Type:	H6 Chondrite

Macroscopic Description Kathleen McBride
100% of the exterior of this ordinary chondrite has smooth black fusion crust with oxidation halos. The interior has gray patches of matrix but is rusty all the way through. Tiny black and white specks are visible in the gray areas and metal grains are present. This meteorite is very hard.

Thin Section (,2) Description: Tim McCoy
This meteorite is a fine example of an impact-melt breccia or melt-veined H6 chondrite. Approximately half the section consists of an igneous-textured silicate matrix with quenched metal-troilite blebs up to 1 mm across.

Sample No.: **QUE 97001**

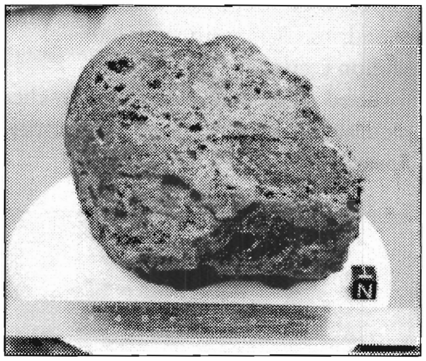


Location:	Queen Alexandria Range
Dimensions (cm):	18.0x11.0x8.5
Weight (g):	2358.3
Meteorite Type:	Howardite

Macroscopic Description: Kathleen McBride
Thin black fusion crust covers 50% of the exterior surface of this achondrite. It has a dull luster and the exposed interior shows a variety of clasts. Some rusty patches are visible and some shiny patches are present on the fusion crust. The interior has numerous clasts of various sizes and colors. It has a concrete gray matrix, dull with a sandy texture. A large area of olivine and smaller gray aphanitic clasts, white clasts, black and white brecciated clasts and brown clasts are visible.

Thin Section (,5) Description: Tim McCoy
The section is a microbreccia of pyroxene with minor plagioclase and a few basaltic clasts. Individual clasts range up to 4 mm across. Most of the pyroxene is low-Ca with compositions ranging from $Fs_{17}Wo_1$ to $Fs_{54}Wo_1$. One augite grain of $Fs_{24}Wo_{42}$ was analyzed. Plagioclase ranges from

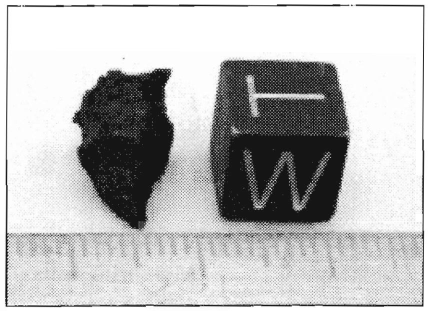
An_{72-94}. The Fe/Mn ratio in pyroxene is about 30. The meteorite is a howardite.

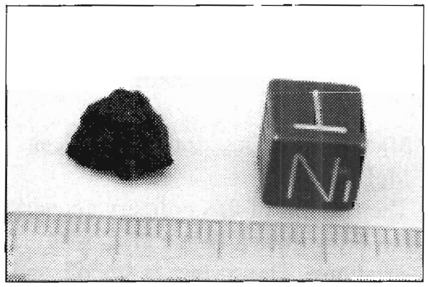


Sample No.:	**QUE 97002**
Location:	Queen Alexandria Range
Dimensions (cm):	11.0x8.0x8.0
Weight (g):	1384.3
Meteorite Type:	Howardite

Macroscopic Description: Kathleen McBride
50% of the exterior of this achondrite has brown/black fusion crust with small glassy patches. Interior is a breccia, a light fine grained matrix with numerous clasts and an oxidation rind. Clasts are mostly white, elongated and angular. Angular dark gray clasts and black subrounded to angular clasts are visible. Some rusty patches are present.

Thin Section (,5) Description: Tim McCoy
The section is a microbreccia of coarse-grained clasts dominated by pyroxene with lesser plagioclase and fine-grained basaltic clasts. Individual clasts range up to 4 mm across. Shock effects are extensive. Most of the pyroxene is low-Ca with compositions ranging from $Fs_{54}Wo_2$ to $Fs_{60}Wo_2$. One augite grain of $Fs_{21}Wo_{44}$ was analyzed. Plagioclase ranges from An_{85-94}. The Fe/Mn ratio in pyroxene is about 30. The meteorite is a howardite.

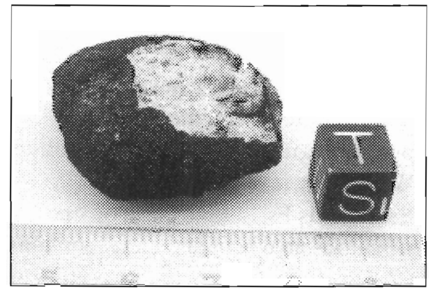




Sample No.:	**QUE 97003; QUE 97005**
Location:	Queen Alexandria Range
Dimensions (cm):	1.0x0.75x0.75; 1.0x1.0x0.5
Weight (g):	0.90; 0.72
Meteorite Type:	C2 Chondrite

Macroscopic Description: Kathleen McBride
Small patchy black fusion crust is visible on the exterior. Exposed interior has black matrix with white mm to sub-mm sized white chondrules. There are some dull rusty circular stains present. The interior is a dull black matrix with numerous yellowish and white chondrules and metal grains. Irregularly shaped clasts are present and are mm to sub-mm in size.

Thin Sections (QUE97003,5; 97005,5) Description: Tim McCoy
A single description can be given for these sections. They consist of small chondrules (up to 0.8 mm), aggregates and mineral grains in a black matrix. Olivine compositions range from Fa_{0-46}, with most Fa_{0-2}. Low-Ca pyroxene is Fs_{1-2}. The matrix is composed dominantly of Fe-rich serpentine. The meteorites are C2 chondrites and pairing with the QUE 93004 pairing group is possible.



Sample No.:	**QUE 97004**
Location:	Queen Alexandria Range
Dimensions (cm):	3.0x3.0x1.5
Weight (g):	13.91
Meteorite Type:	Eucrite (brecciated)

Macroscopic Description: Kathleen McBride
Black, glassy, vesicular fusion crust is on the exterior of this achondrite. The fusion crust on the bottom surface is very thick and shiny. Two areas are lacking fusion crust. The interior has a granular or gritty texture. The matrix is off white in color with clasts of numerous colors and sizes, plagioclase, pyroxene, olivine, FeMg minerals and some metal grains are all present. Some rusty patches are present.

Thin Section (,5) Description: Tim McCoy
The section is a microbreccia of pyroxene and plagioclase clasts and mineral fragments. Much of the section exhibits a granoblastic texture. Pyroxene compositions are quite homogeneous, with low-Ca pyroxene of $Fs_{59}Wo_6$ and augite of $Fs_{30}Wo_{40}$. Plagioclase ranges from An_{85-91}. The Fe/Mn ratio in pyroxene is about 30. The meteorite is a brecciated eucrite.

Table 4: Natural Thermoluminescence (NTL) Data for Antarctic Meteorites

Jason Slinker, Paul Benoit, and Derek Sears
Cosmochemistry Group
Dept. Chemistry and Biochemistry
University of Arkansas
Fayetteville, AR 72701

The measurement and data reduction methods were described by Hasan et al. (1987, Proc. 17th LPSC, E703-E709; 1989, LPSC XX, 383-384). For meteorites whose TL lies between 5 and 100 krad the natural TL is related primarily to terrestrial history. Samples with NTL <5 krad have TL below that which can reasonably be ascribed to long terrestrial ages. Such meteorites have had their TL lowered by heating within the last million years or so (by close solar passage, shock heating, or atmospheric entry), exacerbated, in the case of certain achondrite classes, by "anomalous fading".

Sample	Class	Natural TL [krad at 250 deg. C]	Sample	Class	Natural TL [krad at 250 deg. C]
EET96029	C2	<1	EET96024	L6	2.5 ± 0.2
			EET96028	L6	50 ± 2
GRA95229	CR2	16 ± 3	EET96038	L6	85.2 ± 0.5
			EET96060	L6	51.3 ± 0.7
GRO95551	CHON-AN	18.2 ± 0.3	EET96061	L6	0.6 ± 0.1
			GRO95553	L6	40.6 ± 0.1
MET96500	HOW	20.7 ± 0.9	GRO95562	L6	24.2 ± 0.2
			GRO95563	L6	20.9 ± 0.5
GRO95509	H5	<3	GRO95564	L6	60 ± 1
			GRO95567	L6	5.3 ± 0.1
EET96023	H6	23.2 ± 0.1	GRO95568	L6	28 ± 1
EET96025	H6	17.0 ± 0.1	GRO95604	L6	49.5 ± 0.2
EET96027	H6	9.2 ± 0.1	GRO95636	L6	15.9 ± 0.1
GRO95554	H6	45 ± 3	GRO95637	L6	39.3 ± 0.1
EET96035	L4	<1	GRO95552	LL4	39.8 ± 0.2
GRA95216	L5	74.6 ± 0.3	GRO95557	LL5	73.2 ± 0.1
GRA95217	L5	2.0 ± 0.2			
GRO95579	L5	79.0 ± 0.5	GRO95556	LL6	47.2 ± 0.5
EET96020	L6	8.9 ± 0.1	EET96026	R	<2
EET96022	L6	53.4 ± 0.1			

The quoted uncertainties are the standard deviations shown by replicate measurements of a single aliquot.

COMMENTS: The following comments are based on natural TL data, TL sensitivity, the shape of the induced TL glow curve, classifications, JSC and Arkansas group sample descriptions.

Pairings suggested by the TL data:

L5: GRO95579 with GRO95529 (AMN 21:1)
L6: EET96020 with EET90157 group (AMN 16:1).
L6: EET96022 and EET 96060 with EET92055 group (AMN 18:1)
L6: EET96024 with EET86800 (Benoit et al., 1994, J. Geophys. Res. 99, 2073-2085)
L6: GRO95563 with GRO95500 (AMN 21:1)

Sample Request Guidelines

All sample requests should be made in writing to:

Meteorite Curator/SN2
NASA Johnson Space Center
Houston, TX 77058 USA

Requests that are received by the Curator before Sept. 11, 1998, will be reviewed at the MWG meeting on Sept. 25-26, 1998, to be held in Washington, D.C. Requests that are received after the Sept. 11 deadline may possibly be delayed for review until the MWG meets again in the Spring of 1999. **PLEASE SUBMIT YOUR REQUESTS ON TIME.** Questions pertaining to sample requests can be directed in writing to the above address or can be directed to the curator by phone, FAX, or e-mail.

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 be initialed or countersigned by a supervising scientist to confirm access to facilities for analysis. All sample requests will be reviewed in a timely manner. Those requests that do not meet the JSC Curatorial Guidelines will be reviewed by the Meteorite Working Group (MWG), 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. Issuance of samples does not imply a commitment by any agency to fund the proposed research. Requests for financial support must be submitted separately to the appropriate funding agencies. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation and all allocations are subject to recall.

Each request should accurately refer to meteorite samples by their respective identification numbers. Specific requirements for sample types within individual specimens, or special handling or shipping procedures should be explained in each request. Each request should include a brief justification, which should contain: 1) what scientific problem will be addressed; 2) what analytical approach will be used; 3) what sample masses are required; 4) evidence that the proposed analyses can be performed by the requester or collaborators; and 5) why Antarctic meteorites are best suitable for the investigation. For new or innovative investigations, proposers are encouraged to supply additional detailed information in order to assist the MWG. Requests for thin sections which will be used in destructive procedures such as ion probing, etching, or even repolishing, must be stated explicitly. Consortium requests must be initialed or countersigned by a member of each group in the consortium. All necessary information, in most cases, should be condensable into a one-or two-page letter.

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 Contr. Earth Sci.:* Nos. 23, 24, 26, 28, and 30. A table containing all classifications as of December 1993 is published in *Meteoritics* 29, p. 100-142 and updated as of April 1996 in *Meteoritics and Planetary Science* 31, p. A161-A174.

Antarctic Meteorite Laboratory Contact Numbers

Marilyn Lindstrom
Curator
Mail code SN2
NASA Johnson Space Center
Houston, Texas 77058

(281) 483-5135

mlindstr@ems.jsc.nasa.gov

Cecilia Satterwhite
Lab Manager
Mail code SN2
NASA Johnson Space Center
Houston, Texas 77058

(281) 483-6776

csatterw@ems.jsc.nasa.gov

Donald Morrison
MWG Secretary
Mail code SN2
NASA Johnson Space Center
Houston, Texas 77058

(281) 483-5039

dmorriso@ems.jsc.nasa.gov

FAX: (281) 483-5347

Meteorites On-Line

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

JSC Curator, Antarctic meteorites	http://www-curator.jsc.nasa.gov/curator/antmet/antmet.htm
JSC Curator, martian meteorites	http://www-curator.jsc.nasa.gov/curator/antmet/marsmets/contents.htm
JSC Curator, Mars Meteorite Compendium	http://www-curator.jsc.nasa.gov/curator/antmet/mmc/mmc.htm
Antarctic collection	http://www.cwru.edu/affil/ansmet
LPI martian meteorites	http://cass.jsc.nasa.gov/lpi/meteorites/mars_meteorite.html
NIPR Antarctic meteorites	http://www.nipr.ac.jp/
BMNH general meteorites	http://www.nhm.ac.uk/mineralogy/collections/meteor.htm
UHI planetary science discoveries	http://www.soest.hawaii.edu/PSRdiscoveries
Meteoritical Society	http://www.uark.edu/studorg/metsoc
Meteorite! Magazine	http://www.meteor.co.nz
Geochemical Society	http://www.geochemsoc.org

The curatorial databases may be accessed as follows:

Via INTERNET

1) Type **TELNET 139.169.126.35** or **TELNET CURATE.JSC.NASA.GOV**.
2) Type **PMPUBLIC** at the USERNAME: prompt.

Via WWW

1) Using a Web browser, such as Mosaic, open URL **http://www-sn.jsc.nasa.gov/curator/curator.htm**.
2) Activate the ***Curatorial Databases*** link.

For problems or additional information, you may contact: Claire Dardano, Lockheed Martin Engineering & Sciences Company, (281) 483-5329, cdardano@ems.jsc.nasa.gov.