

# 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.

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The Meteorite Working Group will meet next on April 10, 1980, to consider sample requests for Antarctic meteorites. Please submit requests to:

John O. Annexstad Secretary, Meteorite Working Group Curator's Branch/SN2 NASA-Johnson Space Center Houston, TX 77058

# Availability of Large Chondrites for Studies of Cosmic-Ray-Interactions:

Two large ordinary chondrites, Allan Hills 78084 ( $\sim$  15 kg) and Meteorite Hills 78028 ( $\sim$  20 kg), appear to be complete specimens in that they are nearly fully covered with a fusion crust. Preliminary examination suggests that neither meteorite is appreciably weathered or fractured. It is the intention of the MWG that samples of one of these meteorites be made available to investigators wishing to make detailed studies of products of cosmic ray interactions as a function of depth in a relatively large chondrite. For such studies, the MWG will entertain moderately elaborate requests for multiple samples from accurately determined subsurface depths. The MWG will also entertain requests from investigators who wish to organize and lead a consortium-like study of the products of cosmic ray interactions in one of these chondrites. Although the descriptions and petrographic classifications of these chondrites will not be announced until the next Newsletter, persons wishing to participate in the planned investigations of cosmogenic products are encouraged to transmit a sample request or a statement of their intent to participate to the MWG before the April meeting.

#### 1979-1980 Antarctic Search for Meteorites

The Antarctic Search for Meteorites (ANSMET) field party consisted of William A. Cassidy (Principal Investigator), University of Pittsburgh; Louis A. Rancitelli, Battelle Institute; Lee Benda, University of Washington and John O. Annextad, NASA. Everett K. Gibson, Jr., from the Johnson Space Center, was also a member of the field party for a portion of the season.

The work accomplished this season in Antarctica consisted of:

- 1 The resurvey of the Allan Hills triangulation network for ice movement and ablation studies. Preliminary data indicates an average ablation rate of 5 centimeters per year in the meteorite concentration areas.
- 2 A brief meteorite search in the Allan Hills area produced 52 chondrites, 1 achondrite and 2 possibles for a total of 52 specimens.
- 3 An oversnow traverse by snowmobile and Nansen sleds resulted in the discovery of two new areas of meteorite concentration. These areas are located over 200 miles NW of McMurdo near a small mountain called Reckling Peak. Area I, tentatively identified as Reckling Moraine, is located 12 miles west of Reckling Peak. Fourteen chondrites and one iron were found there. Area 2, tentatively identified as Elephant Moraine, is located 45 miles west of Reckling Peak. Seven chondrites and five possible achondrites were found there.

Total meteorites found by the U.S. party this year are 80 plus 2 possibles. Since the primary purpose of the expedition was to reconnoiter previously unsearched blue ice areas, the total count is lower than previous years. The search team believes that the newly discovered fields could yield many more specimens in the years to come.

The magnetic orientation, at the time of recovery, of fifteen meteorites from the 1978 Antarctic collection has been recorded. The orientation of the samples is documented in the field photographs of each of the specimens. The following magnetically oriented meteorites, most of which have not been processed, will be available for study upon request from MWG:

ALHA78085	META78012
ALHA78102	META 78014
ALHA78103	META78015
~ ALHA78105	META78016
- META 78002	META78028
~ META78006	DRPA78007
META78007	DRPA78008
META78008	

# 1977 Collection

NUMBER	FRACTURING	WEATHERING	PAGE
ALHA77009	Α	С	4
ALHA77010	A	С	5
ALHA77011	Α	С	6
ALHA77012	Α	С	7
ALHA77180	Α	С	8
ALHA77183	Α	С	8
ALHA77221	Α	С	9
ALHA77223	С	С	9
ALHA77225	С	С	10
ALHA77232	С	С	11
ALHA77259	В	С	12
ALHA77268	C	С	12
ALHA77274	Α	С	13
ALHA77286	В	С	14
ALHA77287	Α	С	15
ALHA77292	Α	В	15

# 1978 Collection

<u>GE</u>
6
7
8
9
0
1
2
2
3
4
5
2 2 2 2 2 2

Sample No.:

ALHA77009

Location: Allan Hills

Field No.:

77122943

Field Contamination Category: 2

Weight (ams):

235.5

Meteorite Type: H4 chondrite

### Physical Description:

This is a complete specimen with fusion crust missing only on the corners and one small area on the T surface. The fusion crust, where present, is approximately 0.5 mm thick and black. On the surfaces not covered by fusion crust, many weathered inclusions are present. An  $\sim 0.5$  cm green inclusion, that appears to radiate, is present on the T surface. Much of the interior of the sample has weathered to a reddish-brown.

Dimensions:  $\sim 6.5 \times 4.5 \times 4.3$  cm.

Petrographic Description: Brian Mason

Chondritic structure is prominent. The usual variety of chondrule types is present, the commonest being barred oliving, granular olivine, and fine-grained radiating pyroxene. In a few of the barred chondrules the bars between the olivine are transparent brown glass, but in most the bars are turbid and devitrified. Some of the pyroxene is polysynthetically twinned clinobronzite. The groundmass between the chondrules consists of granular olivine and pyroxene, with minor amounts of nickel-iron and troilite. Remnants of fusion crust are present on one edge of the section. Microprobe analyses show olivine  $(Fa_{18})$  and pyroxene  $(Fs_{16})$  of essentially uniform composition. The meteorite is classified as an H4 chondrite.

Sample No.:

ALHA77010

Location: Allan Hills

Field No.:

77122939

Field Contamination Category: 2

Weight (gms):

295.8

Meteorite Type: H4 Chondrite

### Physical Description:

The exterior of the specimen is nearly a uniform reddish-brown. However, a small amount of thin, black fusion crust is present on the E surface. Several rounded (chondrules) and angular (lithic clasts) inclusions are apparent on the sawed surfaces. The inclusions are lighter in color than the reddish-brown, iron oxide stained matrix material.

Dimensions: 7.0x5.0x5.0 cm.

Petrographic Description:

Brian Mason

Chondrules are prominent and well developed, 0.2-1.5 mm in diameter; a variety of types is present, the commonest being prophyritic olivine, granualr olivine-pyroxene, and finegrained pyroxene. Pyroxene grains in the olivine-pyroxene chondrules are polysynthetically twinned clinobronzite. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite. The section shows a considerable degree of weathering in the form of small areas and veinlets of brown limonite. Microprobe analyses show olivine of essentially uniform composition ( $Fa_{18}$ ) and pyroxene of somewhat variable composition ( $Fs_{15}$ - $Fs_{18}$ , average  $Fs_{16}$ ). The meteorite is classified as an H4 chondrite.

Sample No.:

ALHA77011

Location: Allan Hills

Field No.:

77122937

Field Contamination Category: 2

Weight (qms):

2915

Meteorite Type: LL-3 Chondrite

### Physical Description:

The major portion of the sample is covered with fusion crust. Inclusions are apparent through the thin fusion crust on the B surface. The fusion crust on the T surface is shiny blackish-red and appears to be more severely weathered than the other surfaces. Regmaglypts are present on the E surface. In areas where the fusion crust has been removed, probably by physical processes, many inclusions are apparent in the interior of the stone.

#### Petrographic Description:

Brian Mason

Chondrules are numerous and well developed, 0.2-1.2 mm in diameter, and are close-packed with only a small amount of ground-mass. Some of the chondrules have prominent dark rims. The commonest types are granular olivine and prismatic or fine-grained pyroxene. Most of the pyroxene is polysynthetically twinned clinobronzite. Nickel-iron and troilite are present in unusually small amounts; troilite is concnetrated in chondrule rims. A moderate amount of limonitic staining is present. Microprobe analyses show that olivine and pyroxene vary in composition; olivine ranges from Fa4 to Fa36, with a mean of Fa16, and the pyroxene ranges from Fs<sub>1</sub> to Fs<sub>33</sub>, with a mean of Fs<sub>12</sub>. The low content of nickeliron and troilite suggests LL group, and the meteorite is tentatively classified as an LL3 chondrite; however, definite assignment should await further investigation.

Sample No.:

ALHA77012

Location: Allan Hills

Field No.:

77122942

Field Contamination Category: 2

Weight (gms):

180.2

Meteorite Type: H5 Chondrite

#### Physical Description:

The sample is roughly pyramidal in shape, with the E surface being semi-flat and a fracture surface. The B and S surfaces have very thin, patchy, black fusion crust. The remainder of the sample is stained reddish-brown by iron oxidation. No unweathered material was exposed during processing.

Petrographic Description:

Brian Mason

Chondritic structure is well developed; chondrules are 0.3-0.9 mm in diameter, the commonest types being granular olivine, barred olivine, and fine-grained pyroxene. olivine chondrules the material interstitial to the olivine is a fine-grained aggregate probably of pyroxene and plagioclase. Some larger irregular aggregates of granular olivine (up to 6 mm in greatest dimension) are present. The matrix of the chondrules and aggregates is a granular aggregate of olivine and pyroxene, with minor nickel-iron and troilite (nickeliron in excess of troilite). Somewhat eroded fusion crust is present along one edge. The section is pervaded with brown limonitic staining, and small patches and veinlets of limonite are present. Microprobe analyses show uniform olivine (Fals) and orthopyroxene (Fs<sub>16</sub>) compositions. The meteorite is classified as an H5 chondrite.

Sample No.:

ALHA77180

Location: Allan Hills

Field No.:

Y77123109

Field Contamination Category: 4

Weight (gms):

190.8

Meteorite Type: L6 Chondrite

### Physical Description:

Remnant fusion crust remains on three surfaces of the sample. The other surfaces are fracture surfaces that are stained reddish-brown by iron oxidation.

One fine grained gray inclusion, approximately 1 cm in diameter, was exposed in the sample during processing. The interior of the specimen is fine grained and light gray.

#### 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 subequal amounts of nickel-iron and troilite. A little untwinned plagioclase is present. One edge of the section is bordered by remnants of fusion crust. A small amount of limonite is present, concentrated near the fusion crust. Microporbe analyses show olivine  $(Fa_{24})$ , orthopyroxene  $(Fs_{20})$ , and plagioclase  $(An_{10})$  of uniform composition; one grain of diopside  $(Wo_{48}En_{46}Fs_6)$  was analyzed. The meteorite is classified as an L6 chondrite.

Sample No.:

ALHA77183

Location: Allan Hills

Field No.:

Y78010313A

Field Contamination Category: 4

Weight (gms):

288.0

Meteorite Type: H6 Chondrite

## Physical Description:

This is a well rounded speciment, with the exception of the B surface which is flat. No fusion crust is present on the sample, and all surfaces are stained and uniform reddishbrown. Outlines of small inclusions are visible on the T surface.

No unweathered material was observed when the stone was cleaved.

Petrographic Description:

Brian Mason

Some well-defined chondrules are present, but most of the section consists of a granular aggregate of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite. A little limonite is present, usually in association with the nickel-iron. Microprobe analyses show olivine  $(Fa_{19})$ , orthopyroxene  $(Fs_{16})$ , and plagioclase  $(An_{11})$  of uniform composition. The meteorite is classified as an H6 chondrite.

Sample No.:

ALHA77221

Location: Allan Hills

Field No.:

78012504

Field Contamination Category: 6

Weight (gms):

229.2

Meteorite Type: H4 Chondrite

### Physical Description:

All surfaces of the meteorite, with the exception of the S surface, have remnant patches of thin, dull black fusion crust. The exterior surfaces devoid of fusion crust are stained by iron oxidation. Several clasts, approximately 1 mm in diameter, are apparent on the S surface. The specimen is fractured.

Chipping revealed no unweathered material in the interior of the sample.

Petrographic Description: Brian Mason

Chondrules are numerous and well developed, and unusually large, ranging up to 3 mm in diameter; the commonest types are granular and barred olivine. One example of a chondrule within a chondrule (barred olivine) was noted. The groundmass consists of olivine and pyroxene, with a fair amount of nickel-iron in relatively large (up to 1.2 mm) grains, and a smaller amount of troilite. The groundmass is pervaded with fine-grained black material, probably carbonaceous. A little limonite is present. Microprobe analyses show olivine ( $Fa_{15}$ ) of essentially uniform composition and slightly variable pyroxene ( $Fs_{13}$ - $Fs_{15}$ , average  $Fs_{14}$ ). The meteorite is classified as an H4 chondrite.

Sample No.:

ALHA77223

Location: Allan Hills

Field No.:

78012505

Field Contamination Category: 6

Weight (gms):

207.9

Meteorite Type: H4 Chondrite

## Physical Description:

The T surface of this specimen has patches of dull black fusion crust. The remainder of the sample is stained reddish brown by iron oxidation. The surfaces devoid of fusion crust are fracture surfaces. Several cracks penetrate the sample.

Petrographic Description: Brian Mason

Chondritic structure is well developed; chondrules range from 0.2-1.5 mm in diameter, and are of the usual types, the commonest being barred olivine, granular olivine and olivinepyroxene, and fine-grained pyroxene. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Some of the pyroxene is polysynthetically twinned clinobronzite. The section is extensively veined with red-brown limonite. Microprobe analyses show olivine of uniform composition ( $Fa_{17}$ ), and pyroxene of somewhat variable composition ( $Fs_{15}$ - $Fs_{23}$ , average  $Fs_{17}$ ); some analyzed spots within pyroxene grains showed CaO contents up to 15%, suggesting exsolution

Sample No.:

ALHA77225

Location: Allan Hills

Field No.:

77122910

Field Contamination Category: 1

Weight (qms):

5878

Meteorite Type: H4 Chondrite

### Physical Description:

This specimen has no fusion crust and is uniformly weathered and stained reddish-brown. however, some surfaces are more shiny than others. The sample is extremely fractured. One brassy colored clast is present on the T surface, possibly a troilite nodule. The B surface has what appears to be slickensides, but because of the severe weathering of the specimen it is impossible to determine this unambiguously. No unweathered material is present on the exterior of the sample. When the specimen was cleaved it fell into many pieces and no unweathered material was exposed.

Dimensions: 20x19x11 cm.

Petrographic Description:

Brian Mason

Chondrules are numerous and well-defined, ranging from 0.5 to 1.8 mm in diameter; a variety of types is present, the commonest being prophyritic olivine and olivine-pyroxene, barred olivine, and fine-grained radiating pyroxene. Much of the pyroxene in the olivine-pyroxene chondrules is polysynthetically twinned clinobronzite. Minor amounts of nickel-iron (√15%) and troilite  $(\sim5\%)$  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  $(Fs_{16})$  of essentially uniform composition. The olivine and pyroxene composition and the presence of clinobronzite indicate that the meteorite can be classified as an H4 chondrite.

Sample No.:

ALHA77232

Location: Allan Hills

Field No.:

77122905

Field Contamination Category: 1

Weight (qms):

6494.3

Meteorite Type: H4 Chondrite

#### Physical Description:

The sample is rounded and only small patches of remnant fusion crust remain on the exterior surface. The sample is severely weathered, the entire specimen is uniformly stained reddish-brown, and fractured. When the sample was sawed it crumbled into many pieces. All of the surfaces exposed during processing were severely weathered. White deposits developed on some surfaces of the meteorite while they dried in the nitrogen cabinet.

Dimensions: 20x19x14 cm.

Petrographic Description:

Brian Mason

The section shows well-developed chondritic structure, the chondrules ranging from 0.4 to 1.2 mm in diameter. Chondrule types include porphyritic olivine, granular olivine and olivine-pyroxene, and fine-grained radiating pyroxene; in the porphyritic chondrules the olivine crystals are set in a turbid devitrified glass. Much of the pyroxene is polysnythetically twinned clinobronzite. The chondrules are in a fine-grained granular matrix consisting largely of olivine and pyroxene, with minor amounts of nickel-iron (∿15%) and troilite  $(\sim 5\%)$ . The meteorite is considerably weathered, with limonite pervading the section and also concentrated in veinlets. Microprobe analyses show olivine (Fa<sub>17</sub>) and pyroxene (Fs<sub>15</sub>) of essentially uniform composition. The olivine and pyroxene composition and the presence of clinobronzite indicate that the meteorite can be classified as an H4 chondrite.

Sample No.:

ALHA77259

Location: Allan Hills

Field No.:

77123008

Field Contamination Category: 6

Weight (gms):

294.0

Meteorite Type: H5 Chondrite

## Physical Description:

This appears to be a nearly complete specimen, with only a small portion of the T surface not intact. The fractured portion of the T surface is yellowish-brown and weathered with slight traces of inclusions discernible in the stone. The remaining surfaces are covered with remnant patches of dull black fusion crust over a reddish brown iron oxide stained weathered surface. Regmaglypts are present on the E/S surface. The stone was difficult

#### Petrographic Description: Brian Mason

Chondritic structure is well-developed, chondrules ranging from 0.2-1.2 mm in diameter; a variety of types is present, the commonest being barred olivine, granular olivine, and fine-grained pyroxene. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite. The section is partly rimmed with fusion crust. Brown limonitic staining pervades the section. Microprobe analyses show olivine  $(Fa_{18})$ and pyroxene (Fs<sub>15</sub>) of uniform composition. The meteorite is classified as an H5 chondrite.

Sample No.:

ALHA77268

Location: Allan Hills

Field No.:

Y78010311

Field Contamination Category: 6

Weight (gms):

272.0

Meteorite Type: H5 Chondrite

## Physical Description:

This appears to be a complete specimen with dull black fusion crust on all surfaces. small area of material with an irridescent sheen is present on the T surface. A large fracture penetrates the entire stone.

No unweathered material was exposed in the meteorite during processing.

#### Petrographic Description: Brian Mason

Chondritic structure is well developed; chondrules range from 0.3-1.8 mm in diameter, some being broken or irregular in form. The usual types of chondrules are present, the commonest being granular and porphyritic olivine and fine-grained pyroxene. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron inexcess of troilite); it is extensively veined with red-brown limonite. Microprobe analyses show olivine (Fa<sub>18</sub>) and pyroxene (Fs<sub>16</sub>) of uniform composition. The meteorite is classified as an M5 chondnite.

Sample No.:

ALHA77274

Location: Allan Hills

Field No.:

Y78010504

Field Contamination Category: 6

Weight (qms):

288.1

Meteorite Type: H5 Chondrite

#### Physical Description:

A small patch of dull black fusion crust remains on the B surface. The remaining surfaces are devoid of fusion crust and are weathered and stained a reddish-brown by iron oxidation. One small fracture is present on the B surface.

After sawing the interior of the sample revealed small metallic flecks, probably due to the abrasion of the saw blade against the metal included in the meteorite, as the remainder of the stone's sawed surface appeared a reddish-brown.

Dimensions: 7.5x6.0x3.0 cm.

Petrographic Description:

Brian Mason

Chondritic structure is well developed, but many of the chondrules have indistinct margins and tend to merge with the groundmass. Chondrules range up to 2.4 mm in diameter; the commonest types are granular olivine and fine-grained radiating pyroxene. The groundmass consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. Brown limonitic staining pervades the section. Microprobe analyses show olivine (Fals) and pyroxene (Fs<sub>16</sub>) of uniform composition. The meteorite is classified as an H5 chondrite.

Sample No.:

ALHA77286

Location: Allan Hills

Field No.:

Y78010506

Field Contamination Category: 6

Weight (gms):

245.8

Meteorite Type: H4 Chondrite

#### Physical Description:

The B surface and portions of the N surface are devoid of fusion crust. The remaining surfaces have remnants of a thin black fusion crust. The srufaces that are devoid of fusion crust are rough on a small scale. It appears that many  $\sim 1$  mm inclusions produce the roughness. Chondrules and lithic clasts are present in the sample. Only one small fracture occurs on the T surface.

No unweathered material was exposed when the sample was sawed.

Dimensions:  $\sim 7.5 \times 5.5 \times 3.5$  cm.

Petrographic Description:

Brian Mason

The section shows a close-packed aggregate of chondrules, 0.2-1.8 mm in diameter, with a relatively minor amount of matrix material. A variety of chondrule types is present, the commonest being granular olivine, olivine-pyroxene, and fine-grained pyroxene. Much of the granular pyroxene in chondrules is polysynthetically twinned clinobronzite. The matrix consists of fine-grained olivine and pyroxene with minor nickel-iron and troilite; some of the troilite occurs as rims to chondrules. The matrix is infiltrated with veinlets of red-brown limonite. Microprobe analyses show olivine of essentially uniform composition ( $Fs_{12}$ - $Fs_{16}$ , average  $Fs_{14}$ ). The meteorite is classified as an H4 chondrite.

Sample No.:

ALHA77287

Location: Allan Hills

Field No.:

Y78010503

Field Contamination Category: 6

Weight (gms):

2301

Meteorite Type: H5 Chondrite

#### Physical Description:

Small patches of remnant fusion crust remain on the T and B surfaces of the specimen. The remaining surfaces are smooth and are weathered a reddish-brown. Small areas of the exterior surface have an irridescent sheen.

No unweathered material was exposed during the processing of the sample.

Petrographic Description:

Brian Mason

Chondritic structure not prominent, the chondrules tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. The section is extensively veined with brown limonite. Microprobe analyses show olivine  $(Fa_{18})$  and pyroxene  $(Fs_{16})$  of uniform composition; a little fine-grained plagioclase  $(An_{11})$  and one grain of merrillite were also identified. The meteorite is classified as an H5 chondrite.

Sample No.:

ALHA77292

Location: Allan Hills

Field No.:

78010211A

Field Contamination Category: Not Known

Weight (gms):

199.6

Meteorite Type: L6 Chondrite

### Physical Description:

This is not a complete specimen. The T surface is less severely weathered than any of the remaining surfaces. The N surface has remnants of dull black fusion crust. The surfaces devoid of fusion crust are stained reddish-brown by iron oxidation and are rough. On fractured surfaces it appears as if rounded and irregular inclusions are present in the sample. This sample appears macroscopically similar to ALHA77180, 218, 267, 292 and 301.

#### Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, their margins tending to merge with the granular groundmass, which consists of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron and troilite. The nickel-iron grains show a small amount of limonitic alteration. Microprobe analyses show olivine  $(Fa_{24})$ , orthopyroxene  $(Fs_{20})$ , and plagioclase  $(An_{10})$  of uniform composition. The meteorite is classified as an 16 chandrite

Sample No.:

ALHA78050

Location: Allan Hills

Field No.:

262

Weight (gms):

1045

Meteorite Type: L6 Chondrite

## Physical Description:

This is not a complete specimen. The N, T and B surfaces are fracture surfaces that are stained reddish-brown by iron-oxidation. Inclusions in the meteorite are apparent on these surfaces and patches of remnant fusion crust remain on the B surface. The fusion crust, where present, is mottled brown and black.

Unoxidized (<5%) metallic particles, and some metallic particles with oxidation halos are apparent on the sawed surfaces of the sample. Fracturing, with oxidation staining along the margins, is apparent on the W sawed face, as are small irregular inclusions.

Dimensions: 15x8x6 cm.

Petrographic Description:

Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists of olivine and pyroxene, minor subequal amounts of nickel-iron and troilite, a little plagioclase, and accessory chromite. A little limonitic staining is associated with some of the nickel-iron grains. Microprobe analyses show olivine  $(Fa_{23})$ , orthopyroxene  $(Fs_{20})$ , and plagioclase  $(An_{12})$  of uniform composition. The meteorite is classified as an L6 chondrite.

Sample No.:

ALHA78105

Location: Allan Hills

Field No.:

249

Weight (qms):

9417

Meteorite Type: L6 Chondrite

#### Physical Description:

The exterior of the sample is irregular and rough on a mm scale. The character of the exterior appears to be the result of the weathering of the fusion crust. Small patches of fusion crust remain on the B and N surfaces. Where the sample is devoid of fusion crust, light to medium gray matrix material with chondrules and lithic clasts is exposed.

When the specimen was cleaved the interior of the sample appeared greenish-gray and fine grained. Only a very small amount of a metallic mineral phase is present in the sample. One fracture that penetrates the specimen is stained by iron oxidation along the margins.

Dimensions: 11x7x6 cm.

Petrographic Description:

Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists mainly of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of limonitic staining is associated with some of the nickel-iron grains. Microprobe analyses show olivine  $(Fa_{23})$ , orthopyroxene  $(Fs_{20})$ , and plagioclase  $(An_{11})$  of uniform composition. The meteorite is classified as an L6 chondrite.

Sample No.:

ALHA78251

Location: Allan Hills

Field No.:

Allan Camp #1

Weight (gms):

1312

Meteorite Type: L6 Chondrite

### Physical Description:

The exterior of the sample is rough and irregular and macroscopically appears similar to ALHA77105. The sample is completely devoid of fusion crust.

A small piece of material has been removed from the S surface, revealing a fine grained. greenish-gray interior. Metallic particles are apparent in the interior of the sample. and some oxidation of these has occurred.

Oxidation halos around metallic particles ( $\sim 10\%$ ) are also apparent on the sawed surfaces of the sample. Several fracture are apparent with iron oxidation along their margins.

Dimensions: 12x7.5x10 cm.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, merging with the granular groundmass, which consists mainly of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron. and troilite, and accessory chromite. Limonitic staining is prominent around the nickeliron grains. Microprobe analyses show olivine  $(Fa_{23})$ , orthopyroxene  $(Fs_{20})$ , and plagioclase  $(An_{10})$  of uniform composition. The meteorite is classified as an L6 chondrite.

Sample No.:

BTNA78002

Location: Bates Nunatak

Field No.:

325 and 326

Weight (qms):

4301

Meteorite Type: L6 Chondrite

#### Physical Description:

This specimen consists of two individual pieces that fit together. Nearly the entire sample is covered with thin, dull brown fusion crust (apparently weathered) that is dotted with black fusion crust. The fusion crust appears to have been physically removed from some small areas on all surfaces and an approximately 7.0x10.0 cm area on the S surface of the sample appears to have been broken away. The areas devoid of fusion crust are light gravish-green where they are not stained by iron oxidation. A few flecks of metallic phase minerals are discernible in these areas.

The T surface of the meteorite has flow bands in the E-W direction and regmaglypts are visible on the B surface.

The plane on which this specimen broke is very flat and is 90% iron oxide stained a reddish-brown. The areas not iron oxide stained are the same greenish-gray color seen on the exterior surfaces of the sample. Some small metallic mineral flakes are visible on these fracture surfaces.

Dimensions: 20x12x14 cm.

Petrographic Description:

Brian Mason

Two polished thin sections were examined, one from BTNA78002,3 and one from BTNA78002,6. They are identical in all respects and confirm the macroscopic identification of these as two pieces of a single meteorite. Chondrules are sparse and poorly defined, merging with the granular groundmass, which consists of olivine and pyroxene, with minor maskelynite and subequal amounts of nickel-iron and troilite. A little limonitic staining is associated with the nickel-iron grains. Microprobe analyses show olivine (Fa24) and orthopyroxene (Fs<sub>20</sub>) of uniform composition; the maskelynite has CaO (2.0%) appropriate to oligoclase composition, but has deficient and variable Na<sub>2</sub>O content (3.2-6.6%). The meteorite is classified as an L6 chondrite.

Sample No.:

BTNA78004

Location: Bates Nunatak

Field No.:

324

Weight (gms):

1079

Meteorite Type: LL6 Chondrite

### Physical Description:

One surface of this sample is a fracture surface. The remaining surfaces of the sample are covered with thin (0.5 mm) dull black fusion crust. Regmaglypts are present on the N and S surfaces.

Macroscopically, the sample appears to be composed of angular, light colored clasts, surrounded by greenish-brown to gray interstitial material. The clasts comprise approximately 70% of the surface area and have a wide range in size, some are as much as 2.0 cm in diameter. Chondrules are apparent on the surfaces exposed during cleaving.

Dimensions: 12x7x7 cm.

#### Petrographic Description: Brian Mason

The section shows a granular aggregate consisting mainly of olivine and pyroxene (average grain size 0.1-0.2 mm), with minor amounts of plagioclase, nickel-iron, and troilite, and accessory chromite. Chondritic structure is barely visible in a few places, and the chondrules are somewhat fragmented. Many of the silicate grains show undulose extinction. The meteorite has a brecciated structure, and the breccia fragments are outlined by an anastomosing network of black glassy veinlets which contain numerous minute troilite globules. A small amount of limonite staining is present around some of the nickel-iron grains. Microprobe analyses show olivine  $(Fa_{30})$  and orthopyroxene  $(Fs_{24})$  of essentially uniform composition; plagioclase is somewhat variable in composition,  $\bar{A}n_{13}$ - $An_{22}$ , average An<sub>19</sub>. The black glass is quite variable in composition, as follows (range and average, in weight percent): SiO<sub>2</sub> 31.5-49.9, 40.4; Al<sub>2</sub>O<sub>3</sub> 0-6.3, 2.8; FeO 17.5-40.9, 23.9; MgO 16.7-31.3, 27.3; CaO 0-3.3, 1.6; Na<sub>2</sub>O 0-2.4,  $\overline{1}.\overline{1}$ ; TiO<sub>2</sub> 0-0.15, 0.09; MnO 0.3-0.5, 0.4. The meteorite is classed as an LL6 chondrite; it shows to a high degree the brecciation characteristic of many LL chondrites.

Sample No.:

META78001

Location: Meteorite Hills

Field No.:

323

Weight (gms):

624.4

Meteorite Type: H4 Chondrite

### Physical Description:

This sample is shaped like a boomerang and is entirely covered with fusion crust. The fusion crust on the B surface has an irridescent sheen, is much thinner than the fusion crust on the remainder of the sample, and has a well defined area of weathering, 1 cm from the edge of the sample. Remaining surfaces have dull, brownish-black fusion crust. Small regmaglypts are apparent on the T and N surfaces and flow bands are present in the B surface at the E and W ends. Small fractures exist on the T and B surfaces, but they do not appear to penetrate the specimen.

The interior material of the meteorite ranges from being completely weathered and iron oxide stained to unweathered. The weathered portions are massive and are preferentially located in the T half of the sample. The unweathered areas are light grayish-green and contain unoxidized metallic fragments.

Dimensions: 14.5x8x3 cm.

Petrographic Description:

Brian Mason

Chondritic structure barely observable, the sparse chondrules merging with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite (the nickel-iron in excess of troilite). The section shows areas of blackening which appear to be due to fine-grained troilite, possibly a shock effect. Minor limonitic staining pervades part of the section. Microprobe analyses show olivine of essentially uniform composition (Fa $_{17}$ ) and somewhat variable pyroxene (Fs $_{14}$ -Fs $_{21}$ , average Fs $_{16}$ ). The meteorite is classified as an H4 chondrite.

Sample No.:

META78002

Location: Meteorite Hills

Field No.:

334

Weight (gms):

542.2

Meteorite Type: L6 Chondrite

### Physical Description:

Thin dull black fusion crust is present on three surfaces of this pyramidal specimen. The fusion crust is pitted, apparently due to the preferential weathering of small inclusions. The T, W and B are fracture surfaces that are stained reddish-brown. Many clasts, as much as 3 mm in diameter, can be seen on the T and W surfaces.

Chipping for a suitable thin section sample revealed a greenish-gray matrix which contained metallic particles, some of which have iron oxidation halos.

#### Petrographic Description:

Brian Mason

Chondrules are sparse and poorly defined, merging with the granular groundmass, which consists of olivine and pyroxene with minor amounts of plagioclase, nickel-iron and troilite. A little limonitic staining is associated with the nickel-iron grains. Wellpreserved fusion crust, 0.6 mm thick, is present along one edge of the section. Microprobe analyses show olivine ( $Fa_{23}$ ), orthopyroxene ( $Fs_{20}$ ), and plagioclase ( $An_{10}$ ) of uniform composition. The meteorite is classified as an L6 chondrite.

Sample No.:

META78006

Location: Meteorite Hills

Field No.:

349

Weight (gms):

409.6

Meteorite Type:

H6 Chondrite

## Physical Description:

This sample is entirely covered by fusion crust and when it was removed from cold-storage ice was present on the sample. The ice looked as if it had been melted and refrozen.

The meteorite was cleaved in processing and 3/4 of the meteorite was found to be stained by iron oxidation. The remaining 1/4 of the sample is light gray and spotted with areas of iron oxidation staining. A few darker colored inclusions are present in the sample.

### Petrographic Description:

Brian Mason

Chondrules are sparse and poorly defined, merging with the granular groundmass, which consists of olivine and pyroxene with minor amounts of plagioclase, nickel-iron, and troilite (nickel-iron in excess of troilite). Brown limonitic staining and occasional grains of limonite are associated with the nickel-iron. Microprobe analyses show olivine  $(Fa_{18})$ , orthopyroxene  $(Fs_{15})$ , and plagioclase  $(An_{13})$  of uniform composition. The meteorite is classified as an H6 chondrite

Sample No.:

RKPA78001

Location: Reckling Peak

Field No.:

Reckling Peak #1

Weight (gms):

234.9

Meteorite Type: L6 Chondrite

#### Physical Description:

A thin, dull black fusion crust covers 2 surfaces of this angular sample. The other surfaces are fracture surfaces and are stained reddish-brown by iron oxidation. Several cracks appear to penetrate the specimen.

When the sample was cleaved only a very small amount of unweathered material was observed. This material is grayish in color. No inclusions were discernible.

Dimensions: 9x5x4.5 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. One edge is bordered by a small amount of fusion crust. Some limonite is present, usually in association with nickel-iron. The section is cut by a dark glassy veinlet, about 0.05 mm thick; clear isotopic material in this veinlet is tentatively identified as ringwoodite and majorite. Microprobe analyses show olivine (Fa23) and orthopyroxene (Fs<sub>20</sub>) of uniform composition; the maskelynite has CaO content (2.4%) appropriate to oligoclase composition, but has deficient and variable Na O content (3.4-6.2%). Accessory merrillite was identified with the microprobe. The meteorite is classified as an L6 chondrite.

Sample No.:

RKPA78003

Location: Reckling Peak

Field No.:

Reckling Peak #3

Weight (gms):

1276

Meteorite Type: L6 Chondrite

### Physical Description:

This sample was found in Antarctica as two individual pieces, which fit together perfectly. All surfaces with the exception of 2 are covered with thin, dull black fusion crust. The surfaces devoid of fusion crust have weathered a deep reddish-coppery-brown, as have the two surfaces that fit together. The W butt end has a clast, ∿1 cm in diameter, that appears to be troilite.

Upon chipping the meteorite to obtain a suitable thermoluminescence sample, the interior of the specimen was exposed, revealing weathered surfaces composed of very dark gray and very light gray matrix material, possibly the result of weathering processes.

#### Brian Mason Petrographic Description:

This thin section is indistinguishable from that of RKPA78001, both in texture and mineral composition. It contains maskelynite of similar variable composition, and includes a veinlet like that in RKPA78001, again with material tentatively identified as ringwoodite and majorite. The meteorite is an L6 chondrite. RKPA78003 and RKPA78001 are presumably pieces of a single meteorite.

Sample No.:

RKPA78004

Location: Reckling Peak

Field No.:

Reckling Peak #4

Weight (qms):

166.9

Meteorite Type: H4 Chondrite

#### Physical Description:

All but one surface of the sample is covered with thin, dull black fusion crust, although portions of the fusion crust on another surface appear to have been physically plucked away. The portions of the sample devoid of fusion crust are shiny reddish-brown. Chipping this small stone was impossible. Sawing revealed an interior with many clasts discernible in the dark gray matrix. Metallic fragments are present. On the cut face of the sample it appears that the inclusions in the meteorite have a more dense population around the circumference of the sample, from the exterior margin to a depth of approximately 1 cm.

#### Petrographic Description: Brian Mason

Chondritic structure is well developed, but many of the chondrules appear to be deformed or broken. The groundmass consists of finely granular olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Well-preserved fusion crust is present along one edge of the section. Brown limonitic staining pervades the section, and veinlets and patches of limonite are present. Microprobe analyses show olivine of essentially uniform composition (Fa<sub>17</sub>) and pyroxene of somewhat variable composition (Fs<sub>14</sub>-Fs<sub>21</sub>, average Fs<sub>16</sub>); some analysed spots within the pyroxene grains show up to 15% CaO, suggesting exsolution of diopsidic pyroxene. The meteorite is classified as an H4 chondrite.