Antarctic Meteorite

NEWSLETTER

INSIDE THIS ISSUE:

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

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Houston, Texas
77058

SAMPLE REQUEST DEADLINE:
October 11, 1991 !!!!

MWG MEETS October 24-26, 1991

All sample requests should be made in writing to:

Secretary, MWG
SN2/Planetary Science Branch
NASA/Johnson Space Center
Houston, TX 77058 USA.

Requests that are received by the MWG Secretary before Oct. 11, 1991 will be reviewed at the MWG meeting on Oct. 24-26, 1991 to be held in Washington D.C. Requests that are received after the Oct. 11 deadline may possibly be delayed for review until the MWG meets again in the Spring of 1992. **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 at (713) 483-5135 or the secretary at (713) 483-5125.

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 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 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. Requests for thin sections which will be used in destructive procedures such as ion probe, etch or even repolishing, must be stated explicitly. Consortium requests should be initialed or countersigned by a member of each group in the consortium. All necessary information should probably be condensable into a one- or two-page letter, although informative attachments (reprints of publication that explain rationale, flow diagrams for analyses, etc.) are welcome.

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 four Smithsonian Contr. Earth Sci.: Nos. 23, 24, 26, and 28.

New Meteorites

This newsletter presents classifications of 249 meteorites from the 1987-1990 collections, including the first announcements of meteorites from the 1100 collected during the 1990-1991 ANSMET season. Descriptions are given for 34 meteorites of special petrologic type. Three of these are particularly noteworthy: **LEW88516** is a 13 g **shergottite** similar to ALHA77005; **LEW88763** is a 4 g achondrite similar to **Brachina**; and **LEW90500** is a 295 g **C1 carbonaceous chondrite**, the first C1 in our collection. In addition, LEW88280 and MAC88177 have been reclassified as lodranites. Descriptions of these meteorites are given in AMN 13(2) and 13(3).

New AMLAMP Maps Available

The Antarctic Meteorite Location and Mapping Project (AMLAMP) announces the availability of four new meteorite location maps and updates to existing maps. Three maps of the Lewis Cliff meteorite stranding area have been produced. Two sheets, Lewis Cliff-North Section and Lewis Cliff-South Section, cover the area of densest meteorite concentration at a scale of 1:5000. The Lewis Cliff Area Map covers most of the meteorite stranding area, including the Ice Tongue, at a scale of 1:20000. A preliminary map of the Elephant Moraine-Texas Bowl Icefield, at a scale of 1:5000, shows the locations of 1209 mostly unclassified specimens recovered during the 1987-1988 and 1990-1991 seasons. Preliminary explanatory text and meteorite listings accompany each map. Existing maps of the Allan Hills Main Icefield-North and South Sections, Near Western Icefield, Far Western Icefield-East Section, and Elephant Moraine-Elephant Moraine Icefield have been updated to show locations for meteorites recovered in the 1987-1988, 1988-1989, and 1990-1991 seasons.

To order meteorite location or thematic maps contact: AMLAMP, Lunar and Planetary Institute, 3303 NASA Rd. 1, Houston, TX 77058. Phone (713) 486-2184.

What is a Meteorite?

In our last newsletter we announced LEW88446 as a unique achondrite consisting mainly of Ca-rich plagioclase and Fe-Mn-rich olivine. Because the specimen lacked true fusion crust and its mineral assemblage is very unusual, we were suspicious that it may not be a meteorite, but if so it is an unusual terrestrial rock. We sent splits of the sample to various investigators to determine if it was indeed a meteorite. The results came in gradually and we are now convinced that it is not a meteorite. Allan Treiman summarizes these results in the following article. For the NASA and Smithsonian curators this has been an interesting experience in evaluating what is a meteorite.

LEW88446: NOT A METEORITE

By Allan Treiman

LEW88446 was originally described as a unique achondrite. Analyses of its mineralogy, composition, oxygen isotope ratios, and noble gas abundances suggest strongly that LEW88446 is terrestrial.

PETROGRAPHY: Petrography and mineralogy were investigated by B. Mason, G. MacPherson, A. Davis, and A. Treiman. LEW88446 consists mostly of olivine, Fo_{12} with 3-4% wt MnO. The remainder is a variable mixture of plagioclase (An_{97}), fluorite, Ni-free iron sulfide, hercynite spinel, manganoan ilmenite, and fluorapatite. The proportions of plagioclase and fluorite vary inversely; much of the rock (both library sections) contains no fluorite. Fluorapatite is present as inclusions in plagioclase. The rock is cut by veinlets of fine-grained phyllosilicates.

OXYGEN ISOTOPE RATIOS: Oxygen isotope ratios for LEW88446 were measured by T. Mayeda and R. Clayton. Its oxygen isotope composition falls on the terrestrial fractionation line; $\delta^{18}O$ =-3.9 and $\delta^{17}O$ = -2.1. This oxygen is significantly light compared to achondrites and lunar samples. Yields of oxygen were low because the analyzed aliquot was rich in fluorite.

NOBLE GAS ABUNDANCES: Abundances of noble gas isotopes were measured by D. Garrison and D. Bogard. Noble gases were extracted in two temperature steps, 600°C and 1650°C. For both extractions, cosmogenic ^{21}Ne and ^{38}Ar were below detection limits, <0.003 and <0.006 x 10^{-8} ccSTP/g respectively. The 600°C extraction yielded a large quantity of air Ar; the 1650°C extraction yielded a large quantity of air Ar and a modest abundance of radiogenic ^{40}Ar, < 61.0 x 10^{-8} ccSTP/g. In conjunction with the estimated bulk K_2O of 0.1%, an age of less than approximately 100 My is implied.

GEOLOGY: The rocks in the Lewis Cliffs area, where LEW88446 was found, include Triassic-age dikes and sills of basalt (Ferrar dolerite) intruding sediments. Skarn deposits are common, and massive fluorite (presumably from the skarns) has been found in the meteorite collection area (R. Harvey, personal communication).

CONCLUSION: There is no evidence that LEW88446 is a meteorite. Its mineralogy, petrography, FeO/MnO, oxygen isotope ratios, noble gas isotope abundances, and age estimate are all consistent with an origin as a terrestrial rock, and inconsistent with known meteoritic or lunar materials. Its characteristics are consistent with derivation from the local bedrock. One may speculate that LEW88446 formed as a hybrid between evolved Ferrar dolerite and calcitic sediments, flushed with hot fluorine-rich fluid. However unusual LEW88446 may be, it is quite unlikely to be a meteorite.

From 1987-1988 Collections

Pages 6-22 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 14(1) (February 1991). All specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrologic 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:

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Antarctic Meteorite Locations

ALH — Allan Hills
BOW — Bowden Neve
BTN — Bates Nunataks
DOM — Dominion Range
DRP — Derrick Peak
EET — Elephant Moraine
GEO — Geologists Range
GRO — Grosvenor Mountains
HOW — Mt. Howe
ILD — Inland Forts
LEW — Lewis Cliff
MAC — MacAlpine Hills
MBR — Mount Baldr
MET — Meteorite Hills
MIL — Miller Range
OTT — Outpost Nunatak
QUE — Queen Alexandra Range
PCA — Pecora Escarpment
PGP — Purgatory Peak
RKP — Reckling Peak
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range

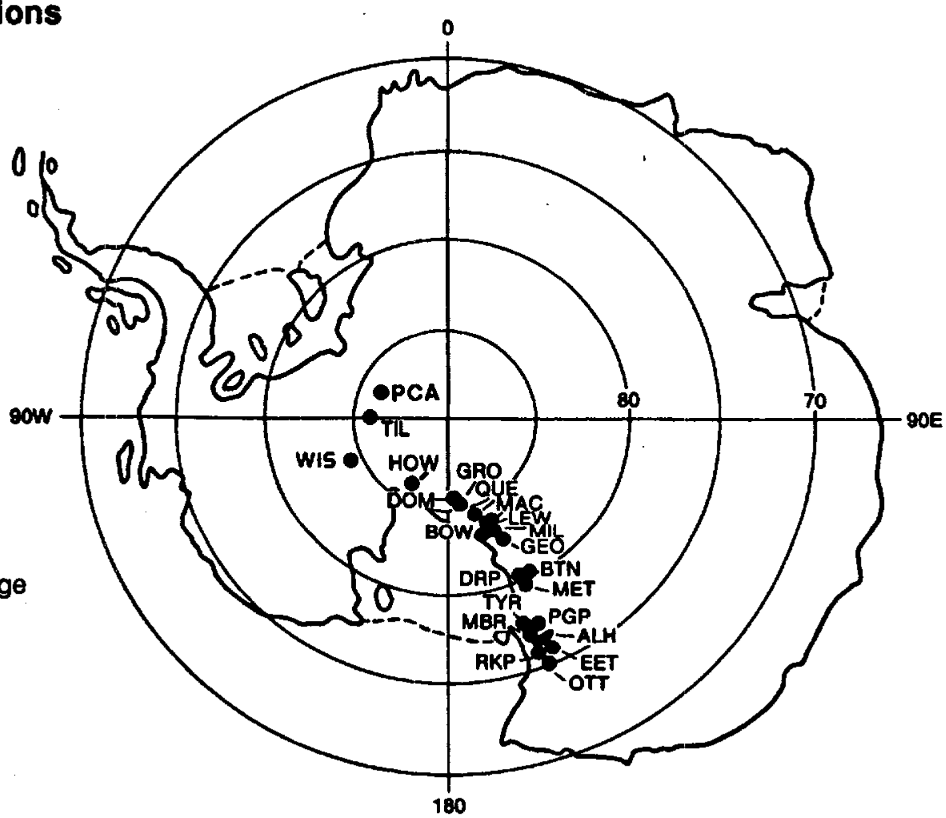

TABLE 1

List of Newly Classified Antarctic Meteorites **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LEW 87115	30.4	H-6 CHONDRITE	C	B	17	15
LEW 87127	12.7	H-6 CHONDRITE	B/C	A	18	16
LEW 87128	18.5	H-5 CHONDRITE	C	A/B	18	16
LEW 87129	10.2	L-5 CHONDRITE	B/C	A	25	20
LEW 87137	20.7	L-4 CHONDRITE	B	A	24	15-21
LEW 87144	22.3	H-5 CHONDRITE	C	A	18	16
LEW 87150	16.8	H-5 CHONDRITE	B	A	17	15
LEW 87157	19.4	H-5 CHONDRITE	B/C	A	16	15
LEW 87162	35.3	H-5 CHONDRITE	B/Ce	A	19	17
LEW 87176	34.2	H-6 CHONDRITE	B/C	B	19	17
LEW 87177	12.2	H-5 CHONDRITE	B/C	A	18	16
LEW 87207	40.2	H-4 CHONDRITE	B/C	A	19	13-16
LEW 87242	17.3	H-5 CHONDRITE	C	A	17	15
LEW 87243	34.8	H-5 CHONDRITE	C	A	17	15
LEW 87245	27.5	H-5 CHONDRITE	B/C	A	17	15
LEW 87246	31.3	H-5 CHONDRITE	C	B	17	15
LEW 87255	39.7	H-5 CHONDRITE	C	A/B	19	16
LEW 87257	13.5	H-6 CHONDRITE	C	A	18	16
LEW 87260	37.0	H-5 CHONDRITE	B/C	A	18	16
LEW 87262	15.9	H-5 CHONDRITE	B/C	A	18	16
LEW 87269	25.3	H-5 CHONDRITE	B/C	B	18	16
LEW 87270	42.2	H-5 CHONDRITE	C	A	19	16
LEW 87274	34.2	H-5 CHONDRITE	C	B	18	16
LEW 87276	11.7	H-5 CHONDRITE	C	A	18	16
LEW 87282	41.0	H-5 CHONDRITE	C	A	17	15
LEW 87283	33.3	H-5 CHONDRITE	B/C	B	18	16
LEW 87287	22.5	H-5 CHONDRITE	B/C	A	18	16
LEW 87290	20.6	H-5 CHONDRITE	C	A	18	16
MAC 88177**	35.3	LODRANITE	B/C	A	13	12
HOW 88402	21.9	H-5 CHONDRITE	A/B	A	18	16
LEW 88021	731.0	L-4 CHONDRITE	Ce	A	23	19
LEW 88022	1274.3	H-5 CHONDRITE	C	A	18	16
LEW 88135	16.0	E-6 CHONDRITE	B/Ce	B		0.3
LEW 88140	10.4	H-5 CHONDRITE	B/C	A	19	17
LEW 88144	18.8	H-6 CHONDRITE	B/C	A	18	16
LEW 88147	19.7	H-5 CHONDRITE	B/C	A	19	17
LEW 88150	3.7	H-5 CHONDRITE	B/C	B	19	17
LEW 88152	2.9	H-6 CHONDRITE	B/C	A	18	16
LEW 88155	19.7	H-5 CHONDRITE	B/C	A	19	17
LEW 88176	7.5	LL-3 CHONDRITE	B/C	A	9-38	3-16
LEW 88209	17.8	H-5 CHONDRITE	B/C	A	19	16
LEW 88221	20.4	L-5 CHONDRITE	B/C	A/B	23	20
LEW 88222	5.4	L-5 CHONDRITE	B/C	A	25	22
LEW 88228	3.9	L-4 CHONDRITE	B/C	A	23	20-26
LEW 88232	6.0	LL-6 CHONDRITE	B/C	A	30	24
LEW 88238	4.3	H-5 CHONDRITE	B/C	A	17	15

~Classified by using refractive indices.
**Reclassified

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LEW 88243	12.7	H-5 CHONDRITE	B/C	A	18	16
LEW 88246	11.1	L-4 CHONDRITE	B/C	A	18	16-19
LEW 88247	10.5	H-5 CHONDRITE	B/C	A	17	15
LEW 88258	21.9	H-5 CHONDRITE	B/C	A	18	16
LEW 88259	22.1	L-6 CHONDRITE	B/C	A/B	25	22
LEW 88262	13.6	H-5 CHONDRITE	B/C	A	17	15
LEW 88264	16.5	H-5 CHONDRITE	B/Ce	A	18	16
LEW 88266	16.8	H-5 CHONDRITE	B/C	A	18	16
LEW 88267	12.4	H-6 CHONDRITE	B/C	A	18	16
LEW 88279	11.6	L-6 CHONDRITE	B/C	A	24	20
LEW 88280**	6.0	LODRANITE	B	A	13	12
LEW 88283	8.1	H-4 CHONDRITE	B/Ce	A	18	13-19
LEW 88287	10.0	H-5 CHONDRITE	B/C	A	19	17
LEW 88289	16.0	H-5 CHONDRITE	B/C	A	18	16
LEW 88290	19.8	H-6 CHONDRITE	B	A/B	19	17
LEW 88293	19.9	H-6 CHONDRITE	B/C	B	17	15
LEW 88294	11.6	H-5 CHONDRITE	B/C	A	19	17
LEW 88300	86.1	H-5 CHONDRITE	B/C	A	18	16
LEW 88302	57.5	H-5 CHONDRITE	C	C	19	17
LEW 88303	28.2	H-4 CHONDRITE	C	A	18	16
LEW 88305	18.7	H-6 CHONDRITE	C	A	18	16
LEW 88308	20.0	L-5 CHONDRITE	B/C	A	23	19
LEW 88309	30.9	H-5 CHONDRITE	C	A	19	17
LEW 88311	23.8	L-5 CHONDRITE	B	A	25	21
LEW 88312	32.1	H-6 CHONDRITE	B/C	A	18	16
LEW 88313	32.0	H-4 CHONDRITE	C	A	17	13-17
LEW 88314	20.0	H-5 CHONDRITE	C	A	19	16
LEW 88315	25.1	H-3 CHONDRITE	Ce	B	1-22	2-39
LEW 88316	38.2	L-5 CHONDRITE	C	A	22	19
LEW 88319	30.3	H-5 CHONDRITE	C	A	17	15
LEW 88320	105.2	H-5 CHONDRITE	C	A	17	15
LEW 88321	70.3	H-6 CHONDRITE	C	C	18	16
LEW 88322	32.8	H-5 CHONDRITE	C	A	17	15
LEW 88323	53.0	H-5 CHONDRITE	B/C	A	17	15
LEW 88325	41.6	H-5 CHONDRITE	C	A	19	17
LEW 88326	47.0	L-6 CHONDRITE	B/C	A	25	21
LEW 88328	43.1	L-3 CHONDRITE	C	A	8-28	10-24
LEW 88329	34.1	H-5 CHONDRITE	C	A	19	17
LEW 88332	23.9	H-5 CHONDRITE	C	A	18	16
LEW 88333	40.5	H-5 CHONDRITE	C	A	18	16
LEW 88334	40.4	H-5 CHONDRITE	C	A/B	19	17
LEW 88335	19.0	H-5 CHONDRITE	C	A	19	17
LEW 88336	29.8	LL-3 CHONDRITE	B/C	A	4-41	3-17
LEW 88337	25.6	H-5 CHONDRITE	C	A	19	17
LEW 88339	26.7	H-5 CHONDRITE	C	A	18	16
LEW 88341	22.7	H-5 CHONDRITE	C	A	19	17
LEW 88342	19.7	H-5 CHONDRITE	C	A/B	19	17
LEW 88343	28.1	H-4 CHONDRITE	C	A	18	15-20
LEW 88345	19.1	H-5 CHONDRITE	C	B	18	16
LEW 88348	17.7	H-5 CHONDRITE	C	C	17	15
LEW 88349	16.3	H-6 CHONDRITE	C	A	18	16
LEW 88352	11.0	H-5 CHONDRITE	C	A	19	16
LEW 88353	13.2	H-5 CHONDRITE	C	A	18	16
LEW 88355	18.3	H-5 CHONDRITE	C	A	19	17
LEW 88358	14.5	H-5 CHONDRITE	C	A	18	16
LEW 88359	17.9	H-6 CHONDRITE	C	A	18	16
LEW 88363	11.2	H-4 CHONDRITE	C	A	19	12-18

~Classified by using refractive indices.
**Reclassified

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LEW 88367	14.0	H-3 CHONDRITE	B/Ce	A	14-22	4-25
LEW 88369	33.2	H-5 CHONDRITE	C	A	18	16
LEW 88371	6.6	H-6 CHONDRITE	C	A	19	16
LEW 88372	8.7	LL-6 CHONDRITE	Ce	A	28	23
LEW 88373	4.2	H-5 CHONDRITE	C	A	17	15
LEW 88374	13.2	L-4 CHONDRITE	B/C	A	23	12-17
LEW 88375	12.9	H-6 CHONDRITE	C	A	18	16
LEW 88377	3.9	H-5 CHONDRITE	Ce	A	18	16
LEW 88378	9.6	L-5 CHONDRITE	B/C	A	24	20
LEW 88379	11.4	H-5 CHONDRITE	C	A	19	17
LEW 88383	10.7	H-4 CHONDRITE	C	A	18	16
LEW 88384	10.7	H-4 CHONDRITE	C	A	18	14-16
LEW 88387	15.8	H-5 CHONDRITE	C	A	17	15
LEW 88391	15.7	H-5 CHONDRITE	C	A	18	16
LEW 88393	12.2	H-3 CHONDRITE	C	A	8-22	2-23
LEW 88395	16.8	H-5 CHONDRITE	C	A	18	16
LEW 88402	3.6	L-5 CHONDRITE	B/C	A	23	19
LEW 88407	5.6	H-5 CHONDRITE	C	A	17	15
LEW 88409	24.2	H-5 CHONDRITE	C	C	19	17
LEW 88412	11.3	H-6 CHONDRITE	C	A	18	16
LEW 88416	11.1	LL-6 CHONDRITE	C	A	29	23
LEW 88418	21.7	H-5 CHONDRITE	C	A	18	16
LEW 88422	5.5	L-5 CHONDRITE	B/C	A	24	20
LEW 88432	1.3	METAL FROM H CHON.				
LEW 88435	6.6	H-5 CHONDRITE	B/C	A	19	16
LEW 88436	8.3	H-5 CHONDRITE	B/C	A	18	16
LEW 88447	10.1	L-5 CHONDRITE	B/C	A	22	19
LEW 88452	13.4	L-3 CHONDRITE	B/C	A	2-35	1-25
LEW 88457	4.6	L-5 CHONDRITE	B/C	A/B	24	20
LEW 88462	8.1	L-3 CHONDRITE	B/C	A	7-18	3-23
LEW 88467	6.6	L-3 CHONDRITE	B	A/B	6-15	3-15
LEW 88484	8.4	LL-3 CHONDRITE	B/C	A	6-32	4-16
LEW 88493	3.3	H-6 CHONDRITE	C	A	19	16
LEW 88494	4.0	H-6 CHONDRITE	C	A	19	16
LEW 88495	12.2	H-5 CHONDRITE	C	A	18	16
LEW 88496	3.0	H-5 CHONDRITE	C	A	18	16
LEW 88497	9.7	H-5 CHONDRITE	C	A	18	16
LEW 88498	6.5	H-5 CHONDRITE	C	A	18	16
LEW 88499	3.3	LL-6 CHONDRITE	B	A	28	24
LEW 88507~	23.1	L-6 CHONDRITE	B	C		
LEW 88509~	14.5	H-6 CHONDRITE	C	A		
LEW 88512~	9.8	H-6 CHONDRITE	C	A/B		
LEW 88515	7.6	LL-6 CHONDRITE	B	A	29	24
LEW 88516	13.2	SHERGOTTITE	A/B	A	33	28
LEW 88520	3.1	LL-3 CHONDRITE	C	A	4-24	2-17
LEW 88523~	7.2	L-6 CHONDRITE	C	A		
LEW 88526	7.1	L-5 CHONDRITE	B/C	A	24	20
LEW 88531~	17.1	H-6 CHONDRITE	C	A		
LEW 88533~	2.0	L-6 CHONDRITE	C	A		
LEW 88534~	3.6	LL-6 CHONDRITE	B/C	A		
LEW 88536	2.6	LL-3 CHONDRITE	C	A	3-22	2-15
LEW 88537~	2.9	L-6 CHONDRITE	C	A		
LEW 88538~	10.1	H-6 CHONDRITE	C	A		
LEW 88542~	3.1	L-6 CHONDRITE	C	A		
LEW 88543~	11.3	L-6 CHONDRITE	C	A		
LEW 88544	18.9	H-6 CHONDRITE	B/C	A	18	16
LEW 88545~	18.4	H-6 CHONDRITE	C	A/B		

~Classified by using refractive indices.
**Reclassified

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LEW 88551~	8.6	H-6 CHONDRITE	Ce	A		
LEW 88559~	4.1	L-6 CHONDRITE	C	A		
LEW 88561	10.7	LL-3 CHONDRITE	B/C	A	6-22	3-14
LEW 88565~	14.9	L-6 CHONDRITE	C	A		
LEW 88566~	10.6	L-6 CHONDRITE	C	A		
LEW 88569~	3.0	H-6 CHONDRITE	C	A		
LEW 88570~	9.5	H-6 CHONDRITE	C	A		
LEW 88575~	3.4	H-6 CHONDRITE	Ce	A		
LEW 88577~	5.9	H-6 CHONDRITE	C	A		
LEW 88596	8.9	LL-3 CHONDRITE	Ce	A	2-38	1-18
LEW 88598~	2.8	L-6 CHONDRITE	B/C	A		
LEW 88603	6.2	H-4 CHONDRITE	A/B	A	18	16
LEW 88604~	4.7	L-6 CHONDRITE	B/C	A		
LEW 88605~	12.3	L-6 CHONDRITE	C	A		
LEW 88607~	7.0	H-6 CHONDRITE	C	A		
LEW 88608~	2.8	H-6 CHONDRITE	C	A		
LEW 88614~	8.9	L-6 CHONDRITE	C	A		
LEW 88615	12.1	L-5 CHONDRITE	B	A	23	20
LEW 88629~	7.2	L-6 CHONDRITE	B/C	A		
LEW 88631	3.2	IRON-ANOMALOUS				
LEW 88632	10.3	L-3 CHONDRITE	B/C	A	2-21	8-23
LEW 88638~	3.4	L-6 CHONDRITE	B	A		
LEW 88640~	3.1	L-6 CHONDRITE	C	A		
LEW 88644	15.9	L-3 CHONDRITE	A/B	A	3-30	2-26
LEW 88645	14.5	L-4 CHONDRITE	C	A	24	20
LEW 88648~	21.7	H-6 CHONDRITE	C	A		
LEW 88649~	20.1	H-6 CHONDRITE	C	A		
LEW 88650~	1.5	L-6 CHONDRITE	B/C	A		
LEW 88652~	17.1	L-6 CHONDRITE	B/C	A		
LEW 88654~	8.3	L-6 CHONDRITE	C	A		
LEW 88656~	5.5	L-6 CHONDRITE	B/C	A		
LEW 88657~	6.4	L-6 CHONDRITE	B/C	A		
LEW 88658~	6.6	LL-6 CHONDRITE	C	A		
LEW 88659~	10.8	L-6 CHONDRITE	B	A		
LEW 88661~	5.2	L-6 CHONDRITE	B/C	A		
LEW 88668~	3.1	L-6 CHONDRITE	C	A		
LEW 88669~	2.8	L-6 CHONDRITE	C	A		
LEW 88672~	11.5	L-6 CHONDRITE	C	A		
LEW 88677	.6	METAL FRAGMENT	C			
LEW 88683~	15.7	L-6 CHONDRITE	B	A		
LEW 88684~	1.8	L-6 CHONDRITE	C	A		
LEW 88687~	5.2	L-6 CHONDRITE	C	A		
LEW 88688~	22.0	H-6 CHONDRITE	C	B		
LEW 88698	.8	METAL FRAGMENT				
LEW 88699~	2.3	L-6 CHONDRITE	C	A		
LEW 88705~	9.2	L-6 CHONDRITE	C	A		
LEW 88710~	7.1	L-6 CHONDRITE	B/C	A		
LEW 88718~	11.5	L-6 CHONDRITE	C	A		
LEW 88720~	7.5	H-6 CHONDRITE	C	A/B		
LEW 88721~	7.7	L-6 CHONDRITE	B	A		
LEW 88723~	3.8	L-6 CHONDRITE	B/C	A		
LEW 88728~	2.9	L-6 CHONDRITE	C	A		
LEW 88730~	8.0	H-6 CHONDRITE	B/C	A/B		
LEW 88732~	12.2	L-6 CHONDRITE	C	A		
LEW 88736~	7.2	L-6 CHONDRITE	C	A		
LEW 88739~	3.1	L-6 CHONDRITE	C	A		
LEW 88740~	2.9	H-6 CHONDRITE	C	A		

~Classified by using refractive indices.
**Reclassified

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
LEW 88741~	27.0	H-6 CHONDRITE	C	A		
LEW 88742~	4.3	LL-6 CHONDRITE	B/Ce	A		
LEW 88744~	6.8	LL-6 CHONDRITE	B/C	A		
LEW 88747~	3.3	L-6 CHONDRITE	Ce	A		
LEW 88750~	13.2	L-6 CHONDRITE	A/B	A/B		
LEW 88753~	7.6	L-6 CHONDRITE	C	A		
LEW 88757~	22.5	L-6 CHONDRITE	C	A		
LEW 88761~	3.6	L-6 CHONDRITE	C	A		
LEW 88763	4.1	ACHON. (BRACHINA-LIKE)	B	A	33	18
LEW 88769~	4.8	L-6 CHONDRITE	C	A		
LEW 88771~	3.9	L-6 CHONDRITE	C	A		
LEW 88776	39.2	H-4 CHONDRITE	C	A	19	16
LEW 88778~	10.1	L-6 CHONDRITE	B/C	A		
LEW 88782~	4.0	L-6 CHONDRITE	B/C	A		
LEW 88786~	11.9	L-6 CHONDRITE	C	A		
ALH 90411	5836.5	L-3 CHONDRITE	Be	B/C	4-24	5-14
EET 90004	56.7	CARBONACEOUS C4	A/Be	A	29	
EET 90007	131.0	CARBONACEOUS C4	A/Be	A	29	
EET 90012	226.1	L-4 CHONDRITE	B/C	A/B	24	20
EET 90015	86.8	CARBONACEOUS C4	A/Be	A	29	
EET 90018	31.4	CARBONACEOUS C4	Be	A	29	
EET 90020	154.0	EUCRITE	A	A		40-55
EET 90022	15.5	CARBONACEOUS C4	A/Be	A	29	
EET 90024	22.8	EUCRITE	B	A		26-60
EET 90029	7.9	EUCRITE	A/B	A		27-57
EET 90030	75.3	L-6 CHONDRITE	B/C	A	24	20
EET 90031	55.8	LL-6 CHONDRITE	A	A/B	30	25
EET 90032	30.0	LL-6 CHONDRITE	B/C	A/B	30	25
EET 90033	3.9	AUBRITE	B	A		0-2
EET 90034	1413.6	L-6 CHONDRITE	B	A	23	19
LEW 90500	294.7	CARBONACEOUS C1	B	A	1-28	
QUE 90200	9216.7	H-4 CHONDRITE	B/C	B/C	18	15-26
QUE 90201	1282.5	L-4 CHONDRITE	A/B	A	26	22
QUE 90202	440.0	L-4 CHONDRITE	A	A	26	22

~Classified by using refractive indices.
**Reclassified

Newly Classified Specimens Listed By Type **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		Achondrites				
LEW 88763	4.1	ACHON. (BRACHINA-LIKE)	B	A	33	18
EET 90033	3.9	AUBRITE	B	A		0-2
EET 90020	154.0	EUCRITE	A	A		40-55
EET 90024	22.8	EUCRITE	B	A		26-60
EET 90029	7.9	EUCRITE	A/B	A		27-57
LEW 88516	13.2	SHERGOTTITE	A/B	A	33	28
		Carbonaceous Chondrites				
LEW 90500	294.7	CARBONACEOUS C1	B	A	1-28	
EET 90004	56.7	CARBONACEOUS C4	A/Be	A	29	
EET 90007	131.0	CARBONACEOUS C4	A/Be	A	29	
EET 90015	86.8	CARBONACEOUS C4	A/Be	A	29	
EET 90018	31.4	CARBONACEOUS C4	Be	A	29	
EET 90022	15.5	CARBONACEOUS C4	A/Be	A	29	
		Chondrites - Type 3				
LEW 88315	25.1	H-3 CHONDRITE	Ce	B	1-22	2-39
LEW 88367	14.0	H-3 CHONDRITE	B/Ce	A	14-22	4-25
LEW 88393	12.2	H-3 CHONDRITE	C	A	8-22	2-23
LEW 88328	43.1	L-3 CHONDRITE	C	A	8-28	10-24
LEW 88452	13.4	L-3 CHONDRITE	B/C	A	2-35	1-25
LEW 88462	8.1	L-3 CHONDRITE	B/C	A	7-18	3-23
LEW 88467	6.6	L-3 CHONDRITE	B	A/B	6-15	3-15
LEW 88632	10.3	L-3 CHONDRITE	B/C	A	2-21	8-23
LEW 88644	15.9	L-3 CHONDRITE	A/B	A	3-30	2-26
ALH 90411	5836.5	L-3 CHONDRITE	Be	B/C	4-24	5-14
LEW 88176	7.5	LL-3 CHONDRITE	B/C	A	9-38	3-16
LEW 88336	29.8	LL-3 CHONDRITE	B/C	A	4-41	3-17
LEW 88484	8.4	LL-3 CHONDRITE	B/C	A	6-32	4-16
LEW 88520	3.1	LL-3 CHONDRITE	C	A	4-24	2-17
LEW 88536	2.6	LL-3 CHONDRITE	C	A	3-22	2-15
LEW 88561	10.7	LL-3 CHONDRITE	B/C	A	6-22	3-14
LEW 88596	8.9	LL-3 CHONDRITE	Ce	A	2-38	1-18

~Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
		E Chondrites				
LEW 88135	16.0	E-6 CHONDRITE	B/Ce	B		0.3
		Irons				
LEW 88631	3.2	IRON-ANOMALOUS				
LEW 88432	1.3	METAL FROM H CHON.				
LEW 88677	.6	METAL FRAGMENT				
LEW 88698	.8	METAL FRAGMENT				
		Stony Irons				
LEW 88280**	6.0	LODRANITE	B	A	13	12
MAC 88177**	35.3	LODRANITE	B/C	A	13	12

*****NOTES TO TABLES 1 AND 2:***

"Weathering" categories:

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

"Fracturing" categories:

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

~Classified by using refractive indices.
**Reclassified

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).

CARBONACEOUS C4:

EET 90004, 90007, 90015, 90018, 90022
with EET 87507.

L-4 CHONDRITE:

QUE 90201, 90202.

LL-6 CHONDRITE:

EET 90031, 90032.

Sample No.:	**ALH90411**
Location:	Allan Hills
Field Number:	6609
Dimensions (cm):	28 x 16.5 x 7.5
Weight (g):	5836.5
Meteorite Type:	L3 chondrite

Macroscopic Description: Robbie Marlow

Exterior is ~90% covered with dull black fusion crust. Evaporite deposit is visible on one exterior surface. Fractures penetrate deeply into the interior in several locations. Interior matrix is light gray and oxidation is scattered throughout. Numerous millimeter-sized chondrules are present.

Thin Section (.6) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.4 mm across, in a matrix of fine-grained olivine and pyroxene with a minor amount of nickel-iron and troilite. Some weathering is indicated by brown limonitic staining around metal grains. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{4-24}, mean Fa_{21} (CV FeO is 34); pyroxene, Fs_{5-14}. The amount of nickel-iron suggests L group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an L3 chondrite (estimated L3.6).

Sample No.:	**EET90004; EET90007; EET90015; EET90018; EET90022**
Location:	Elephant Moraine
Field Number:	6502; 7149; 6803; 6497; 6521
Dimensions (cm):	4.5 x 3 x 2.8; 4.5 x 4.3 x 3.5; 4.8 x 3.9 x 3.0; 5 x 3.5 x 1.4; 2.9 x 1.8 x 2.1
Weight (g):	56.7; 131.0; 86.8; 31.4; 15.5
Meteorite Type:	Carbonaceous C4

Macroscopic Description: Robbie Marlow

Dull brown or black fusion crust covers approximately half of all 5 specimens. Evaporite deposits are present on all. EET90015, and 90018 have white deposit; 90004 and 90007 have more abundant light green colored deposit; and 90022 has abundant thick, fluffy looking deposit with euhedral crystals. The original hydrated color of the deposit on 90022 was turquoise which turned to a lighter green after it was dried. The interior of all specimens is medium gray with minor amounts of metal and a few white inclusions. Weathering of the interior is minimal.

Thin Section (EET90004,4; 007,5; 015,6; 018,3; 022,4) Description: Brian Mason

The sections of these meteorites are all very similar and a single description applies to all. They show an aggregate of small (average about 0.02 mm) olivine grains and minor opaque material; some of the opaque material is finely dispersed and gives the sections a gray color. Occasional chondrules, up to 1.2 mm across, are present. Fusion crust is present on 90007, 90015, and 90022. Olivine composition is Fa_{29}; a little plagioclase of variable composition, An_{33-45}, is present; one grain of diopside, $Wo_{40}Fs_{11}$, was analysed. The opaque material is mainly magnetite with a little troilite and pentlandite. The meteorites are C4 chondrites; they are very similar in texture and mineral compositions to the EET 87507 group of C4 chondrites, and the possibility of pairing should be considered.

Sample No.:	**EET90020**
Location:	Elephant Moraine
Field Number:	7245
Dimensions (cm):	5.3 x 4.5 x 4.8
Weight (g):	154.0
Meteorite Type:	Eucrite

Macroscopic Description: Robbie Marlow

Thin, shiny, black fusion crust covers 80% of the exterior of this sample. No fractures exist. Cleaving this achondrite revealed an interior with coarse-grained matrix containing an even distribution of white laths. The specimen is coherent and weathering is minimal.

Thin Section (.7) Description: Brian Mason

The section shows an equigranular aggregate (average grain size 0.6 mm) of plagioclase laths and anhedral to subhedral pyroxene grains, with a little opaque material. The pyroxene is pale brown and weakly pleochroic. Pyroxene compositions show a continuous range from Wo_5Fs_{55} to $Wo_{23}Fs_{40}$, with relatively uniform En content. Plagioclase composition is An_{86-92}. Tridymite is present as an accessory. The meteorite is a eucrite.

Sample No.: **EET90024**
Location: Elephant Moraine
Field Number: 6945
Dimensions (cm): 2.9 x 2.5 x 1.8
Weight (g): 22.8
Meteorite Type: Eucrite

Macroscopic Description: Cecilia Satterwhite
The exterior of this achondrite is covered with dull black fusion crust but some patches are shiny/glassy. Areas without fusion crust are brownish in color. Gray matrix with white inclusions (plagioclase?) makes up the interior. Black glassy veins enclose small inclusions and oxidation is speckled throughout the specimen.

Thin Section (.4) Description: Brian Mason
The section shows large pyroxene crystals, up to 6 mm long, with a minor amount of interstitial plagioclase. The pyroxene crystals are somewhat granulated, and both the plagioclase and the pyroxene show undulose extinction. Dark glassy veins, up to 1.2 mm across, are present. The pyroxene shows a range of compositions, from Wo_2Fs_{60} to $Wo_{42}Fs_{26}$, with relatively uniform En content; mean composition is $Wo_{13}Fs_{50}$. Plagioclase composition is An_{89-92}. The meteorite is a eucrite.

Sample No.: **EET90029**
Location: Elephant Moraine
Field Number: 7298
Dimensions (cm): 2 x 2 x 1.5
Weight (g): 7.9
Meteorite Type: Eucrite

Macroscopic Description: Cecilia Satterwhite
Sixty percent of this meteorite is covered with black fusion crust. Areas devoid of fusion crust are medium to dark gray and contain some oxidation. The interior is light gray with small black grains (1mm). Black glassy veins were noted.

Thin Section (.3) Description: Brian Mason
The section consists largely of pyroxene, with some plagioclase and a little opaque material. The pyroxene is very fine-grained (average grain size 0.01 - 0.02 mm); the plagioclase is present as laths up to 0.2 mm long. Pyroxene compositions range from Wo_4Fs_{57} to $Wo_{12}Fs_{50}$, with one grain $Wo_{40}Fs_{27}$; plagioclase composition is An_{88-93}. The meteorite is a eucrite.

Sample No.: **EET90033**
Location: Elephant Moraine
Field Number: 6527
Dimensions (cm): 2 x 1.4 x 1
Weight (g): 3.9
Meteorite Type: Aubrite

Macroscopic Description: Cecilia Satterwhite
Little blebs of fusion crust remain on the exterior of this aubrite. The interior is grayish-white with large enstatite clasts. Some dark inclusions are present. Oxidation is moderate and scattered throughout.

Thin Section (.2) Description: Brian Mason
The section has a cataclastic texture, with enstatite clasts up to 3 mm across in a comminuted matrix of this mineral. The clasts show undulose extinction and contain small blebs of diopside. The enstatite is almost pure $MgSiO_3$, with FeO ranging up to 0.5%, and CaO 0.3-0.5%. Diopside composition is $Wo_{45}En_{55}$. The meteorite is an aubrite.

Sample No.: **LEW88135**
Location: Lewis Cliff
Field Number: 4495
Dimensions (cm): 2.5 x 1.8 x 1.5
Weight (g): 16.0
Meteorite Type: E6 chondrite

Macroscopic Description: Cecilia Satterwhite
Fractures penetrate the interior of this weathered chondrite. About half of the stone is covered by fusion crust. The interior is heavily oxidized but metal is still obvious. Evaporite deposit is present in the interior.

Thin Section (.2) Description: Brian Mason
Chondritic structure is barely perceptible, the section showing an aggregate of small pyroxene grains, up to 0.2 mm across, with a little plagioclase and about 25% of metal and sulfide. Considerable weathering is indicated by the presence of veins and patches of brown limonite. Microprobe analyses show that the pyroxene is almost pure $MgSiO_3$, with 1.0% CaO and up to 0.4% FeO; plagioclase composition is An_{18}; the nickel-iron contains up to 1.1% Si. The meteorite is a E6 chondrite.

Sample No.: **LEW88176**
Location: Lewis Cliff
Field Number: 5310
Dimensions (cm): 2 x 1.5 x 1.5
Weight (g): 7.5
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite
Frothy fusion crust covers 80% of LEW88176. This meteorite broke along a pre-existing fracture revealing a heavily weathered interior with some inclusions/chondrules still visible.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.8 mm across, in a matrix of fine-grained olivine and pyroxene with a little nickel-iron and troilite. Extensive weathering is indicated by brown limonitic staining throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{9-38}, mean Fa_{20} (CV FeO is 38); pyroxene, Fs_{3-16}. The small amount of nickel-iron suggests LL group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an LL3 chondrite (estimated LL3.6).

Sample No.: **LEW88315**
Location: Lewis Cliff
Field Number: 6175
Dimensions (cm): 2.7 x 2.5 x 2.2
Weight (g): 25.1
Meteorite Type: H3 chondrite

Macroscopic Description: Cecilia Satterwhite
Oxidation haloes are present in the omnipresent black/brown fusion crust. One large fracture penetrates the interior of this weathered meteorite. Inclusions and metal are visible in the dark brown matrix. Evaporite deposit is present.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.6 mm across, in a matrix of fine-grain olivine and pyroxene with a moderate amount of nickel-iron and troilite. Considerable weathering is indicated by limonitic staining and patches of brown limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{1-22}, mean Fa_{15} (CV FeO is 41); pyroxene, Fs_{2-39}. The amount of nickel-iron suggests H group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an H3 chondrite (estimated H3.5).

Sample No.: **LEW88328**
Location: Lewis Cliff
Field Number: 6089
Dimensions (cm): 3.9 x 3.4 x 2.1
Weight (g): 43.1
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow
Smooth dark brown fusion crust covers approximately 80% of this otherwise extremely weathered stone.

Thin Section (.2) Description: Brian Mason
The section shows abundant chondrules and chondrule fragments, up to 1.8 mm across, in a finely granular matrix of olivine and pyroxene with minor nickel-iron and troilite. Weathering is extensive, with brown limonitic staining and small patches of limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{8-28}, mean Fa_{20} (CV FeO is 22); pyroxene, Fs_{10-24}. The variability of olivine and pyroxene compositions indicates type 3, and the small amount of nickel-iron L group, hence the meteorite is classified as an L3 chondrite (estimated L3.7).

Sample No.: **LEW88336**
Location: Lewis Cliff
Field Number: 6070
Dimensions (cm): 3 x 2.2 x 2
Weight (g): 29.8
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite
Black, pitted fusion crust covers 85% of this unequilibrated chondrite. Cleaving LEW88336 revealed an interior which ranges in color from dark gray to red-brown. Several inclusions are present but one notable one is 5 mm in longest dimension, gray in color, and fine-grained.

Thin Section (.3) Description: Brian Mason
The section shows abundant chondrules and chondrule fragments, up to 3.1 mm across, in a dark matrix consisting largely of finely granular olivine and pyroxene with accessory amounts of troilite and nickel-iron. A variety of chondrule types is present, mainly granular and porphyritic olivine and olivine-pyroxene, but also some radiating to cryptocrystalline pyroxene chondrules. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{4-41}, mean Fa_{23} (CV FeO is 43); pyroxene, Fs_{3-17}. The small amount of nickel-iron suggests LL group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an LL3 chondrite (estimated LL3.5).

Sample No.: **LEW88367**
Location: Lewis Cliff
Field Number: 4525
Dimensions (cm): 3 x 2 x 1.8
Weight (g): 14.0
Meteorite Type: H3 chondrite

Macroscopic Description: Robbie Marlow
Regmaglypts are present in the dark brown fusion crust which covers 90% of this meteorite. Numerous millimeter sized chondrules/inclusions were noted in the weathered matrix. Evaporite deposit is present on the interior material.

Thin Section (,2) Description: Brian Mason
The section shows numerous chondrules and chondrule fragments, up to 1.8 mm across, in a finely granular matrix of olivine and pyroxene which contains a moderate amount of nickel-iron and troilite. Weathering is extensive, with brown limonitic staining throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{14-22}, mean Fa_{19} (CV FeO is 11); pyroxene, Fs_{4-25}. The amount of nickel-iron suggests H group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an H3 chondrite (estimated H3.8).

Sample No.: **LEW88393**
Location: Lewis Cliff
Field Number: 5196
Dimensions (cm): 2.5 x 2.3 x 1.6
Weight (g): 12.2
Meteorite Type: H3 chondrite

Macroscopic Description: Robbie Marlow
The dark brown fusion crust which covers 95% of LEW88393 contains numerous regmaglypts. Abundant inclusions/chondrules with a range in size are visible in the heavily oxidized matrix.

Thin Section (,2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.9 mm across, in a small amount of finely granular matrix which contains a moderate amount of nickel-iron and troilite. Minor weathering is indicated by limonitic staining concentrated around metal grains. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{8-22}, mean Fa_{17} (CV FeO is 20); pyroxene, Fs_{2-23}. The amount of nickel-iron suggests H group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an H3 chondrite (estimated H3.7).

Sample No: **LEW88432**
Location: Lewis Cliff
Field Number : 5236
Dimensions (cm): 1.1 x 1.1 x 0.25
Weight (g): 1.3
Meteorite Type: Metal from an H chondrite.

Macroscopic Description: Roy S. Clarke, Jr.
This metallic plate with a roughly square outline is covered with a reddish brown weathering crust. Rounding of the plate edges suggests that anterior and posterior surfaces formed during atmospheric ablation. One small area on the edge of the plate had the glassy luster of melted silicate.

Polished Section (,1): Roy S. Clarke, Jr.
A 114 mg slice (10 x 3 mm) was removed for section preparation approximately 2 mm in from an edge and perpendicular to the large surface, yielding butts of 193 mg and 867 mg. The sawn surface revealed an area of silicates 0.5 mm thick and extending along the exterior edge for 3.8 mm. After this identification had been made, it became obvious that this silicate area extended along the adjacent exterior surface (3 x 4.5 mm). Several other small areas of silicates were observed partially within metal and located along the exterior edge of the section. The exposed metal has all been heat-altered to a fine α_2 structure. Electron microprobe measurements give a uniform metal composition: 6.9 wt% Ni, 0.51 wt% Co, and <0.05 wt% P. Brian Mason looked at the silicates and found olivine (Fa_{19}) and pyroxene ($Fs_{17}Wo_1$). These metal and silicate compositions suggest that the specimen is a large metal inclusion from an H group chondrite. Metallographic structures suggest that this metal fragment passed through much of the atmosphere as an individual.

Sample No.: **LEW88452**
Location: Lewis Cliff
Field Number: 5295
Dimensions (cm): 2.2 x 1.8 x 1.5
Weight (g): 13.4
Meteorite Type: L3 chondrite

Macroscopic Description: Cecilia Satterwhite
One quarter of the exterior is not covered with dull black fusion crust. The black interior matrix contains abundant weathered chondrules. Metal is obvious.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.5 mm across, in a granular matrix of olivine and pyroxene with small amounts of troilite and nickel-iron. Weathering is moderate, with some limonitic staining and small areas of brown limonite. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{2-35}, mean Fa_{15} (CV FeO is 68); pyroxene, Fs_{1-25}. The amount of nickel-iron suggests L group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an L3 chondrite (estimated L3.4).

Sample No.: **LEW88462**
Location: Lewis Cliff
Field Number: 5238
Dimensions (cm): 1.8 x 1.6 x 1.7
Weight (g): 8.1
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow
Smooth dark brown fusion crust covers 85% of this meteorite. A discontinuous weathering rind was exposed when LEW88462 was cleaved. The matrix is medium gray, contains numerous chondrules and ranges in oxidation from light to heavy.

Thin Section (.2) Description: Brian Mason
The section shows numerous chondrules and chondrule fragments, up to 1.8 mm across, in a granular matrix of olivine and pyroxene with minor amounts of nickel-iron and troilite. A moderate degree of weathering is indicated by limonitic staining throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{7-18}, mean Fa_{14} (CV FeO is 22); pyroxene, Fs_{3-23}. The amount of nickel-iron suggests L group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an L3 chondrite (estimated L3.7).

Sample No.: **LEW88467**
Location: Lewis Cliff
Field Number: 5253
Dimensions (cm): 1.6 x 1.5 x 1.4
Weight (g): 6.6
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow
Eighty percent of the exterior of this friable unequilibrated chondrite is covered with dull black, pitted fusion crust. The interior is medium gray with abundant chondrules.

Thin Section (.2) Description: Brian Mason
The section shows chondrules and chondrule fragments, up to 2.8 mm across, in a finely granular matrix of olivine and pyroxene with minor troilite and nickel-iron. Minor weathering is indicated by limonitic staining associated with metal grains. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{6-15}, mean Fa_{12} (CV FeO is 16); pyroxene, Fs_{3-15}. The amount of nickel-iron suggests L group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an L3 chondrite (estimated L3.8).

Sample No.: **LEW88484**
Location: Lewis Cliff
Field Number: 5213
Dimensions (cm): 1.8 x 1.6 x 1.2
Weight (g): 8.4
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite
LEW88484 is a weathered specimen with 90% of its surface covered by fusion crust. The interior is brown in some areas and yellowish-gray in others. Inclusions are visible, as are metal blebs.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.5 mm across, in a small amount of finely granular matrix which contains accessory amounts of nickel-iron and troilite. Weathering is extensive, with limonitic staining and areas of brown limonite throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{6-32}, mean Fa_{22} (CV FeO is 32); pyroxene, Fs_{4-16}. The small amount of nickel-iron suggests LL group, and the variability of olivine and pyroxene compositions type 3, hence the meteorite is classified as an LL3 chondrite estimated LL3.6).

Sample No.: **LEW88516**
Location: Lewis Cliff
Field Number: 5348
Dimensions (cm): 2 x 2 x 1.5
Weight (g): 13.2
Meteorite Type: Shergottite

Macroscopic Description: Cecilia Satterwhite
Pitted and mostly shiny fusion crust covers 80% of LEW88516. The sample's interior consists of green/black matrix which appears glassy and has conchoidal fractures. Several dark colored inclusions are present.

Thin Section (.3) Description: Brian Mason
The section shows that this meteorite is an achondrite with the approximate composition (volume percent): olivine 50, pyroxene 35, maskelynite 8, opaques (mostly chromite, with a little troilite) 2, brown glass 5. Olivine is present as rounded anhedral to subhedral grains, up to 1.8 mm long, and weakly pleochroic in pale brown. Pyroxene occurs as colorless subhedral grains up to 3 mm long, showing undulose extinction, and maskelynite is interstitial to the olivine and pyroxene. Dark brown glass containing numerous birefringent needly-like crystals (probably olivine) occurs as veinlets and patches up to 1.5 mm across. A little fusion crust is present on one edge. Microprobe analyses gave the following compositions: olivine, Fa_{33}; pyroxene, Wo_5Fs_{28}; maskelynite, An_{53}. The meteorite is a shergottite; it resembles ALHA 77005 in texture and mineral compositions.

Sample No.: **LEW88520**
Location: Lewis Cliff
Field Number: 5383
Dimensions (cm): 1.9 x 1.2 x 1
Weight (g): 3.1
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow
Dark brown fusion crust covers almost half of this weathered meteorite. Although the interior is extremely weathered, some millimeter sized inclusions/chondrules are visible.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.4 mm across, in a matrix of fine-grained olivine and pyroxene and a little nickel-iron and troilite. Brown limonitic staining pervades the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{4-24}, mean Fa_{14} (CV FeO is 41); pyroxene, Fs_{2-17}. The variability of olivine and pyroxene compositions indicated type 3, and the amount of nickel-iron suggests L group, hence the meteorite is classified as an L3 chondrite (estimated L3.5).

Sample No.: **LEW88536**
Location: Lewis Cliff
Field Number: 5381
Dimensions (cm): 1.5 x 1 x 0.7
Weight (g): 2.6
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite
Black fusion crust with orangish oxidation haloes covers 95% of this stone. Abundant inclusions/chondrules were exposed when this unequilibrated chondrite was cleaved. The matrix is brown to black in color.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.5 mm across, in a fine-grained dark matrix which contains a little nickel-iron and troilite. Brown limonitic staining pervades the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{3-22}, mean Fa_{13} (CV FeO is 45); pyroxene, Fs_{2-15}. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron LL group, hence the meteorite is classified as an LL3 chondrite (estimated LL3.5).

Sample No.: **LEW88561**
Location: Lewis Cliff
Field Number: 4258
Dimensions (cm): 3 x 1.1 x 1.2
Weight (g): 10.7
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite
Shiny black fusion crust covers 95% of this meteorite. Abundant inclusions/chondrules are present in the dark brown matrix.

Thin Section (.2) Description: Brian Mason
The section shows abundant chondrules and chondrule fragments, up to 2.1 mm across, in a fine-grained matrix of olivine and pyroxene and a little nickel-iron and troilite. Brown limonitic staining and small areas of limonite are present throughout the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{6-22}, mean Fa_{13} (CV FeO is 37); pyroxene, Fs_{3-14}. The variability of olivine and pyroxene compositions indicate type 3, and the amount of nickel-iron LL group, hence the meteorite is classified as an LL3 chondrite (estimated LL3.6).

Sample No.: **LEW88596**
Location: Lewis Cliff
Field Number: 5322
Dimensions (cm): 2.3 x 2.1 x 0.5
Weight (g): 8.9
Meteorite Type: LL3 chondrite

Macroscopic Description: Cecilia Satterwhite

Seventy-five percent of this chondrite is covered by fusion crust. Chipping this sample revealed a dark brown to black interior with some rusty areas. Evaporite deposit was noted. Light gray and cream colored inclusions/chondrules are present.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.2 mm across, in a black opaque groundmass which contains a little nickel-iron and troilite. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{2-38}, mean Fa_{13} (CV FeO is 65); pyroxene, Fs_{1-18}. The variability of olivine and pyroxene compositions indicates type 3, and the small amount of nickel-iron LL group, hence the meteorite is classified as an LL3 chondrite (estimated LL3.4).

Sample No: **LEW88631**
Location: Lewis Cliff
Field Number: 6142
Dimensions (cm): 0.8 x 0.9 x 1.1
Weight (g): 3.2
Meteorite Type: An anomalous iron similar to Horse Creek

Macroscopic Description: Roy S. Clarke, Jr.

This irregularly shaped and somewhat rounded metallic lump is covered with a reddish brown weathering crust. Black, patchy areas within this crust suggest the possibility that weathered fusion crust is present.

Polished Section (.1): Roy S. Clarke, Jr.

A median slice of 370 mg (0.8 x 1.0 cm) was removed for section preparation, leaving butts of 1.11 g and 1.45 g. The sawn surface revealed metal containing a large schreibersite (3.0 x 3.7 mm). Terrestrial corrosion products adhere to edges of the section, and corrosion invades the interior along a series of off-set cracks that penetrate from the edge to the center. Within the corrosion products along exterior edges there are several areas of remnant fusion crust, including one place where both oxidic and melt crust are present. Ablation heating has also melted small areas at the edge of the large schreibersite. A thin rim of α_2 structure is present along parts of the exterior metal edge, but most of the metal is kamacite that has not been obviously heat altered. The kamacite contains abundant rhabdites and occasional shock induced distortions. Superimposed upon this basic structure is a dense pattern of fine needles of a silicide mineral, probably perryite. Preliminary electron microprobe analysis of the Si-containing kamacite matrix gave 3.5-4.0 wt% Ni, approximately 0.4 wt% Co, and <0.05 wt% P. The silicide crystals are too thin for easy analysis, but they contain high Ni, with one analysis giving 31 wt% Ni. Silicide crystals also contain small amounts of P. This is an anomalous iron similar to Horse Creek.

Sample No.: **LEW88632**
Location: Lewis Cliff
Field Number: 6115
Dimensions (cm): 2.5 x 1.5 x 1.3
Weight (g): 10.3
Meteorite Type: L3 chondrite

Macroscopic Description: Cecilia Satterwhite

This weathered chondrite has 80% of its exterior covered with fusion crust. The dark brown interior contains numerous chondrules. Some metal is still obvious.

Thin Section (.2) Description: Brian Mason

The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 1.8 mm across, in a fine-grained matrix of olivine and pyroxene with minor amounts of nickel-iron and troilite. Brown limonitic staining pervades the section. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{2-21}, mean Fa_{12} (CV FeO is 37); pyroxene, Fs_{8-23}. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron L group, hence the meteorite is classified as an L3 chondrite (estimated L3.6).

Sample No.: **LEW88644**
Location: Lewis Cliff
Field Number: 6196
Dimensions (cm): 3.3 x 1.7 x 1.8
Weight (g): 15.9
Meteorite Type: L3 chondrite

Macroscopic Description: Robbie Marlow
Dull, black, frothy fusion crust almost completely covers this unequilibrated chondrite. The interior is medium gray in color with oxidation scattered throughout. Many millimeter-sized chondrules are present.

Thin Section (.2) Description: Brian Mason
The section shows a close-packed aggregate of chondrules and chondrule fragments, up to 2.4 mm across, in a matrix of fine-grained olivine and pyroxene with minor amounts of nickel-iron and troilite. Some weathering is indicated by brown limonitic staining around metal grains. Microprobe analyses show olivine and pyroxene of variable composition: olivine, Fa_{3-30}, mean Fa_{17} (CV FeO is 43); pyroxene, Fs_{2-26}. The variability of olivine and pyroxene compositions indicates type 3, and the amount of nickel-iron L group, hence the meteorite is classified as an L3 chondrite (estimated L3.5).

Sample No: **LEW88677**
Location: Lewis Cliff
Field Number: 6133
Dimensions (cm): 0.4 x 0.6 x 0.9
Weight (g): 0.6
Meteorite Type: Fragment of meteoritic iron of unknown pedigree.

Macroscopic Description: Roy S. Clarke, Jr.
This pea-shaped metallic specimen has a reddish brown weathering coating indicating fairly severe terrestrial corrosion. However, a small lip around part of the specimen is clearly an accumulation of fusion crust at an anterior/posterior surface junction of a specimen that experienced oriented flight in the atmosphere. Thin streamers of melt crust flowed from the anterior surface, accumulating and forming the lip at the join of the surfaces.

Polished Section (.1): Roy S. Clarke, Jr.
A 40 mg median slice was taken perpendicular to the plane of the lip joining the two surfaces, resulting in butts of 189 mg and 306 mg. A polished section 0.5 x 0.35 mm survived section preparation. Several small areas of terrestrial corrosion invade the metal, but it is otherwise a uniform area of kamacite transformed by severe atmospheric heating to α_2. At the end of the section corresponding to the accumulation lip, a rim of melt crust is present tapering from 0.4 mm at the anterior surface to 0.2 mm on the posterior surface. An electron microprobe traverse across the interior metal revealed a uniform composition: 5.1 wt% Ni, 0.33 wt% Co, and 0.24 wt% P. The Ni value is too low to connect this fragment with a particular iron meteorite group, and the high P, apparently in solution in the metal, probably represents schreibersite dissolved during heating. These data establish the meteoritic origin of the specimen but are insufficient to establish the class of meteorite from which it came. It is most likely from a low Ni area of a coarse-structured iron or stony-iron parent body.

Sample No: **LEW88698**
Location: Lewis Cliff
Field Number: 6112
Dimensions (cm): 0.4 x 0.5 x 0.8
Weight (g): 0.8
Meteorite Type: Metallic fragment from an iron or stony-iron meteorite.

Macroscopic Description: Roy S. Clarke, Jr.
This pea-shaped metallic mass is covered with a reddish brown weathering crust indicative of severe weathering.

Polished Section (.1): Roy S. Clarke, Jr.
A 137 mg median slice was removed for section preparation, leaving butts of 116 mg and 352 mg. The surface is bordered intermittently with terrestrial corrosion products. Within these corrosion layers are several small structures that appear to be remnant fusion crust. Several faint subgrain boundaries are present in the metal. Otherwise the surface consists of a uniform α_2 structure that suggests strong heating of kamacite in the atmosphere. An electron microprobe traverse across the center of the surface revealed a uniform composition: 6.3 wt% Ni, 0.33 wt% Co, and 0.11 wt% P. This composition suggests a fragment from an iron or stony-iron parent body.

Sample No.: **LEW88763**
Location: Lewis Cliff
Field Number: 4475
Dimensions (cm): 2.0 x 1.6 x 0.6
Weight (g): 4.1
Meteorite Type: Achondrite, Brachina-like

Macroscopic Description: Robbie Marlow
Thick rough, dull, black fusion crust covers 95% of this meteorite. The exposed interior is dark in color and crystalline with a massive texture.

Thin Section (.2) Description: Brian Mason
The section consists largely of an equigranular aggregate of anhedral olivine (grain size 0.3-0.6 mm), with minor amounts of plagioclase and pyroxene and a little opaque material. Well-preserved fusion crust, 1.2 mm thick, borders part of the section. Microprobe analyses give the following compositions: olivine, Fa_{33}; pyroxene, $Wo_{35}Fs_{18}$; plagioclase An_{21}. The meteorite is an achondrite, very similar to Brachina in texture and mineral compositions.

Sample No.: **LEW90500**
Location: Lewis Cliff
Field Number: 6177
Dimensions (cm): 7 x 6.5 x 6
Weight (g): 294.7
Meteorite Type: Carbonaceous C1

Macroscopic Description: Cecilia Satterwhite
This carbonaceous chondrite is covered with dull black fusion crust that is weathered in some areas and frothy in others. Areas devoid of fusion crust are heavily pitted. Black matrix with small lighter colored inclusions make up the interior of this meteorite. Although the sample is coherent, it breaks easily.

Thin Section (.7) Description: Brian Mason
The section is 90% black matrix, with scattered olivine grains up to 0.3 mm across; chondrules are few and small. Olivine grains show a wide range in composition, Fa_{1-28}. The meteorite is tentatively classified as a C1 chondrite.

Natural Thermoluminescence (NTL) Data for Antarctic Meteorites

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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 NTL lies between 5 and 100 krad, the natural TL is related primarily to terrestrial age. 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 past million years or so (by close solar passage, shock heating, or atmospheric entry), exacerbated, in the case of certain achondrite classes, by "anomalous fading". We suggest that meteorites with NTL > 100 krad are candidates for an unusual history involving high radiation doses and/or low temperatures. (July 1991 data set).

Sample	Class	NTL [krad at 250 deg. C]	Sample	Class	NTL [krad at 250 deg. C]
LEW85300	EUC	19 ± 4	LEW85471	L6	39.8 ± 0.1
LEW85302	EUC	28 ± 8	LEW88190	L6	0.5 ± 0.1
LEW85328	Ure	31 ± 6	LEW88174	H4	116.0 ± 0.6
			ALH85024	H5	<0.1
LEW85311	C2	<1	ALH85025	H5	27.0 ± 0.2
ALH85002	C4	<1	DOM85507	H5	0.7 ± 0.1
			GRO85206	H5	16.7 ± 0.2
ALH85019	LL6	17.9 ± 0.1	LEW85326	H5	150.6 ± 0.6
			MIL85600	H5	30.6 ± 0.2
ALHA76009*	L6	10.4 ± 0.1	ALH85036	H6	41.7 ± 0.2
ALH85022	L6	55 ± 4	LEW85412	H6	97.9 ± 0.3
ALH85046	L6	13 ± 3			

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

*ALHA76009 was measured as part of an interlaboratory comparision in collaboration with W.A. Cassidy (University of Pittsburgh) and was not sampled under the rigorous JSC guidelines.

TABLE 5

^{26}Al Activity Data for Antarctic Meteorites

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SPECIMEN NUMBER		CLASS	^{26}Al Activity (dpm/kg)	SPECIMEN NUMBER		CLASS	^{26}Al Activity (dpm/kg)
EET	82609	H4	78 ± 4	EET	83399	L3	77 ± 4
EET	82610	H6	46 ± 3	EET	84301	L6	42 ± 3
EET	83205	L6	60 ± 2	EET	84303	H5	49 ± 3
EET	83207	H4	55 ± 6	EET	84304	L6	79 ± 5
EET	83210	L6	71 ± 4				
EET	83217	L6	65 ± 4	META	78007	H6	63 ± 4
EET	83220	L6	70 ± 4	META	78016	H6	65 ± 4
EET	83238	L6	79 ± 5				
EET	83239	L6	75 ± 3	PCA	82507	LL6	54 ± 3
EET	83240	L5	61 ± 3	PCA	82508	L6	49 ± 2
EET	83241	L6	75 ± 5	PCA	82509	L6	57 ± 3
EET	83242	L5	51 ± 3	PCA	82510	L5	60 ± 4
EET	83243	L6	74 ± 4	PCA	82512	H6	33 ± 2
EET	83244	L6	57 ± 3	PCA	82513	L5	66 ± 5
EET	83248	H3	44 ± 7	PCA	82514	L4	60 ± 4
EET	83252	L6	81 ± 5	PCA	82519	L5	79 ± 5
EET	83253	L6	72 ± 4	PCA	82524	H4	41 ± 4
EET	83271	L6	76 ± 5	PCA	82525	L6	54 ± 4
EET	83274	L3	18 ± 2	PCA	82526	H6	62 ± 5
EET	83276	L6	64 ± 3				
EET	83305	H5	51 ± 2	RKPA	79008	L3	88 ± 4
EET	83308	L5	64 ± 4	RKPA	79014	H5	58 ± 4
EET	83312	L6	77 ± 4	RKPA	80205	H3	40 ± 4
EET	83318	L4	58 ± 5	RKPA	80240	H5	59 ± 5
EET	83324	H5	55 ± 4	RKPA	80245	H5	45 ± 5
EET	83329	L4	74 ± 4				
EET	83335	L6	80 ± 3	TIL	82400	L5	60 ± 3
EET	83348	L6	80 ± 4	TIL	82401	L6	62 ± 4
EET	83363	L6	85 ± 3	TIL	82402	LL6	76 ± 5
EET	83364	L6	68 ± 4	TIL	82404	L4	52 ± 3

Uncertainties are calculated from counting statistics. All data have been corrected for background effects and counting geometry, and preliminary corrections have been made for sample geometry effects. For more information or to request a copy of the complete Battelle ^{26}Al dataset, please contact John Wacker [telephone: (509) 376-1076; FAX: (509) 376-5021].