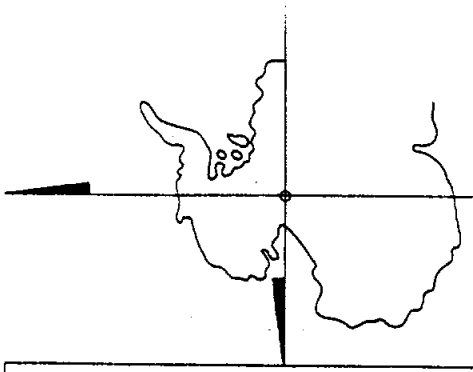


Antarctic Meteorite NEWSLETTER

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

Volume 1, Number 3

November 1978

Supported by the National Science Foundation, Division of Polar Programs, and compiled at Code SN2, Johnson Space Center, NASA, Houston, Texas 77058

- Sample Requests -

The Meteorite Working Group will meet next in mid-January 1979 to consider sample requests for specimens described in the newsletters. Please submit requests to the Secretary, MWG, prior to January 2.

REQUIREMENTS AND PROCEDURES FOR ANTARCTIC METEORITE SAMPLE REQUESTS

Formal requests for Antarctic meteorite samples for scientific research should be submitted in writing to the Secretary, Meteorite Working Group, Curator's Branch, Code SN2, Johnson Space Center, NASA, Houston, Texas 77058. Requests are welcome from U.S. and foreign scientists and will be considered two or three times each year by the Meteorite Working Group of the National Science Foundation. In order for a request to be considered, it must arrive in the Secretary's office prior to a deadline published in the newsletter. Consideration will be given to sample requests independently of whether or not the requestor is presently funded for meteorite or lunar sample studies. It should be noted that sample allocation does not in any way commit funding agencies to financing of the proposed research on Antarctic meteorites. Requests for financial support for research must be submitted separately to the appropriate funding agencies.

Sample requests should provide detailed scientific justification of the proposed research. Requests for specific samples should include sample numbers, weight requirements, special handling and shipping requirements, etc. Consortium type sample requests which are aimed at in-depth studies of specific samples by groups of scientists of different specialties are encouraged. Relevant sample information will be contained in the newsletters published by the Meteorite Working Group of the NSF through the Office of the Curator, Johnson Space Center, Houston, Texas.

Investigators wishing to study polished thin sections of Antarctic meteorites in support of their sample requests can do so at the thin section libraries, which are being established at the Johnson Space Center (contact Secretary, Meteorite Working Group), at the National Museum of Natural History, Smithsonian Institution, Washington, DC (contact Brian Mason, Curator), or at the National Institute of Polar Research, Ministry of Education, 1-9-10, Itabashi-ku, Tokyo, 173, Japan (contact T. Nagata, Director, and K. Yanai, Curator). These sections are for optical examination only and cannot be loaned out. Requests for polished thin sections or microprobe mounts will be entertained by the MWG, which will recommend the number and distribution of additional sections.

All allocated Antarctic meteorite samples remain the property of the National Science Foundation and are subject to recall to avoid any unnecessary duplication of effort. Any changes in the scope of research on allocated samples not detailed in the original sample request must be approved by the Meteorite Working Group.

- Sample Allocations -

At the September, 1978 meeting of the Meteorite Working Group approximately 140 individual samples from 15 meteorites in the collection were allocated to approximately 45 investigators. A table of these allocations is reproduced in this Newsletter. More than 90 percent of those investigators who requested samples received all or part of their request. Denials of requests were generally for one of three reasons: The request was for the carbonaceous chondrite, 306, where material is in short supply; the request was for specimens not yet reported in the Newsletter; or the specific request was infeasible at this time for technical reasons. In order that everyone has an equal opportunity, it is the policy of the MWG not to honor requests for a specimen which has not been reported in the Newsletter.

The Meteorite Curatorial Facility at JSC has suspended the initial processing of meteorites until the September allocation can be filled and mailed to investigators. It is anticipated that allocations will be filled and that initial processing will resume by early December. The Meteorite Facility now has an additional nitrogen processing cabinet, which increases our capability for both initial processing and allocating.

- Official Meteorite Names -

The Nomenclature Committee of the Meteoritical Society met in Sudbury, Ontario, during August to consider the naming of Antarctic meteorites. The decision of that committee, which has been agreed to by NASA, NSF and Smithsonian, is as follows:

1 - A place name shall precede the number of each meteorite found in the Antarctic. This place name will refer to the geographic feature closest to the find.

2 - Following the place name, a letter designating the search party will be assigned.

3 - A five-digit number beginning with the December year of the austral summer season as the first two digits and the individual meteorite number as the last three will also be assigned.

4 - The Nomenclature Committee will approve the requested names and expedition letters prior to the arrival of any year's finds in the U.S.

For example, the 303 specimens found by Dr. Cassidy in the Allan Hills region during the 1977-78 season are labeled Allan Hills A77001 to Allan Hills A77307.

Since the Johnson Space Center began numbering the 77-78 collection with 30,001, the only change is to add Allan Hills A and replace 30 with 77. Hence 30,001 becomes Allan Hills A77001.

A meteorite not from Allan Hills is the large 19 kilogram iron found in Victoria Valley by a graduate, Mr. Steven Kite, from the University of Maine. The finder requested that this specimen be called Purgatory Peak since it was found in

SAMPLE/ INVESTIGATOR	ALHA 77001	ALHA 77002	ALHA 77003	ALHA 77005	ALHA 77033	ALHA 77081	ALHA 77140	ALHA 77214	ALHA 77256	ALHA 77257	ALHA 77272	ALHA 77278	ALHA 77299	ALHA 77306	PGPA 77006
Arnold	x	x	x					x	x	x	x	x	x		x
. Bogard				x											
A. Brecher			x					x	x	x					
M. Christophe						x									
R. Clarke															x
A. Cohen														x	
G. Crozaz				x					x	x					
S. Durrani			x	x				x	x	x	x				
W. Ehmann	x	x	x	x				x	x	x	x	x	x	x	
M. Feierberg				x											
E. Fireman			x					x	x		x				
M. Fuller				x											
M. Gaffey				x											
E. Gibson														x	
W. Herr			x					x	x			x	x		
R. Hewins				x		x			x	x					
E. Jarosewich			x	x				x	x	x		x	x		
Jedwab										x					
. Kalleymeyn														x	
K. Keil				x			x			x		x			
E. King			x		x		x	x				x	x	x	
J. Knudsen		x							x		x	x			
J. Laul									x						
M. Lipschutz				x						x		x	x		
U. Marvin										x					
H. McSween				x										x	
C. Moore														x	
L. Nyquist				x											
D. O'Kelly				x											
R. O'Nions				x						x					
J. Oro														x	
J. Papike				x						x	x				
C. Ponnamperuma														x	
M. Prinz				x							x				
L. Rancitelli									x	x					
M. Rowe														x	
O. Schaeffer				x					x	x					
R. Schmitt				x			x			x		x			
L. Schultz						x									
D. Sears			x	x				x	x	x	x				
Tatsumoto									x	x		x	x		
Taylor				x					x	x					
R. Walker	x	x		x			x	x	x	x	x	x	x		
J. Wood														x	
Y. Yang			x	x				x		x	x	x	x		

that vicinity. The Nomenclature Committee agreed to this change. Since the iron had originally been numbered 30,006, the last digit has been retained and the specimen is now labeled Purgatory Peak A77006.

Specimen allocations listed on assignment forms from the Johnson Space Center will have the name printed out in full along with a three letter shortened form compatible with the JSC computer. The Allan Hills designation is ALH and Purgatory Peak is PGP for these purposes.

- Antarctic Search for Meteorites - 1978-79 -

The 1978-79 austral summer season is upon us and another expedition has been dispatched to the Antarctic. The participants in this year's search include William A. Cassidy and Dean A. Clauter from the University of Pittsburgh, John O. Annexstad from the Curator's Office (Johnson Space Center), and Ursula B. Marvin from Smithsonian Astrophysical Observatory. They will be joined by Fumihiko Nishio, Minouri Funaki and Kazayuki Shiraishi of the Japanese Polar Institute for this season.

The planned field activities for November through January are listed below:

November: Annexstad and Funaki will accompany a party of four geologists led by Philip Kyle to visit Allan Hills, Battlements Nunatak, and Reckling Peak. They will travel by helicopter to Carapace Nunatak and by snowmobile for the rest of the trip. They will investigate bare ice areas to the east and west of Reckling Peak, coordinating their field work with that of the Kyle party.

December: Cassidy and Shiraishi will begin helicopter reconnaissance out of Darwin Glacier Base Camp. Sites visited will include Warren Range, Boomerang Range, Butcher Ridge, Finger Ridges, Turnstile Ridge, Westhaven Nunatak, Bates Nunatak, and the high icefalls of the upper Darwin Basin. These sites can be located on the following USGS quadrangle maps: Mount Harmsworth, Turnstile Ridge, Carlyon Glacier, and Mount Olympus.

Annexstad and Nishio, plus one or two others, will initiate ice movement and ablation studies at the Allan Hills and resurvey the area of meteorite occurrence there to see if new specimens have been uncovered or if additional specimens can be recovered that had been overlooked in earlier visits.

If the reconnaissance party at the Darwin Glacier finds a new site where meteorites are concentrated, two more people will be brought in to set up a remote camp.

January: Work out of Darwin Glacier camp will be finished, using as many personnel as necessary to finish collecting meteorites from all new meteorite sites that have been discovered. As many as two remote camps, supplied from the Darwin Glacier base camp, may be in operation simultaneously.

We wish this party every success and hope they will return home with many new and exciting specimens.

- Characteristics of the 1977 Collection -

Although most specimens in the collection have not yet been weighed and photographed, they have been assigned a name/number combination and have been placed in individual containers. Eight types of containers of different sizes were used, and each meteorite was placed in a given type of container, depending upon its size. This fact permits us to construct an approximate histogram of the number of specimens versus mass,

as is shown in the accompanying figure. Each bar of the histogram shows the number of meteorite specimens in a given type of container. The cross-hatched area of each bar indicates the number of specimens in each category which have been weighed, photographed, described and classified to date. The weights shown below each bar are the approximate average weights of specimens in each category, as determined by the weights of those specimens already processed or by estimation. The weights in parentheses are the estimated total specimen mass in each container category as determined by multiplying the total number of specimens in each category with average weight. Although ∿60% of the total number of specimens have a mass of ≲50 g, ∿95% of the total mass of the collection is contained in specimens of ≳100 g in weight. The most massive specimen is an iron (PGPA77006) weighing 19 kg.

So far as we know, all rarer meteorites (i.e., achondrites, carbonaceous chondrites, and irons) of >100 g in the 1977 collection have been reported in the Newsletters. However, additional rarer specimens quite possibly will be identified as the remainder of the collection is classified. Also included in this Newsletter are descriptions of meteorites collected near Allan Hills in the 1976 field season. These specimens are being made available to investigators by Dr. William Cassidy and may be requested through the Meteorite Working Group. Additional descriptions on these meteorites may be found in an article by Olsen et al. (Meteoritics 13, p. 209, 1978). The four iron meteorites in the 1977 collection have been sent to the Smithsonian Institution to be sawed and allocated upon recommendation of the MWG and NSF.

Most meteorite data sheets reported in the Newsletter contain descriptions of the surface of the specimen and of a thin section made from an exterior chip. Sometimes sawing or breaking of the meteorite reveals interior features (e.g., clasts) which are worth reporting. Rather than reproduce the entire data sheet for that meteorite, we initiate in this Newsletter an Update Sheet. The Update Sheet reports important characteristics of meteorites learned since publication of their data sheets.

- New Mailing List -

This Newsletter was mailed only to those who have let us know that they wish to continue to receive the Newsletter. However, in changing our computerized mailing list, we may have inadvertently dropped some names from the list. If you know of anyone who did not receive Vol. 1, No. 3 of the Newsletter, but who wishes to receive it and future copies, please let us know. Our present mailing list contains approximately 475 names.

- Some Additional Comments -

Initial processing priorities for the remainder of the 1977 meteorite collection will emphasize the larger chondrites of ≳500 g, followed by the smaller chondrites.

Color photographs taken of specimens record many details of the surface features (ablation marks, fusion crust, coloration, etc.) and of sawed faces (size and shapes of chondrules and irregular clasts, the extent of internal weathering and fracturing, etc.) after the specimen itself has been subdivided and distributed. We anticipate that at some future time these photographs can be made available to investigators through some photographic data center yet to be selected.

Name/number combinations were assigned to the specimens at JSC in a random fashion and do not reflect the order of field recovery in Antarctica. However, most specimens were identified with their field photographs, and for many the orientation relative to the ice at the time of recovery is known.

Freeze-drying was done on a few meteorites (nos. 214, 269, 234, 003, 299, 002, and 256). For several of these the volatiles released (presumably mostly water) were collected on silica gel at -196°C and can be made available to anyone interested in their analysis.

Freeze-drying proved to be a time-consuming operation. It has now been replaced with drying of the specimens at +23°C in a nitrogen cabinet for 48 hours before sawing and allocations are done. Some simple tests suggest that of the total water which vaporizes from the specimens during nitrogen drying, approximately half is gone after 24 hours. If you are interested in freeze-drying of volatiles from additional samples, let us know.

A catalogue of the 1977 collection is planned to be published by the Smithsonian Institution next year. This catalogue will contain individual specimen data (weights, physical descriptions, classifications), some photographs, details of the field collection, details of the curation, and hopefully some information on terrestrial ages and suspected specimens which may represent paired meteorite falls.

Sample requirements or special handling requirements were poorly specified in several of the investigator requests considered by the MWG at the last meeting. If you have requirements, please state these. Some considerations are: chip or fines, interior or exterior, documented depth, special materials to avoid, minimum sample size in case an optimum sample of a rare specimen cannot be made available, etc.

Allocations of the eucrite AHLA77302 were not made at the September meeting of the MWG for the reasons that this specimen is small and appeared to contain large clasts. The MWG decided to defer allocations until 302 could be sawed and any clasts exposed could be described in the Newsletter. This meteorite has now been sawed and a description of its interior surface, along with the original description, is reported in the Update Sheet.

The Newsletter contains a summary table of all meteorites which have been described to date. This summary gives the weight and type classification of each specimen and a relative classification of the apparent degree of chemical weathering and of fracturing for each chondrite. The purpose of the weathering and fracturing classification is to convey our impressions of these characteristics for the overall specimen, which may differ from that seen in the thin section generally made from a surface chip. Relative weathering classifications are based on the degree of oxidation of metal seen on broken or sawed surfaces and are:

A - minor. Chondritic metal flecks have minor rust halos; oxide stain along cracks is minor.

B - moderate. Chondritic metal flecks show large rust halos; internal cracks show extensive oxide stain.

C - severe. Specimen is uniformly stained brown; no evidence of metal.

Relative fracturing classifications are:

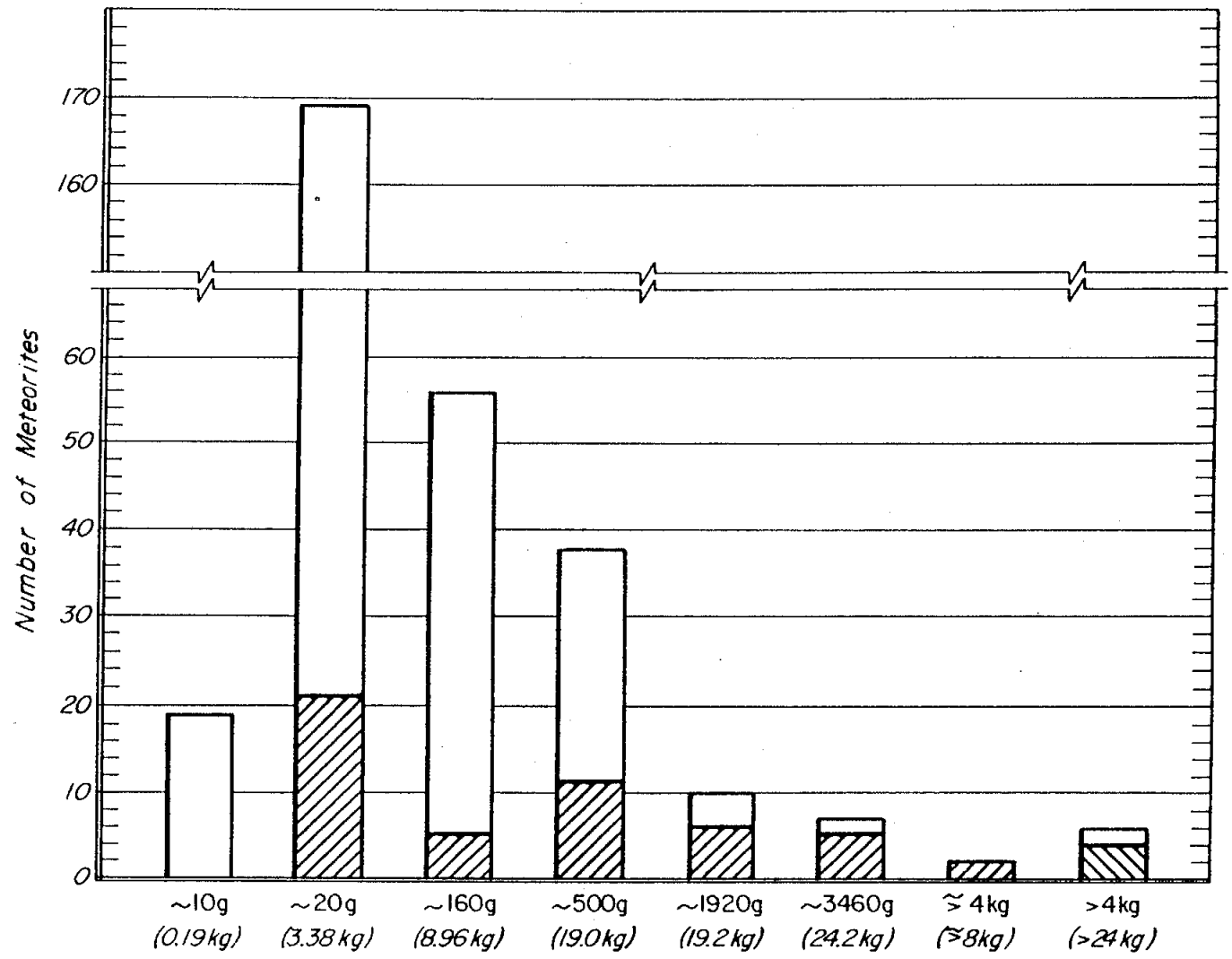
A - slight. Few or no cracks; none extend across entire specimen.

B - moderate. Several cracks which may extend across specimen; specimen is readily broken along cracks.

C - severe. Many extensive cracks; specimen crumbles readily.

Greater degrees of weathering and fracturing commonly, but not always, occur together.

- PLEASE RETAIN THIS SHEET AS A GUIDE -


Number of Meteorites
170
160
60
50
40
30
20
10
0
~10g
(0.19kg)
~20g
(3.38kg)
~160g
(8.96kg)
~500g
(19.0kg)
~1920g
(19.2kg)
~3460g
(24.2kg)
≳4kg
(≳8kg)
>4kg
(>24kg)
Individual Meteorite Mass
(Approximate Total Mass)

Data Sheet Listing - Volume 1, No. 3

NUMBER	WT. (GMS)	CLASSIFICATION (TENTATIVE)	WEATHERING	FRACTURING
ALHA77001	252.0	L-6 Chondrite	A	B
ALHA77002	235.2	L-5Chondrite	B	A
ALHA77003	779.6	L-3 Chondrite	A	A
ALHA77005	482.5	Achondrite (unique)	A	A
PGPA77006	19,068.0	Iron		
ALHA77021	16.65	H5 Chondrite	C	C*
ALHA77025	19.40	H5 Chondrite	C	C*
ALHA77033	9.34	LL3 Chondrite	C	C*
ALHA77061	12.61	H5 Chondrite	B	A*
ALHA77062	16.72	H5 Chondrite	B	B*
ALHA77064	6.47	H5 Chondrite	B	B*
ALHA77071	10.87	H5 Chondrite	B	B*
ALHA77074	12.07	H5 Chondrite	B	B*
ALHA77081	8.59	Unclassified - Possibly unique	B	B*
ALHA77086	19.44	H5 Chondrite	C	C*
ALHA77088	51.15	H5 Chondrite	C	C*
ALHA77102	12.25	H5 Chondrite	B	C*
ALHA77118	7.84	H5 Chondrite	C	B*
ALHA77119	6.36	H5 Chondrite	C	C*
ALHA77124	4.41	H6 Chondrite	C	C*
ALHA77140	78.62	L-3 Chondrite		
ALHA77144	7.88	H6 Chondrite	B	A*
ALHA77148	13.10	H6 Chondrite	C	C*
ALHA77150	58.30	L6 Chondrite	C	C*
ALHA77160	70.42	L-3 Chondrite	C	C*
ALHA77164	38.14	L-3 Chondrite	C	C*
ALHA77165	30.50	L-3 Chondrite	C	C*
ALHA77208	1733.0	H-4 Chondrite		
ALHA77214	2097.4	L or LL Chondrite	C	C*
ALHA77219	637.10	Diogenite - Possibly unique		
ALHA77224	786.90	H5 Chondrite		
ALHA77230	2473.30	L-4 Chondrite		
ALHA77250	10,555	Iron		
ALHA77256	676.2	Achondrite (diogenite)	A	A

*Degree of weathering estimated from physical and petrographic descriptions and photographs.

NUMBER	WT. (GMS)	CLASSIFICATION (TENTATIVE)	WEATHERING	FRACTURING
ALHA77257	1995.7	Achondrite (urelite)		
ALHA77264	10.97	H5 Chondrite		
ALHA77269	1045.0	L-6 Chondrite		
ALHA77271	609.5	H6 Chondrite		
ALHA77272	674.1	L-6 Chondrite	B	B
ALHA77273	492.0	L-6 Chondrite		
ALHA77277	142.73	L-6 Chondrite		
ALHA77278	312.9	L-3 Chondrite	A	A
ALHA77280	3226.0	L-6 Chondrite		
ALHA77281	1231.0	L-6 Chondrite		
ALHA77282	4127.1	L-6 Chondrite		
ALHA77283	10,510	Iron		
ALHA77288	1880.0	H6 Chondrite		
ALHA77290	3784	Iron		
ALHA77299	260.7	H3 Chondrite	A	A
ALHA77302	235.5	Achondrite (eucrite)	A	A
ALHA77305	940.0	L-6 Chondrite	B	B
ALHA77306	19.91	Carbonaceous Chondrite - C2	A	A
ALHA77307	181.30	Carbonaceous Chondrite - C3		

1976 COLLECTION

NUMBER	WT. (GMS)	CLASSIFICATION
MBRA76001	1096.0	H-6
ALHA76002	302.0	Ogg-1A
ALHA76004	52.50	LL-3
ALHA76006	271.0	H-6
ALHA76007	78.5	L-6
ALHA76008	281.3	H-6
ALHA76009	3950.5	L-6

UPDATE SHEET

ALHA77005 - Achondrite (unique)

On the cut surface the sample appears to be fresh. Variations in color of sawed surface suggest heterogeneities on a centimeter scale. Voids up to 2 mm in diameter are present on the sawed surface. Some of these voids show crystal structures on the peripheral surface, but they do not appear to extend into the cavity.

ALHA77302 - Achondrite (eucrite)

The sample contains a large clast, ~1.5 x 1.5 cm, which is darker gray than the comminuted groundmass. Additionally, there are several smaller inclusions which appear similar to the large clast. Numerous light inclusions ranging up to ~3 mm in maximum length were also exposed on the sawed surface. The meteorite appears to have suffered little, if any, weathering.

ALHA77306 - Carbonaceous Chondrite - C2

When the specimen was cleaved into two halves, a greenish-gray weathering rind was observed to have penetrated into the meteorite to a depth of ~1 mm. The interior, non-weathered portion, of the meteorite is a dull, blackish-gray. Small vugs are randomly distributed throughout the meteorite. It was not possible to determine if crystals are present in the vugs.

ANTARCTIC METEORITE DATA SHEET

Sample No.	ALHA77160	Location: Allan Hills, Antarctica
Field No.	77123006	Field Contamination Category: 4
Weight (gms)	70.42	
Meteorite Type	L3 Chondrite	

Physical Description:

Approximately 80% of surface is dark brown and angular with a slight patina. The patina is probably a result of chemical weathering and wind ablation. The remainder of the stone is covered by a spotty, thin, black fusion crust. This is not a complete specimen. The maximum dimension is approximately 5.5 cm. From field photographs it is apparent that the B surface was in contact with the ice.

Petrographic Description: Brian Mason

Chondrules abundant, 0.2-2.5 mm diameter, in a minimal amount of dark fine-grained matrix; some chondrules are spherical, but many are elliptical to irregular in form. Chondrules are mainly composed of barred or porphyritic olivine, some with polysynthetically twinned clinopyroxene. Interstitial glass in chondrules is pale gray, transparent to turbid. Minor subequal amounts of troilite and nickel-iron are present, the nickel-iron extensively altered to red-brown limonitic material, which pervades the section along chondrule boundaries. Microprobe analyses show a wide range of olivine composition, Fa_3-Fa_{46}, and a similar range in pyroxene composition. This range in composition, together with the presence of glass and twinned clinopyroxene, indicates type 3, and the small amount of nickel-iron suggests L group.

ANTARCTIC METEORITE DATA SHEET

Sample No.	ALHA77164	Location:	Allan Hills, Antarctica
Field No.	77123003	Field Contamination Category:	4
Weight (gms)	38.14		
Meteorite Type	L3 Chondrite		

Physical Description:

Specimen is angular. Approximately 75% of the exterior surface of the sample is a fracture surface. This surface is dark brown and has a patina, which is probably due to a combination of chemical weathering and wind erosion. Nearly 25% of the sample is covered by a dark brown, patchy, thin fusion crust. This is not a complete specimen. Its maximum length is ~3.0 cm. No fresh metal was observed when the meteorite was chipped for thin section preparation.

Petrographic Description: Brian Mason

This specimen is similar in texture, mineral composition, and degree of weathering to ALHA77160, which suggests it may be another piece of the same meteorite.

ANTARCTIC METEORITE DATA SHEET

Sample No.	ALHA77165	Location: Allan Hills, Antarctica
Field No.	77123004	Field Contamination Category: 4
Weight (gms)	30.50	
Meteorite Type	L3 Chondrite	

Physical Description:

About 50% of surface of meteorite is angular, dark brown and has a patina, probably the result of chemical weathering and wind ablation. The remaining 50% of the sample is smooth and contains patches of fusion crust. This is not a complete specimen. Its maximum length is approximately 3.5 cm. No fresh metal was revealed by chipping the sample for thin section preparation. From field photographs it is apparent that the N.W. surface was in contact with the ice.

Petrographic Description: Brian Mason

This specimen is similar in texture, mineral composition, and degree of weathering to 30160 and 30164, which suggests it may be another piece of the same meteorite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77208

Location: Allan Hills, Antarctica

Field No.: 77122904

Field Contamination Category: 1

Weight (gms): 1719.82

Meteorite Type: H4 Chondrite

Physical Description:

The specimen is angular, highly fractured, and severely weathered. No fusion crust remains on the specimen. The fractures appear to penetrate throughout the stone. Numerous inclusions are visible on the brown weathered surfaces.

Approximate dimensions: 13.75 x 10 x 9 cm.

Other Characteristics:

No fresh metal or unweathered surface was exposed when obtaining material for a thin section.

Petrographic Description: Brian Mason

Chondrules are numerous and well-developed, ranging from 0.3 to 0.9 mm in diameter; a variety of types is present, the commonest being granular olivine, porphyritic olivine, and fine-grained or granular pyroxene. Much of the granular pyroxene is polysynthetically twinned clinobronzite. Minor amounts of nickel-iron (~15%) and troilite (~5%) are distributed throughout the groundmass. The meteorite is extensively weathered, with limonite pervading the section and also concentrated in veinlets. Microprobe analyses show olivine (Fa_{17}) and pyroxene (Fs_{14}) of essentially uniform composition. The uniform olivine and pyroxene composition and the presence of clinobronzite indicate that the meteorite should be classified as an H4 chondrite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77219 Location: Allan Hills, Antarctica

Field No.: 78012502 Field Contamination Category: 6

Weight (gms): 6371

Meteorite Type: Achondrite - Unique (?)

Physical Description:

This is not a complete specimen. It is rounded to subangular and a dark brown weathering rind covers the entire stone. Many inclusions of various sizes are present on the highly weathered surface; these objects are glassy, dark greenish-black, and range from angular to subrounded. The inclusions are up to 1 cm in diameter.

Approximate diameter: 12 x 8 x 7 cm.

Petrographic Description: Brian Mason

The polished thin section is dominated by large orthopyroxene clasts (up to 6 mm across) in a groundmass consisting largely of crushed and comminuted orthopyroxene (grains up to 0.6 mm across). The groundmass also contains about 20% of nickel-iron (kamacite and taenite) in grains averaging about 0.3 mm, rare grains of plagioclase (An_{90}), troilite, chromite, merrillite, and a silica polymorph (probably tridymite). The groundmass encloses a rounded aggregate (3 mm across) of fine-grained (up to 0.15 mm) olivine, composition Fa_{26}. The composition of the orthopyroxene clasts and groundmass is somewhat variable, Fs_{24-28}, with CaO ranging from 0.5-2.3%; one grain of diopsidic pyroxene was analyzed, $Wo_{43}En_{45}Fs_{12}$.

The major material of this section is characteristic of a diogenite; however, the presence of a considerable amount of nickel-iron and the olivine enclave is unique for this class of achondrites, and suggests a possible affinity to the mesosiderites.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77224

Location: Allan Hills, Antarctica

Field No.: 78012506

Field Contamination Category: 6

Weight (gms): 786.9

Meteorite Type: H5 Chondrite

Physical Description:

Specimen is angular, extremely weathered and friable. When meteorite was removed from cold storage and placed in the processing cabinet, many pieces fell off the main mass. There are many surface fissures that appear to continue throughout the meteorite. The B surface (not photographed) shows patches of fusion crust (very thin) and remnants of regmaglypts. The reddish-brown iron-oxide staining that is the prevalent color has an iridescent-like sheen on the B surface. The remaining exterior surfaces have small patches of a brownish-black fusion crust. Ice was observed in surface cracks when the specimen was removed from cold storage. This is not a complete specimen. The T surface appears to be a fracture surface. Small inclusions were observed on the weathered exterior surface. The T.S. and T.L. chips were taken from chips generated from sample when removed from cold storage.

Approximate size = 13 x 14 cm.

Petrographic Description: Brian Mason

Chondritic structure is well-developed, with individual chondrules 0.2 - 1.0 mm in diameter; chondrule types include granular and porphyritic olivine, barred olivine, and fine-grained pyroxene. Minor amounts of troilite and nickel-iron are present, the nickel-iron being extensively weathered to limonite, which pervades the section. Black veining is prominent, the black color being partly due to fine-grained troilite. Microprobe analyses show olivine (Fa_{19}) and orthopyroxene (Fs_{17}) of essentially uniform composition.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77230 Location: Allan Hills, Antarctica

Field No.: 77122703 Field Contamination Category: 6

Weight (gms): 2473.3

Meteorite Type: L4 Chondrite

Physical Description:

This is a subrounded to angular specimen which is nearly a complete stone. A brownish-black fusion crust, approximately .5 to 1 mm thick, covers the specimen, with the exception of small broken surfaces. The portion of the fusion crust that was in contact with the ice has an iridescent-like sheen. The specimen has several surface fissures.

Other Characteristics:

The specimen was difficult to chip for thin section material. Snow was present along fissures on the interior of the stone. The surface of the meteorite that was in contact with the ice was more severely weathered than the uppermost portion. Weathering is along fissures to a depth of $\sim$.5 mm.

Petrographic Description: Brian Mason

The section shows a closely-packed aggregate of chondrules, some spherical, but many appear fragmented and broken. A variety of chondrule types are present: barred olivine, porphyritic olivine, fine-grained pyroxene, etc. Chondrule size ranges from 0.3 to 1.0 mm; interstitial material in some chondrules is turbid devitrified glass. Some pyroxene shows polysynthetic twinning. Minor subequal amounts of troilite and nickel-iron are present. A moderate amount of limonitic staining pervades the section. Fusion crust is present on one edge. Microprobe analyses show olivine of fairly uniform composition (Fa_{22} -Fa_{25}, average Fa_{23}) and pyroxene averaging Fs_{21}.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77250

Location: Allan Hills, Antarctica

Field No.: 77122930

Field Contamination Category: 3

Weight (gms): 10.555 kg.

Meteorite Type: Iron

Physical Description:

The overall color of the specimen is reddish-brown to brown with some areas of golden brown. The specimen is tabular with angular peaks on the T surface which form a ridge. There are numerous regmaglypts on all surfaces. Rounded holes ∿1-2 cm deep were noted on the S surface. Dark gray material lines the bottom of some of these depressions. Golden-brown squama-like patches appear randomly over the entire meteorite, one larger patch ∿2 cm x 1 cm appears on the B surface.

Other Characteristics:

Ice was preserved on this sample when it was removed from the freezer. Approximate dimensions: 27 x 13 x 11 cm.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77269

Location: Allan Hills, Antarctica

Field No.: Y78010312

Field Contamination Category: 6

Weight (gms): 1045.0

Meteorite Type: L6 Chondrite

Physical Description:

Ice was observed on the meteorite when it was removed from the freezer. This specimen is pyramidal with well-defined edges. Three surfaces are smooth with remnants of brownish-black fusion crust. The other surface is rough on a centimenter scale and has patches of dull, black fusion crust, especially on the high portion of the surface and along the edges. This surface appears to have been broken late during entry and only partially developed a fusion crust. The smooth faces show small voids where it appears that inclusions have been removed. Small fissures are apparent on the surface. Small pieces of fresh metal appeared on the chipped surface.

Dimensions approximately 10.5 x 10 x 8 cm.

Petrographic Description:

Chondrules are relatively sparse, with margins that tend to merge with the granular groundmass. Troilite and nickel-iron are present in minor approximately equal amounts. Limonitic staining pervades the section. Fusion crust, up to 1 mm thick, surrounds most of the section. Microprobe analyses show olivine (Fa_{24}) and orthopyroxene (Fs_{22}) of uniform composition.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77271

Location: Allan Hills, Antarctica

Field No.: Y78010603

Field Contamination Category: 6

Weight (gms): 60.95

Meteorite Type: H6 Chondrite

Physical Description:

This is a complete, rounded specimen. Approximately 25% of the total sample is covered with a dull black fusion crust. The crust appears in small patches on the meteorite's surface and is approximately 1 mm thick. The portion of the meteorite not covered with fusion crust is a dark brown weathered surface. Small inclusions are visible on this surface. The sample was difficult to chip. When the material was collected for thin section preparation, no fresh metal was observed. The sample fractured along a small fissure. The interior of the bulk meteorite was weathered along this fissure.

$\sim$8 cm x 7.5 cm x 5 cm

Petrographic Description: Brian Mason

Chondrules are sparse and tend to merge with the granular groundmass, which consists largely of subequal amounts of olivine and orthopyroxene with minor amounts of nickel-iron ($\sim$20%), plagioclase ($\sim$10%), and troilite ($\sim$5%). Microprobe analyses show olivine (Fa_{18}), orthopyroxene (Fs_{16}), and plagioclase (An_{13}) of uniform composition. The section shows a moderate degree of weathering, with small areas and veins of brown limonite.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77273

Location: Allan Hills, Antarctica

Field No.: Y78010511

Field Contamination Category: 6

Weight (gms): 492.0

Meteorite Type: L6 Chondrite

Physical Description:

Sample is not a complete stone. Black fusion crust remains on four surfaces of the angular specimen (~50% of the sample covered) which is less than 1 mm thick. The broken surface shows a light gray, fine-grained matrix with areas of iron oxide staining. This surface is only moderately weathered and shows small cracks. Chondrules are not prominent.

Approximate size: 14 x 6.5 x 5 cm.

Petrographic Description: Brian Mason

Chondrules are few and poorly defined, tending to merge with the granular groundmass, which consists of subequal amounts of olivine and orthopyroxene, with minor amounts of plagioclase (~10%), nickel-iron (~8%), and troilite (~5%). Microprobe analyses show olivine (Fa_{24}), orthopyroxene (Fs_{20}), and plagioclase (An_{12}) of essentially uniform composition. Limonitic staining pervades the section.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77277

Field No.: B78010501

Weight (gms): 142.73

Meteorite Type: L6 Chondrite

Location: Allan Hills, Antarctica

Field Contamination Category: 6

Physical Description:

Sample is rounded and severely weathered over approximately 75% of the exterior surface. No fusion crust was present. The exterior of the stone had nodules which easily fell off the bulk meteorite. The remaining 25% of the exterior surface appears fresh, light gray and has a granular texture. The specimen has many rounded white clasts.

Approximate size: 5.5 cm x 4.5 cm x 3 cm.

Petrographic Description: Brian Mason

This meteorite resembles 77273 closely, in structure, mineralogy, and composition of the olivine, orthopyroxene, and plagioclase. Weathering is not so pronounced, however, being limited to local limonitic staining around grains of nickel-iron.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77280 Location: Allan Hills, Antarctica

Field No.: Y78010512 Field Contamination Category: 6

Weight (gms): 3226

Meteorite Type: L6 Chondrite

Physical Description:

Specimen is angular. Approximately 75% of the exterior surface is covered with a brownish-black fusion crust. In several places the fusion crust has spalled away revealing a heavily oxidized material. One face of the specimen is a broken surface, which is light gray and moderately iron oxide stained. The surface is irregular and has numerous linear fractures and a few 1-2 mm spherical inclusions.

Approximate dimensions: 18.5 cm x 13.0 cm x 10.0 cm

Other Characteristics:

When the specimen was removed from storage for initial processing, Antarctic snow was still present on the meteorite's exterior surface.

Petrographic Description: Brian Mason

This meteorite resembles 77273 and 77277 closely, in structure, mineralogy, and composition of the olivine, orthopyroxene, and plagioclase. Weathering appears to be quite extensive, most of the section being stained brown by limonitic material.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77281

Location: Allan Hills, Antarctica

Field No.: Y78010801

Field Contamination Category: 6

Weight (gms): 1232

Meteorite Type: L6 Chondrite

Physical Description:

Specimen is angular and appears to be a complete specimen. A brownish-black fusion crust, with polygonal fractures, approximately 2 mm thick, covers nearly 90% of the meteorite's exterior surface. The B surface is in part void of fusion crust. Many inclusions (2-5 mm dia.) are present on this iron oxide stained surface. Fractures are present on the surface of the specimen and post-chipping observations revealed that weathering occurred along these fracture surfaces. The interior portion of the meteorite, away from fractures, is not weathered.

Specimen's dimensions: ~13.0 x 10.5 x 6.5 cm.

Petrographic Description: Brian Mason

This meteorite resembles 77280 closely, in structure, mineralogy, composition of olivine, orthopyroxene, and plagioclase, and in degree of weathering. Fusion crust is present along one edge of the section.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77282

Location: Allan Hills, Antarctica

Field No.: Y78010306

Field Contamination Category: 6

Weight (gms): 4127.1

Meteorite Type: L6 Chondrite

Physical Description:

Specimen is angular. Approximately 70% of the meteorite's surface is covered with fusion crust, which is ∿2 mm thick. The fractured surface is weathered. This surface has a granular texture and contains rounded to angular, light colored clasts.

The fresh surface revealed during chipping is whitish to whitish-gray and contains tiny flecks of metal.

This is not a complete specimen. Approximate dimensions are: 17.5cmx13.0 cmx9 cm.

Petrographic Description: Brian Mason

This meteorite resembles 77280 and 77281 in all respects, except possibly for a lesser degree of weathering, limonitic staining being limited to areas around nickel-iron grains; however, this may simply reflect a source further from the surface.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77283

Location: Allan Hills, Antarctica

Field No.: Y78010305

Field Contamination Category: 6

Weight (gms): 10.51 kg

Meteorite Type: Iron

Physical Description:

Specimen is reddish brown to brown. The B surface is flat and the remainder of the sample is semi-rounded, suggesting that this is an oriented specimen. Radial and transverse flow marks are evident across all surfaces with the exception of the B. A few rounded holes from ∿1 cm to 3 cm in diameter are present on all surfaces. Some of these depressions are filled with dark gray material. Golden, brown patches ∿3 mm in diameter are distributed over the meteorite's exterior surface.

Other Characteristics:

Ice was preserved in some of the regmaglypts when the sample was removed from the freezer. Approximate dimensions: 15 x 12.5 x 6 cm.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77288 Location: Allan Hills, Antarctica

Field No.: Y78010602 Field Contamination Category: 6

Weight (gms): 1880

Meteorite Type: H6 Chondrite

Physical Description:

The overall form of the specimen is angular. Four surfaces are rounded and smooth with a brown weathering rind and patches of dull black fusion crust ∿1-2 mm thick. The other surfaces are fracture surfaces which also are covered with a brown weathering rind. Numerous fractures penetrate the stone. Inclusions are apparent on the severely weathered surfaces.

Approximately 12 x 10 x 8 cm.

Other Characteristics:

No fresh metal or non-weathered surfaces observed in the process of obtaining material for thin sections or thermoluminescence studies. All surfaces exposed had a reddish-brown iron oxide staining.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which is made up largely of olivine and orthopyroxene, with minor amounts of nickel-iron (∿15%), plagioclase (∿10%), and troilite (∿5%). Microprobe analyses show olivine (Fa_{19}), orthopyroxene (Fs_{17}), and plagioclase (An_{12}) of essentially uniform composition. The meteorite is considerably weathered, with pervasive limonitic staining throughout the section.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77290

Location: Allan Hills, Antarctica

Field No.: Y78010505

Field Contamination Category: 6

Weight (gms): 3784

Meteorite Type: Iron

Physical Description:

Sample is subrounded to angular with a roughly tabular form. The entire specimen is covered with regmaglypts and is reddish to golden brown. From a field photo it was determined that the meteorite was sitting with the B surface on the ice. Irregular, dull metallic red splotches and a scaly iron oxide area, ∿7 x 5 cm, are present on the B-E surface. Present on the T surface is a ∿2 cm depression containing a dull black material.

Approximate dimensions: 15.5 x 16 x 6 cm.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77305

Location: Allan Hills, Antarctica

Field No.: B 77123108

Field Contamination Category: 6

Weight (gms): 940.0

Meteorite Type: L6 Chondrite

Physical Description:

Snow (ice?) observed in cracks of the meteorite when it was removed from the freezer. The exterior surface does not have a fusion crust with the exception of an ∿5 cm diameter area, which is dark and 1-2 mm thick, however, it does have a reddish-brown weathering rind. The iron-oxide staining that is apparent on the exterior surface is heavier adjacent to the several fissures which are present on the surface of the meteorite. It appears that the roundness of the stone may be due to exfoliation. Rounded inclusions are apparent on the surface. It appears that the entire specimen has experienced moderate weathering on the exterior surface. During chipping ∿25% of the specimen fell off along a fissure. The interior portion is both weathered and fresh in appearance. Fresh metal is apparent on surfaces not adjacent to fissures. After sawing the specimen, small metal chips were visible throughout the sample. The sample is very hard, even though many parallel cracks run throughout the entire sample.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, merging with the granular groundmass. Troilite and nickel-iron are present in minor, approximately equal amounts. About 10% of plagioclase is present, as small untwinned grains. The meteorite is relatively unweathered, with a limited amount of limonitic staining associated with nickel-iron grains. Microprobe analyses show olivine (Fa_{24}) and orthopyroxene (Fs_{21}) of uniform composition.

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA77307

Location: Allan Hills, Antarctica

Field No.: 78010702

Field Contamination Category: 6

Weight (gms): 181.2

Meteorite Type: C-3

Physical Description:

The rounded specimen is covered with a dull black fusion crust ∿1-2 mm thick over most of the surface. Specimen is complete with the exception of one end where a fracture surface covers ∿1/8 of the specimen's total surface area. The fusion crust has polygonal fractures over most of the exterior surface. In a few places this fusion crust has been broken away revealing a black fine-grained matrix. Specimen shows several large fractures. On the surface neighboring one of these fractures there is a white material which may be an evaporite deposit. The side of the specimen that was in contact with the ice at the time of recovery is slightly reddish.

4.5 x 4.0 x 5.0 cm.

Other Characteristics:

Small, irregular white inclusions and several chondrules are apparent on a freshly-broken surface.

Petrographic Description: Brian Mason

The section shows a closely-packed aggregate of mineral grains (up to 0.2 mm), mineral aggregates (up to 0.8 mm), and rather sparse small (0.1-0.5 mm) chondrules, set in a dark brown to black opaque matrix; the matrix makes up 40-50% of the section. The mineral grains, aggregates, and chondrules consist of olivine and polysynthetically-twinned clinopyroxene in approximately equal amounts. Microprobe analyses show that most of the olivine has forsterite composition, Fa ∿1, with a few grains ranging up to Fa 30; the average for 30 grains is Fa 5. The pyroxene is mostly clinoenstatite, Fs ∿1, but with a few more iron-rich grains. A little (1-2%) nickel-iron is present in the matrix as scattered grains, many partly altered to brown limonite. Fine-grained sulfide (∿5%) is dispersed through the matrix. Fusion crust, 0.5 mm thick, is present along one edge of the section.

The meteorite is a carbonaceous chondrite; an X-ray powder photograph shows that the matrix consists largely of olivine and pyroxene with some magnetite, which indicates a C3 classification.

ANTARCTIC METEORITE DATA SHEET

Sample No.: MBRA76001

Location: Mt. Baldr, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 1096

Meteorite Type: H-6

Physical Description:

The stone is covered with a reddish-brown fusion crust (<.5 mm) on two surfaces. Two surfaces are reddish-brown fracture surfaces, and two surfaces are cut. The fusion crust is pitted with numerous tiny holes. Several fractures penetrate the meteorite and iron oxide staining is present along some of these fractures. The matrix material is light gray.

Approximate dimensions: 10.7 x 5.6 x 7.4 cm.

Other Characteristics:

This meteorite has been described in Olsen, et al., 1978, as Mt. Baldr a.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76002

Location: Allan Hills, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 302

Meteorite Type: Ogg-1A

Physical Description:

A thin black fusion crust covers the exterior of this specimen. The regmaglypts have a minor amount of iron oxide staining in the depressions.

Dimensions: ~6.8 x 3.7 x 3.7 cm.

Other Characteristics:

This is the same sample as Allan Hills #2 as described in Olsen, et al., 1978, Eleven new meteorites from Antarctica, 1976-1977, Meteoritics, Vol. 13, No. 2., pp 209-225.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76004

Location: Allan Hills, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 52.50

Meteorite Type: LL-3

Physical Description:

This specimen appears to have been covered with a thin reddish-black fusion crust on all exterior surfaces. The fusion crust appears to have been spalled off the rounded corners. The matrix of this stone is very dark gray. The inclusions, both chondrules and clasts, are numerous. The clasts are up to 1 cm in apparent maximum length. Both fresh metal and oxidized metal, surrounding some chondrules and lithic clasts, are present. The meteorite does not appear extensively weathered.

Approximate dimensions: 4.25 x 3.0 x 2.5 cm.

Other Characteristics:

For further discussion see Olsen, et al., 1978, Eleven new meteorites from Antarctica, 1976-1977, Meteoritics, Vol. 3, No. 2, pp 209-225. This sample is described as Allan Hills #4.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76006

Location: Allan Hills, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 271.0

Meteorite Type: H-6

Physical Description:

The stone has a remnant fusion crust that is black and <.5 mm thick. The fusion crust is patchy on the T surface and is more solid on the W surface. A reddish-brown surface underlies the fusion crust on the S and E surfaces. The fusion crust has many small fractures. The interior of the stone is iron oxide stained, however, gray clasts, some of which are circular in cross section are distinguishable under the binocular microscope.

Dimensions: 6.0 x 4.0 x 4.2 cm.

Other Characteristics:

This is same sample as Allan Hills #6, described in Olsen, et al., 1978.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76007

Location: Allan Hills, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 78.5

Meteorite Type: L6

Physical Description:

A black fusion crust that is as thick as .5 mm in spots covers the specimen. The fusion crust is both shiny and dull. The crust is rough with the iron oxide staining concentrated in the depressed areas. Iron oxide staining penetrates inward from the exterior of the meteorite. The interior of the meteorite is light gray and contains chondrules up to 2 mm in diameter.

Dimensions: ∿3.8 x 4.0 x 2.7 cm.

Other Characteristics:

This meteorite was described as Allan Hills #7 in Olsen et al., 1978.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76008 **Location:** Allan Hills, Antarctica

Field No.: **Field Contamination Category:**

Weight (gms): 281.3

Meteorite Type: H-6

Physical Description:

Specimen exhibits a thin (≤.5 mm), reddish-black fusion crust. The fusion crust is absent in some places. Iron oxide staining is randomly scattered over the fusion crust. It appears that the meteorite has experienced preferential melting during entry. The two sawed surfaces are severely iron oxide stained.

Dimensions: 70 x 5.9 x 3.2 cm.

Other Characteristics:

Identical to Allan Hills #8 described in Olsen, et al., 1978.

Petrographic Description:

ANTARCTIC METEORITE DATA SHEET

Sample No.: ALHA76009

Location: Allan Hills, Antarctica

Field No.:

Field Contamination Category:

Weight (gms): 3950.5

Meteorite Type: L6

Physical Description:

Stone possess remnants of a black fusion crust (∿1 mm thick). Much of the crust is fractured in a polygonal pattern. The specimen is fractured. One large, severely weathered fracture runs through the meteorite.

Dimensions: 18 x 13 x 7.6 cm.

Other Characteristics:

This meteorite described as Allan Hills #9 in Olsen et al., 1978.

Petrographic Description: