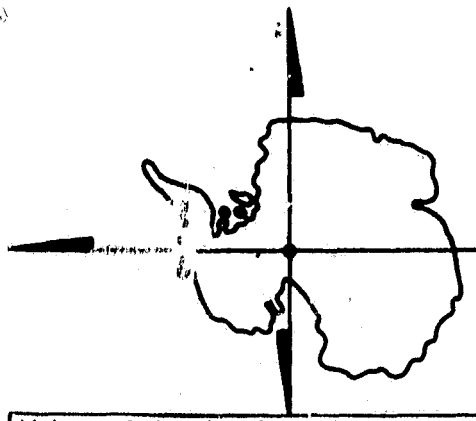
SQT



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 4, Number 2 November, 1981

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

SAMPLE REQUESTS and ALLOCATIONS

Requests for specific samples of Antarctic meteorites (including sample name/number, weight requested, a brief description of the intended meteorite investigation, and pertinent sample specifics) should be sent to:

Secretary, MWG
Curator's Office, SN2
NASA, Johnson Space Center
Houston, TX 77058

The Fourth International Symposium on Antarctic Earth Sciences will be held at the University of Adelaide, South Australia on 16 - 20 August, 1982.

This Newsletter contains data sheets for a number of meteorites, including three achondrites and one iron, recovered in the 1980 field season, and two 1978 stones. The Antarctic Meteorite Working Group may attempt to establish a consortium for study of eucrite ALHA80102. Anyone interested in organizing such a consortium should submit their request prior to January 15, 1982.

The Antarctic Meteorite Working Group meets twice yearly, usually in April and September, to consider sample requests. The April meeting is in Houston, Texas and the September meeting is in Washington, D.C. Sample requests may be submitted at any time, but must reach the Secretary of the MWG at least a few days prior to a given meeting. The MWG reviews all sample requests received since its last meeting and makes recommendations on allocations to the Polar Programs Division of the National Science Foundation. Upon NSF approval of these allocations, they will be prepared by either NASA, JSC (for stones) or the Smithsonian Institution (for irons).

Special provision has been established to make a limited number of allocations between meetings of the MWG. Such allocations must meet certain requirements, e.g., limited numbers of polished thin sections, small amounts of ordinary meteorites, or additional material related to previous allocations. If you require rapid allocation and your sample request meets these requirements, you may ask for rapid consideration. Only a limited number of such requests can be handled, and a justification must be given.

Please note the changes in classification for the following meteorites:

NUMBER	CLASSIFICATION	REFERENCE
ALHA77003	C3	1
ALHA77011	L3 Chondrite	2
ALHA78038	L3 Chondrite	2
EETA79006	Polymict Eucrite	3
ALHA79022	L3-4 Chondrite	4

1) Rhodes, J. N. and Fulton, C. R. (1981) in Lunar and Planet Sci. XII pp 880-882.

2) McKinley, S. G., Scott, E. R. D., Taylor, G. J., and Keil, K. (1981) in Proc. Lunar Planet Sci. Conf. 12th in press.

3) Papike, J. J., personal communication.

4) Scott, E. R. D., Rubin, A. E. and Taylor, G. J., personal communication.

GUIDELINES FOR CONSORTIA STUDIES

The Meteorite Working Group encourages proposals for consortium studies on those Antarctic meteorite specimens whose complexity warrant in-depth, coordinated investigations by several laboratories with different specialties. Examples of such complex meteorites are clast-containing achondrites. Two large consortia currently are operating on the Allan Hills polymict eucrites, 76005, 77302, 78040, 78132, 78158, 78165, and 79017 (Dr. Arch Reid, consortium leader) and on achondrite EETA79001 (Dr. H.Y. McSween, consortium leader). Consortia are being considered for the howardite EETA79006 and for the Elephant Moraine eucrites 79004, 79005, and 79011.

A proposal for consortium studies of one or more Antarctic meteorites should identify a consortium leader who is willing to accept responsibility for coordinating diverse studies. Among the responsibilities of a consortium leader are:

1) To advise the curatorial facility at JSC on selection of appropriate meteorite samples for preparation of thin sections and for chemical analyses. This may require that the consortium leader (or his representative) travel to JSC and participate in sample description and selection.

2) To arrange for petrologic investigation of various thin sections made of the meteorite and its components. Although consortia leaders are often petrologists, this need not always be true.

3) To identify other investigators who are willing to perform the various analytical analyses deemed to be important for proper characterization of the meteorite or parts of it.

4) To coordinate sample requirements and information exchange among members of the consortium.

5) To maximize the scientific information obtainable on the samples allocated.

The scope of a consortium proposal can vary, depending on the nature of the meteorite(s) and of the investigations to be performed. The initial proposal may be detailed and include specific investigations and sample requirements. Alternatively, the proposal can request an initial, detailed petrological study of the meteorite(s), with the scope of additional studies to be defined after this initial characterization. The consortium leader will have considerable latitude in selecting participants, but participants and their proposed investigations must be included in the consortium proposal. During the period of consortium studies the MWG generally will not allocate additional samples to investigators outside the consortium unless the consortium leader approves of these allocations or unless the investigations are outside the scope of the consortium.

Approval of a consortium will be for a period of one year. If requested, the consortium status can be maintained for one additional year provided the MWG is furnished information that the consortium is active and productive. This activity report and a request for a one year extension must reach the MWG by their second meeting after the consortium is established, i.e. generally one year.

METEORITE ALLOCATIONS - April and Sept., 1981

SAMPLE/ INVESTIGATOR	ALHA 76004	ALHA 76009	ALHA 77003	ALHA 77005	ALHA 77011	ALHA 77155	ALHA 77182	ALHA 77214	ALHA 77215	ALHA 77216	ALHA 77217	ALHA 77230	ALHA 77231	ALHA 77252	ALHA 77256	ALHA 77257
N. Bhandari																
P. Buseck			X													X
S. Cisowski																
R. Clarke																
D. Curtis			X													
M. Duke																
E. Fireman																
E. Gibson															X	
J. Goswami									X		X			X		
E. Jarosewich																
K. Keil	X				X											
T. King			X													
M. Lipschutz																
B. Mason																
S. McKeever																
H. McSween				X												
U. Ott																
C. Pillinger	X		X					X	X							
J. Rhodes		X				X	X	X		X		X	X			
K. Rosman																
L. Schultz																
D. Sears																
K. Turekian																
H. Wanke				X												
J. Wasson																
J. Wooden																

SAMPLE/ INVESTIGATOR	ALHA 77262	ALHA 77270	ALHA 77271	ALHA 77278	ALHA 77283	ALHA 77284	ALHA 77288	ALHA 77294	ALHA 77296	ALHA 77297	ALHA 77299	ALHA 77304	ALHA 77306	ALHA 77307	ALHA 78019	ALHA 78075
N. Bhandari																
P. Buseck													X	X	X	
S. Cisowski																
R. Clarke																
D. Curtis				X				X			X			X		
M. Duke																X
E. Fireman																
E. Gibson																
J. Goswami																
E. Jarosewich																
K. Keil												X				
T. King				X												
M. Lipschutz																
B. Mason																
S. McKeever																
H. McSween																
U. Ott					X											
C. Pillinger				X								X				
J. Rhodes	X	X	X			X	X	X	X	X						
K. Rosman																
L. Schultz																
D. Sears														X		
K. Turekian																
H. Wanke																
J. Wasson																
J. Wooden																

SAMPLE/ INVESTIGATOR	ALHA 78076	ALHA 78078	ALHA 78084	ALHA 78085	ALHA 78100	ALHA 78102	ALHA 78106	ALHA 78108	ALHA 78110	ALHA 78112	ALHA 78113	ALHA 78115	ALHA 78132	ALHA 78134	ALHA 79003	ALHA 79005
N. Bhandari																
P. Buseck																
S. Cisowski																
R. Clarke					X											
D. Curtis	X															
M. Duke	X			X		X		X	X			X		X		X
E. Fireman																
E. Gibson																
J. Goswami																
E. Jarosewich																
K. Keil			X												X	
T. King																
M. Lipschutz											X					
B. Mason																
S. McKeever			X													
H. McSween																
U. Ott																
C. Pillinger			X													
J. Rhodes		X	X				X			X						
K. Rosman			X													
L. Schultz													X			
D. Sears																
K. Turekain																
H. Wanke																
J. Wasson					X											
J. Wooden																

SAMPLE/ INVESTIGATOR	ALHA 79017	ALHA 79022	ALHA 79026	ALHA 79039	ALHA 79046	BTNA 78002	EETA 79001	EETA 79002	EETA 79003	EETA 79006	EETA 79007	META 78001	META 78007	META 78010	META 78028	RKPA 78002
N. Bhandari															X	
P. Buseck																
S. Cisowski							X									
R. Clarke																
D. Curtis																
M. Duke			X	X	X						X		X	X		X
E. Fireman								X	X							
E. Gibson																
J. Goswami																
E. Jarosewich																
K. Keil		X														
T. King																
M. Lipschutz																
B. Mason																
S. McKeever															X	
H. McSween																
U. Ott																
C. Pillinger																
J. Rhodes			X			X			X						X	X
K. Rosman																
L. Schultz	X									X						
D. Sears																
K. Turekian																
H. Wanke							X									
J. Wasson																
J. Wooden							X									

SAMPLE/ INVESTIGATOR	RKPA 78004	RKPA 79001	RKPA 79003	RKPA 79004	RKPA 79008	RKPA 79014	DISPLAY	1980 PEBBLES	SAMPLES COUNTED BY EVANS	DKPA78005, 78008 or 78009	INCREASED ALLOCATION
N. Bhandari											
P. Buseck											
S. Cisowski											
R. Clarke											
D. Curtis	X										
M. Duke	X		X	X		X					
E. Fireman		X									
E. Gibson											
J. Goswami											
E. Jarosewich											X
K. Keil					X						
T. King											
M. Lipschutz											
B. Mason								X			
S. McKeever									X		
H. McSween											
U. Ott											
C. Pillinger											
J. Rhodes											
K. Rosman											
L. Schultz											
D. Sears											
K. Turekian							X				
H. Wanke											
J. Wasson										X	
J. Wooden											

It has been known for some time that many of the Antarctic meteorite fragments are pieces from common falls. The list that follows contains those that are believed at the present time to be paired with some degree of certainity. Criteria used to determine this are:

t Field relations
v Physical similarities
w Petrographic similarities
x Metallography
y Bulk chemistry
z Trace element chemistry

1) Polymict Eucrite
ALHA76005, 77302, 78040, 78132, 78158, 78165, 79017, 80102. v,w

2) Ureilites
ALHA78019, 78262. v,w

3) C 2
ALHA77306, 78261. w

4) L 3 Chondrite*
ALHA77011, 77015, 77031, 77033, 77034, 77036, 77043, 77047, 77049, 77050, 77052, 77115, 77140, 77160, 77163, 77164, 77165, 77166, 77167, 77170, 77175, 77178, 77185, 77211, 77214, 77241, 77244, 77249, 77260, 77303, 78038, 78188, 79001, 79045. w

5) L 3 Chondrite
ALHA77215, 77216, 77217, 77252. t,v,w

6) L 6 Chondrite
ALHA77180, 77267, 77292, 77296, 77301. t,v
77001, 77297. t

7) L 6 Chondrite
ALHA77273, 77277, 77280, 77281, 77282. w
77231, 77272. t
77270, 77284. t

8) L 6 Chondrite
ALHA77150, 77305. t

9) L 6 Chondrite
ALHA78043, 78045. w

10) L 6 Chondrite
ALHA78103, 78104. w

11) L 6 Chondrite
ALHA78112, 78114. w

12) L 6 Chondrite
ALHA78126, 78130, 78131. w

13) L 6 Chondrite
ALHA78105, 78251. w

14) L 6 Chondrite
ALHA80101, 80103, 80105, 80110, 80112, 80114, 80115, 80116, 80125. v,w

15) L 6 Chondrite
BTNA78001, 78002. v,w

16) L 6 Chondrite
RKPA78001, 78003, 79001, 79002, 80202. w

17) H 4 Chondrite
ALHA77004, 77190, 77191, 77192, 77208, 77224, 77225, 77226, 77232, 77233. t,w

18) H 4 Chondrite
ALHA78193, 78196, 78223. t,x

19) H 5 Chondrite
ALHA77014, 77264. t

20) H 5 Chondrite
ALHA77021, 77025, 77061, 77062, 77064, 77071, 77074. w
77086, 77088. t,w
77102. t

21) H 5 Chondrite
ALHA77118, 77119, 77124. t

22) H 5 Chondrite
ALHA78209, 78221, 78225, 78227, 78233. t,x

23) H 5 Chondrite
ALHA79031, 79032. w

24) H 6 Chondrite
ALHA77144, 77148. t

25) H 6 Chondrite
ALHA77271, 77288. t

26) H 6 Chondrite
ALHA78211, 78213, 78215, 78229, 78231. t,x

27) Iron
ALHA76002, 77250, 77263, 77289, 77290. t,x,y

28) Iron
DRPA78001, 78002, 78003, 78004, 78005, 78006, 78007, 78008, 78009. t,v
t,x,y

*note: McKinley et al. 1) changed the classification of ALHA77011 and ALHA78038, from LL 3 to L 3. 2) disagreed that ALHA79001 and 79003 are the same meteorite as stated in the last newsletter.

ALHA77011 is an L3 chondrite consisting of 34 individual pieces which were recovered seperately in the Allan Hills, Antarctica, and have since been determined to be paired (15 have previously been reported in the newsletter; 19 are considered pebbles and were sent along with 126 other specimens that are <150 g to the University of New Mexico to be classified). Their combined weight is 6334.0 gms and the fragments range from moderately weathered to extremely weathered in nature.

Petrographic Description: McKinley, S. G. et al.,1981 (see page2) Allan Hills A77011 contains sharply-defined chondrules that range from 0.2-4 mm in diameter. As in other unequilibrated ordinary chondrites, porphyritic chondrules are the most abundant. Barred olivine, radiating pyroxene, and aphanitic chondrules are also present. Many chondrules contain glass, which is predominantly turbid or partially devitrified and less commonly pink-brown and clear. The silicate matrix (Huss matrix) makes up ~15 volume % of the meteorite and consists of equal amounts of opaque and recrystallized material. Olivine ranges from Fa_1 to Fa_{97} (average Fa_{17}) and has a standard deviation of 8.1 mole % Fa; percent mean deviation (PMD) is 39%. Low-Ca pyroxere is mostly monoclinic and frequently polysynthetically twinned. It's composition ranges from Fs_1 to Fs_{40} (average Fs_{12}) and has a standard deviation of 8.3 mole % Fs (PMD=56%).

ALHA77011 is unique because it is the only L3 chondrite we know that contains a few volume % of aggregates of graphite and magnetite crystals, which are generally micron to submicron in size. These aggregates, which range in size from <5 to 200 um, are intimately associated with metallic Fe, Ni. The unique occurence of graphite-magnetite allows us to pair unambiquously 34 L3 meteorite specimens of the 1977-1979 Allan Hills collection.

1978 ANTARCTIC METEORITE SUMMARY

NUMBER	WEIGHT (GMS)	CLASSIFICATION	WEATHERING	FRACTURING	PAGE
ALHA78044	164.1	L-4 Chondrite	B	B	13
ALHA78111	126.8	H-5 Chondrite	B/C	A	13

1980 ANTARCTIC METEORITE SUMMARY

NUMBER	WEIGHT (GMS)	CLASSIFICATION	WEATHERING	FRACTURING	PAGE
ALHA80101	8725.0	L-6 Chondrite	B	B	14
ALHA80102	471.2	Polymict Eucrite	A	B	15
ALHA80103	535.9	L-6 Chondrite	B	A	15
ALHA80104	882.0	Iron-Ataxite	B	A	16
ALHA80105	445.1	L-6 Chondrite	B	B	16
ALHA80106	432.2	H-4 Chondrite	C	B	17
ALHA80110	167.6	L-6 Chondrite	B	B	18
ALHA80112	330.7	L-6 Chondrite	B	B	18
ALHA80113	312.6	L-6 Chondrite	B	B/C	19
ALHA80114	232.8	L-6 Chondrite	B	B	19
ALHA80115	306.0	L-6 Chondrite	B	A	19
ALHA80116	191.2	L-6 Chondrite	B/C	B	20
ALHA80125	139.2	L-6 Chondrite	B/C	B	20
ALHA80132	152.8	H-5 Chondrite	B	B	21
RKPA80201	813.0	H-6 Chondrite	B	A	21
RKPA80202	544.5	L-6 Chondrite	B	A	22
RKPA80204	15.4	Eucrite	A	A	23
RKPA80224	8.0	Unbrecciated Eucrite	A/B	A	24
RKPA80231	238.1	H-6 Chondrite	C	B/C	24
RKPA80233	413.5	H-5 Chondrite	B/C	B	25
RKPA80235	261.2	LL-6 Chondrite	A/B	B	25
RKPA80256	153.2	L-3 Chondrite	B	A	26

Sample No. : ALHA78044 Location: Allan Hills
Field No.: 282
Weight (gms): 164.1
Meteorite Type: L4 Chondrite

Physical Description:
Patches of brown and black fusion crust cover entire specimen except for a 2 x 2 cm area on the B surface. Many clasts are visible on the exterior surfaces. Several fractures penetrate the interior of the stone. Chipping revealed an interior that is mostly weathered. Dark gray inclusions up to 2 mm in diameter are visible in the unweathered light gray matrix.

Dimensions: 6.5 x 4 x 3.5 cm.

Petrographic Description: Brian Mason
The section shows a closely-packed aggregate of chondrules, 0.3-2.4 mm across; a variety of chondrule types is present, the commonest being granular and porphyritic olivine, barred olivine, and radiating and fine-grained pyroxene. The matrix consists of fine-grained olivine and pyroxene and minor subequal amounts of nickel-iron and troilite. The meteorite is considerably weathered, with limonitic staining throughout and areas of red-brown limonite associated with the metal grains. Microprobe analyses show slightly variable olivine composition (Fa_{23-25}, average Fa_{24}) and moderately variable pyroxene (Fs_{19-24}, average Fs_{21}). The meteorite is classified as an L4 chondrite.

Sample No.: ALHA78111 Location: Allan Hills
Field No.: 472
Weight (gms): 126.8
Meteorite Type: H5 Chondrite

Physical Description:
Sample is wedge-shaped and has fusion crust along one edge. Remainder of sample may or may not have remnant fusion crust. One surface contains many chondrules which could be plucked out. Only a small area (0.6 cm) through the center of the stone is unweathered. The unweathered matrix is light gray in color. Some fresh metal is visible. When the meteorite was chipped, it broke into many pieces.

Dimensions: 7.5 x 5.5 x 2 cm.

Petrographic Description: Brian Mason
The section shows well-developed chondritic structure, chondrules ranging from 0.3-1.2 mm across. Chondrule margins are sometimes diffuse, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite and a little fine-grained plagioclase. The meteorite is somewhat weathered, with veins and patches of brown limonite throughout the section. Microprobe analyses gave the following compositions: olivine, Fa_{18}; pyroxene, Fs_{16}; plagioclase, An_{13}. The meteorite is classified as an H5 chondrite.

Sample No.: ALHA80101 Location: Allan Hills
Field No.: 1023
Weight (gms): 8725.0
Metecrite Type: L6 Chondrite

Physical Description: Carol Schwarz
The sample has black fusion crust on two surfaces. The texture of the rest of the meteorite is rough and has weathered to a reddish-brown color. Some distinct chondrules or clasts that are cream colored can be distinguished. The sample shows linear fractures which are more severely weathered.

The interior of this stone is gray with numerous oxidation halos. A darker gray weathering rind is discontinuous. Where broken along fractures, some white evaporate deposit was exposed.

This specimen is similar to ALHA80103 and ALHA80105. The samples have weathered too much to fit together as one sample.

Dimensions: 31 x 17 x 15 cm.

Petrographic Description: Brian Mason
Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of plagioclase, troilite, and nickel-iron. A moderate amount of limonitic staining is present around the nickel-iron grains. Microprobe analyses gave the following mineral compositions: olivine, Fa_{24}; orthopyroxene, Fs_{20}; plagioclase, An_{11}. The meteorite is classified as an L6 chondrite.

Polished thin sections of ALHA80103, 80105 are identical in texture, mineral compositions, and degree of weathering with ALHA80101, indicating that these three specimens are pieces of a single meteorite.

Sample No.: ALHA80102 Location: Allan Hills
Field No.: 1020
Weight (gms): 471.2
Meteorite Type: Polymict Eucrite

Physical Description: Roberta Score
Shiny black fusion crust covers all but one surface of this achondrite. The exterior surfaces have many vugs, typical of the other Allan Hills polymict eucrites, ranging in size from <1 mm to >1 cm.

Chipping revealed an interior that is medium gray colored with mm sized white, yellow, and black clasts throughout. Several larger clasts (up to 1 cm. longest dimension) were noted.

Dimensions: 12.5 x 8 x 5.5 cm.

Petrographic Description: Brian Mason
The section shows a breccia of angular fragments, up to 1 mm across, of pigeonite and plagioclase and a few lithic clasts, in a matrix of comminuted pyroxene and plagioclase. The lithic clasts consist of pyroxene and plagioclase and range in texture from doleritic to gabbroic. Accessory ilmenite was noted. No evidence of weathering was seen. Microprobe analyses show pigeonite ranging in composition from $Wo_6Fs_{34}En_{60}$ to $Wo_{12}Fs_{52}En_{36}$; a few grains of ferroaugite, averaging $Wo_{33}Fs_{30}En_{37}$, were analyzed. Plagioclase ranges in composition from An_{76} to An_{94}, with an average of An_{87}. The meteorite is classified as a polymict eucrite (pyroxene-plagioclase achondrite), and resembles the other polymict eucrites collected at the Allan Hills.

Sample No.: ALHA80103 Location: Allan Hills
Field No.: 1068
Weight (gms): 535.9
Meteorite Type: L6 Chondrite

Physical Description: Carol Schwarz
The specimen has no fusion crust except for an area <1 cm^2. ALHA80103 has a rough texture and has weathered reddish-brown. Unweathered areas are gray with some ∿2 mm clasts distinguishable. A linear fracture runs paralled to the S surface which is smooth and reddish-brown. Sample has broken off in places leaving a flat surface. This feature is also present on ALHA80101 and 80105.

Chipping revealed an interior which is yellow-gray in color and friable. A discontinuous gray weathering rind is present. Some 3-5 mm clasts are barely visible. Oxidation halos are present as are metal flecks.

Dimensions: 10.5 x 7 x 5 cm.

Petrographic Description: Brian Mason
Polished sections of ALHA80101, 80103, 80105 are identical in texture, mineral compositions, and degree of weathering, indicating that these three specimens are pieces of a single meteorite.

Sample No.: ALHA80104 Location: Allan Hills
Field No.: 1011
Weight (gms): 882.0
Meteorite Type: Ataxite

Physical Description: Roy S. Clark, Jr.
This specimen is an irregularly shaped individual, 11 cm x 7 cm x 4 cm. One prominent rounded surface appears to have been ablation-shaped, and a second fairly large and comparatively smooth surface appears to have been the under side while the specimen was exposed at the surface of the ice. The meteorite is covered with a fairly uniform dark reddish brown iron oxide, and no fusion crust seems to remain. There are several deep linear incisions into the body of the meteorite that are possibly due to either preferential ablation or weathering of schreibersite inclusions exposed at the surface.

Tentative Classification: Roy S. Clarke, Jr.
A microetched surface area of approximately 7 cm^2 was examined. A heat-altered zone is present over part of the external surface of the specimen. The metallographic matrix is a martensitic plessite. Kamacite spindles less than 0.1 mm wide, and generally less than ten times their width in length, are moderately uniformly distributed in a vague Widmanstatten pattern orientation. The kamacite spindles frequently enclose small schreibersites. Three large schreiberite areas enclosed in swathing kamacite as wide as 0.2 mm are present. The largest such area is 8 mm long. Weathering has penetrated 0.5 cm into the mass in one area. Chemical data and a more thorough metallographic examination will be required to classify this meteorite precisely.

Sample No.: ALHA80105 Location: Allan Hills
Field No.: 1066
Weight (gms): 445.1
Meteorite Type: L6 Chondrite

Physical Description: Carol Schwarz
This sample is not a complete specimen. It has no fusion crust except for 2 or 3 small spots that may be remnant fusion crust. Some ∿3 mm chondrules are visible. Several linear fractures which are heavily weathered are present and are similar to those in ALHA80101 and 80103.

The interior is gray with oxidation halos and metal flecks. A discontinuous 2 mm thick weathering rind is present.

Dimensions: 12 x 6.5 x 3.5 cm.

Petrographic Description: Brian Mason
Polished thin sections of ALHA80103, 80105 are identical in texture, mineral compositions, and degree of weathering with ALHA80101, indicating that these three specimens are pieces of a single meteorite.

Sample No.: ALHA80106 Location: Allan Hills
Field No.: 1021, 1022
Weight (gms): 432.2
Meteorite Type: H4 Chondrite

Physical Description: Carol Schwarz
ALHA80106 consists of five pieces, one of which had a different field number. That piece plus three others fit together. The fifth piece does not. The sample has patches of shiny black fusion crust on all sides except T which appears to be a fracture surface. Areas devoid of fusion crust are smooth and reddish brown. The interior of this stone is totally weathered.

Dimensions: 6 x 9.5 x 10 cm.

Petrographic Description: Brian Mason
Chondritic structure is well developed, with chondrules ranging from 0.2-1.2mm across; the commonest types are granular and porphyritic olivine, barred olivine, and fine-grained radiating pyroxene. The chondrules are set in a fine-grained granular groundmass of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Some of the pyroxene is polysynthetically twinned clinobronzite. Weathering is pervasive, with brown limonitic staining throughout the section. Microprobe analyses show uniform olivine composition (Fa_{19}) and moderately variable pyroxene (Fs_{16-19}, average Fs_{17}).

The meteorite is classified as an H4 chondrite.

Sample No.: ALHA80110 Location: Allan Hills
Field No.: 1062
Weight (gms): 167.6
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
Only a small patch of weathered fusion crust remains on the exterior of this specimen. The interior is relatively fresh with metal obvious. A 2 mm discontinuous weathering rind is dark gray in color. This is in contrast to the whitish-gray interior material.

ALHA80110 is probably a fragment from ALHA80101.

Dimensions: 7 x 5.5 x 3 cm.

Petrographic Description: Brian Mason
Microscopic and microprobe examination has confirmed that ALHA80110, 80112, and 80115 are fragments of a single meteorite, along with ALHA80101, 80103, 80105, and ALHA80113, 80114, 80116, and 80125 are so similar that they can be included with a reasonable degree of certainty. In all of them chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of plagioclase, troilite and nickel-iron. A moderate amount of limonitic staining is present around the nickel-iron grains. Microprobe analyses gave the following mineral compositions: olivine, Fa_{24}; orthopyroxene, Fs_{20}; plagioclase, An_{10-11}; grains of merrillite were analyzed in ALHA80110, 80115, 80125. These specimens are all L6 chondrites.

The sections of ALHA80115, 80116, and 80125 have thin (0.1-0.2 mm) veinlets consisting largely of brown isotropic material (possibly ringwoodite and majorite); plagioclase near these veinlets is partly converted to maskelynite, with CaO content (2.0-2.2%) appropriate to oligoclase composition, but with deficient and variable Na_2O content.

Sample No.: ALHA80112 Location: Allan Hills
Field No.: 1061
Weight (gms): 330.7
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
Brown and black fusion crust covers only two surfaces while the other surfaces are reddish-brown in color. The interior contains a large weathering rind with a moderately weathered matrix.

Sample is probably a fragment of ALHA80101.

Dimensions: 10 x 5 x 7 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80113 Location: Allan Hills
Field No.: 1064
Weight (gms): 312.6
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
Exterior is reddish-brown in color with a few angular yellow clasts visible. Sample broke along a pre-existing crack which has been extremely weathered. It is hard to tell if further chipping would reveal less weathered material.

Dimensions: 7 x 5 x 4.5 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80114 Location: Allan Hills
Field No.: 1067
Weight (gms): 232.8
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
No fusion crust is present on this orangish-brown specimen. Though the exterior is weathered, several inclusions are obvious. A partial weathering rind (~2 mm thick) was exposed when the sample was chipped. The interior is spotted with oxidation.

ALHA80114 is related to ALHA80101.

Dimensions: 10 x 5 x 3 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80115 Location: Allan Hills
Field No.: 1065
Weight (gms): 306.0
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
No fusion crust is present on this rounded, orangish-brown colored specimen. A 3 cm diameter weathered troilite (?) grain is visible on the exterior of this stone. The interior material is light-gray with some orangish oxidation.

ALHA80115 is probably a fragment from a common fall along with ALHA80101.

Dimensions: 6.5 x 6.5 x 5.5 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80116 Location: Allan Hills
Field No.: 1069
Weight (gms): 191.2
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
The exterior of the specimen has weathered to a deep reddish-brown color. No fusion crust exists. The interior is mostly weathered though some fresh metal is obvious. A 2-3 cm continuous weathering rind is present.

Dimensions: 8.5 x 5.5 x 2.5 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80125 Location: Allan Hills
Field No.: 1029
Weight (gms): 139.2
Meteorite Type: L6 Chondrite

Physical Description: Roberta Score
No fusion crust is present on this reddish-brown colored specimen. The interior of this stone is mostly weathered.

Dimensions: 6.5 x 4.5 x 3 cm.

Petrographic Description: Brian Mason
Refer to ALHA80110 for description.

Sample No.: ALHA80132 Location: Allan Hills
Field No.: 1097
Weight (gms): 152.8
Meteorite Type: H5 Chondrite

Physical Description: Roberta Score
Most of this flat stone is covered with dull brownish-black fusion crust. Flow bands are prominent on one surface. Several fractures penetrate into the interior. A large weathering rind was revealed when the specimen was chipped. The unweathered areas, which are light gray in color, contain inclusions.

Dimensions: 8 x 4.5 x 3 cm.

Petrographic Description: Brian Mason
Chondritic structure is moderately well developed, but chondrule margins are blurred, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Plagioclase was not certainly identified. Limonitic staining is extensive around metal grains, and veinlets of limonite are present near one edge of the section. Microprobe analyses gave the following mineral compositions: olivine, Fa_{18}; orthopyroxene, Fs_{16}. The meteorite is classified as an H5 chondrite.

Sample No.: RKPA80201 Location: Reckling Peak
Field No.: 1300
Weight (gms): 813.0
Meteorite Type: H6 Chondrite

Physical Description: Carol Schwarz
This stone is completely covered with fusion crust except for a small corner on one surface (W). The fusion crust is black with brownish weathering spots and contains polygonal fractures. Another surface (N) contains several holes where something may have been plucked out. Minute amounts of white evaporite deposit are present in some of the polygonal fractures.

When the meteorite was chipped, the gray interior with metal flecks and some oxidation halos was exposed.

Dimensions: 12 x 6 x 5.5 cm.

Petrographic Description: Brian Mason
Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron, plagioclase, and troilite. Minor limonitic staining is present around the nickel-iron grains. Microprobe analyses gave the following mineral compositions: olivine, Fa_{19}; orthopyroxene, Fs_{16}; plagioclase, An_{12}. The meteorite is classified as an H6 chondrite.

Sample No.: RKPA80202 Location: Reckling Peak
Field No.: 1036
Weight (gms): 544.5
Meteorite Type: L6 Chondrite

Physical Description: Carol Schwarz
Less than 1.5 mm thick, brown to black fusion crust covers the entire specimen except for one small area. The fusion crust is polygonally fractured. White evaporate deposit was visible in some of the fractures after the stone dried overnight in the nitrogen cabinet.

Interior material is gray with some oxidation halos. A number of parallel fractures are present. Some weathering has occurred along these cracks.

Dimensions: 12 x 5.5 x 5.5 cm.

Petrographic Description: Brian Mason
Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of maskelynite, nickel-iron, and troilite. Well-preserved fusion crust is present in one edge of the section. A little limonitic staining is present around some of the nickel-iron grains. The section is cut by a dark glassy veinlet, maximum thickness 0.3 mm; clear isotropic material in this veinlet is tentatively identified as ringwoodite and majorite. Microprobe analyses show olivine (Fa_{24}) and orthopyroxene (Fs_{20}) of uniform composition; the maskelynite has CaO content (2.4%) appropriate to oligoclase composition, but has deficient and variable Na_2O content (2.4-5.0%). The meteorite is classified as an L6 chondrite.

This specimen is identical in texture, mineral compositions, and degree of weathering with RKPA78001, 78003, 79001, and 79002, which evidently are all pieces of a single meteorite.

Sample No.: RKPA80204 Location: Reckling Peak
Field No.: 1078
Weight (gms): 15.4
Meteorite Type: Eucrite

Physical Description: Roberta Score
Black fusion crust covers one surface and appears as patches on two other surfaces.

Two texturally distinct lithologies are apparent in this achondrite. One texture (E end) is massive and fine grained. Rounded yellow clasts are obvious in this area. The second lithology (W end) has abundant small light and dark grains, making this area look coarser-grained. Thin (<1mm) black veins extend into both textures. Abundant vugs give the exterior a rough surface. Therefore it is difficult to determine the relationship between the two lithologies.

Chipping of the sample revealed a vein (~2-3 mm thick) of the coarse-grained litnology which extends partially into the massive lithology.

The chip taken to be made into thin section contains both textures.

Dimensions: 3 x 2 x 2 cm.

Petrographic Description: Brian Mason
The section shows clasts (up to 6 mm in maximum dimension) of ophitic intergrowths of pigeonite and plagioclase, separated by veins of coarser-grained pigeonite and plagioclase. The plagioclase laths in the clasts range up to 0.5 mm in length. The pigeonite and plagioclase grains in the veins average about 0.3 mm in maximum dimensions. Microprobe analyses show pigeonite with a limited range of composition ($Wo_4Fs_{57}En_{39}$ - $Wo_{13}Fs_{52}En_{35}$). Plagioclase ranges in composition from An_{85} to An_{94}, with a mean of An_{92}. Accessory ilmenite is present. The meteorite is classified as a eucrite (pyroxene-plagioclase achondrite).

Sample No.: RKPA80224 Location: Reckling Peak
Field No.: 1291
Weight (gms): 8.0
Meteorite Type: Unbrecciated Eucrite

Physical Description: Roberta Score
Thin, shiny black fusion crust covers five surfaces. One surface is a fracture surface. Areas devoid of fusion crust contain white crystals with dark inclusions.

When this achondrite was chipped, fine-grain material was apparent between the white crystals. Some oxidation is present.

Dimensions: ∿3.5 x 1.5 x 1.0 cm.

Petrographic Description: Brian Mason
The section shows an ophitic intergrowth of pigeonite and plagioclase, with accessory amounts of tridymite and opaque minerals; the average grain size of pyroxene and plagioclase is about 1 mm. Fusion crust is present on one edge of the section. The pyroxene and plagioclase crystals are somewhat granulated and show undulose extinction. A little limonitic staining is present in one area of the section. Microprobe analyses show pigeonite with an average composition of $Wo_{10}Fs_{54}En_{36}$; some grains show exsolution lamellae of augite with composition $Wo_{44}Fs_{26}En_{30}$. Plagioclase ranges in composition from An_{85} to An_{91}, with a mean of An_{89}. The opaque minerals are troilite and titanian chromite (TiO_2 13-15%). The meteorite is an unbrecciated eucrite (pyroxene-plagioclase achondrite).

Sample No.: RKPA80231 Location: Reckling Peak
Field No.: 1267
Weight (gms): 238.1
Meteorite Type: H6 Chondrite

Physical Description: Roberta Score
Two small patches of dull black fusion crust remain on this weathered and fractured stone. No unweathered material was exposed when the sample was chipped.

Dimensions: 7 x 5 x 3 cm.

Petrographic Description: Brian Mason
Chondritic structure is poorly defined, the chondrules tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron, plagioclase, and troilite. Weathering is extensive, with numerous thin limonite veinlets throughout the section. The meteorite appears to have been considerably fractured and the minerals partly granulated. Microprobe analyses give the following mineral compositions: olivine, Fa_{18}; orthopyroxene, Fs_{16}; plagioclase, An_{12}. The meteorite is classified as an H6 chondrite.

Sample No.: RKPA80233 Location: Reckling Peak
Field No.: 1096
Weight (gms): 413.5
Meteorite Type: H5 Chondrite

Physical Description: Roberta Score
Patches of fusion crust cover all but one planar, fracture surface. This surface contains numerous chondrules which can easily be plucked out. A small area of unweathered interior material contains dark inclusions.

Dimensions: 8.5 x 6.5 x 5 cm.

Petrographic Description: Brian Mason
Chondritic structure is moderately well developed, with chondrules ranging up to 2.4 mm in diameter. The chondrules are set in a granular groundmass which consists largely of olivine and pyroxene with minor amounts of nickel-iron, troilite, and plagioclase. There is a considerable amount of limonitic staining throughout the section, concentrated around the metal grains. Microprobe analyses gave the following mineral compositions: olivine, Fa_{18}; orthopyroxene, Fs_{16}; plagioclase, An_{11}. The meteorite is classified as an H5 chondrite.

Sample No.: RKPA80235 Location: Reckling Peak
Field No.: 1261
Weight (gms): 261.2
Meteorite Type: LL6 Chondrite

Physical Description: Roberta Score
Several patches of black fusion crust are present. Most of this rough surfaced meteorite is yellowish-brown in color. Numerous clasts are obvious. The interior of this stone is medium gray in color and is relatively unweathered.

Dimensions: 9 x 6.5 x 4.5 cm.

Petrographic Description: Brian Mason
The section is finely granular (average grain size about 0.1 mm), with only traces of chondritic structure. The meteorite consists largely of olivine and pyroxene, with minor amounts of plagioclase; nickel-iron and troilite are unusually sparse, less than 5%. Limonitic staining is absent, the meteorite appearing to be completely unweathered (a recent fall ?). Microprobe analyses gave the following mineral compositions: olivine, Fa_{30}; orthopyroxene, Fs_{24}; plagioclase, An_{10}. The meteorite is classified as an LL6 chondrite.

Sample No.: RKPA80256 Location: Reckling Peak
Field No.: 1290
Weight (gms): 153.2
Meteorite Type: L3 Chondrite

Physical Description: Roberta Score
This meteorite is almost totally covered with a brownish-black fusion crust. Areas along the edges where the fusion crust has been plucked away reveal the clastic nature of this meteorite.

Chipping the sample confirmed that this meteorite is an unequilibrated chondrite with chondrules as large as .5 cm. In addition to the high concentration of chondrules, several white and gray clasts as much as .5 cm. in the longest dimension are present. Weathering is moderate.

Dimensions: 7 x 5.5 x 3 cm.

Petrographic Description: Brian Mason
The thin section shows a closely packed mass of chondrules (0.3-1.8 mm diameter) and irregular crystalline aggregates. Some of the chondrules have prominent dark rims. The sparse matrix is dark and fine-grained, with a small amount of coarser nickel-iron and troilite scattered throughout. A notable variety of chondrules is present; many are granular or porphyritic olivine and olivine-pyroxene with transparent to turbid interstitial glass. The pyroxene is polysynthetically twinned clinobronzite. There is a little limonitic staining in association with metal grains. Microprobe analyses show olivine ranging in composition from Fa_{20} to Fa_{25}, with a mean of Fa_{22}; the pyroxene is low-calcium (CaO = 0.1-0.8%), with a composition range from Fs_{10} to Fs_{26} and a mean of Fs_{18}. This range of composition, together with presence of glass and twinned clinobronzite, indicates Type 3. The small amount of nickel-iron suggests L group. The meteorite is therefore tentatively classified as an L3 chondrite.