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METEORITE NEWS

JAPANESE COLLECTION OF ANTARCTIC METEORITES

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Sample Request Deadline

Sample requests that are received by the curator before **July 10, 2000**, will be reviewed by the Committee on Antarctic Meteorite Research (CAMR) holding in end of July. Requests that are received after the July 10 deadline may be delayed for review until the CAMR in **February, 2001**.

All sample requests should made in writing to:

Dr. Hideyasu Kojima
Meteorite Curator
Antarctic Meteorite Research Center
National Institute of Polar Research (NIPR)
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173-8515
Japan
FAX: 81-3-3962-5711
E-mail: curator@nipr.ac.jp

Available information such as NIPR Sample Allocation Policies and Request Form is also shown in following web site.

http://yamato.nipr.ac.jp/AMRC/index.html

New Lunar Meteorite

Sample No.: Yamato 981031
Location: Minami-Yamato Nunataks
Dimensions (cm): 6.9x4.6x3.8
Weight (g): 185.8
Weathering: A/B
Fracturing: B
Meteorite Type: Lunar Anorthositic breccia

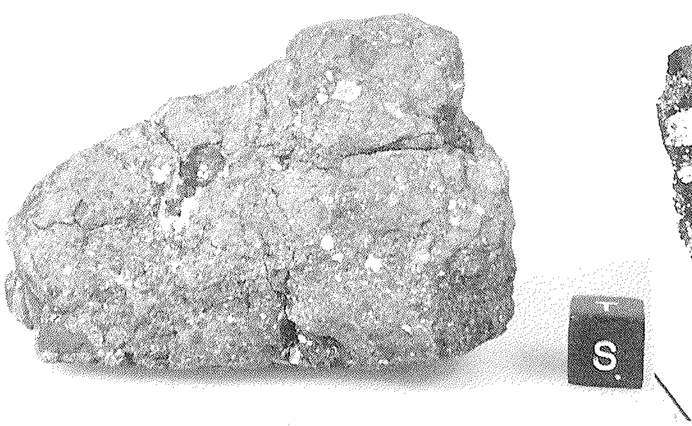
Macroscopic Description

This lunar meteorite is approximately complete stone. The rock has some thin, yellow-green fusion crust. The outer surface consists of dark grey matrix with abundant millimeter sized clasts. Two large white clasts (10x7, 11x3 mm) are observed. Those are friable. 2/3 of original mass of both two have already been missing.

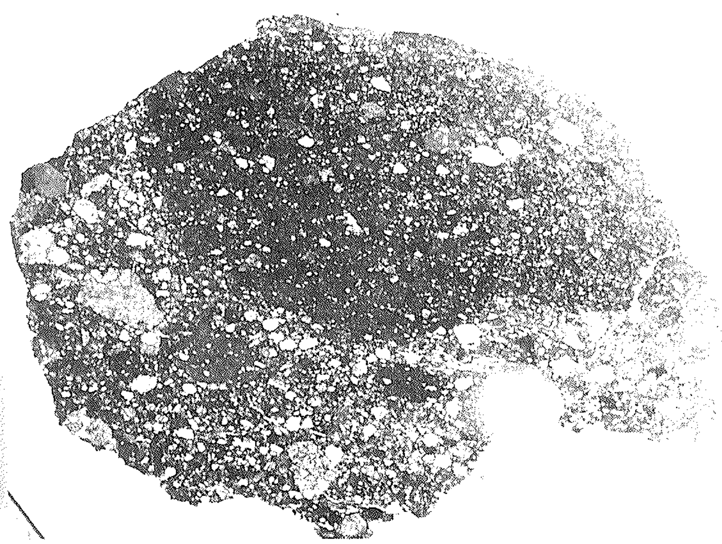
Petrographic Descriptions

A thin section (15 mm width) shows a polimict regolith breccia with feldspar rich lithic and mineral clasts set in a dark matrix. Glass spherules and glass fragments are also observed. Microprobe analyses show that the pyroxene ranges En63.1Fs30.4Wo6.5 to En18.7Fs55.1Wo26.2. Plagioclase composition is An97.4-85.4 with one albite rich one (Ab46.7). Olivine ranges Fo68.7-59.2. The FeO: MnO ratio of pyroxenes is high, 82.1-40.3 characteristic of lunar material. Following is bulk chemical compositions of the meteorite. (analyst: Haramura H.)

SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	Cr2O3	Total
44.88	0.71	18.44	0.00	12.43	0.20	9.42	12.85	0.34	0.04	0.13	0.26	99.70



Cube = 1 cm



Plane polarized light, 15 mm width

INTRODUCTION

Classification and Description of Antarctic Meteorites

The Japanese collection of Antarctic meteorites increases in number up to about 13000 as of 2000, but a large number of the meteorites are not yet classified. In order to classify the Antarctic meteorites belonging to the National Institute of Polar Research (NIPR, Tokyo), the organization of Meteorite-Classification Committee was approved by NIPR on January 23, 1992, and set up in NIPR. The Committee consists of 10 members, and most of them are petrologists working on meteorites. The chairperson and vice chairperson are H. Takeda and H. Kojima, respectively.

First, the Committee assigned the role to the members for the classification as follows:

Macroscopic description of meteorite;
    H. Kojima and N. Imae

Microscopic description and classification of chondrites;
    Y. Ikeda, M. Kimura, T. Noguchi, H. Nagahara, H. Fujimaki, A. Tsuchiyama and H. Kojima

Microscopic description and classification of achondrites and stony irons;
    Y. Ikeda and H. Takeda

Classification of irons;
    Y. Ikeda and K. Misawa

Secondly, the Committee decided not to follow the traditional way of meteorite description which has been written in sentence such as those in past METEORITES NEWS (NIPR) or Antarctic Meteorite NEWSLETTER (NASA), and decided to present the classification and description as a table (see Table 2). In order to do this, the Committee made a manual format (Table 1), by which each member carries out the microscopic description and classification by checking all of the articles. Table 1 consists of GENERAL DESCRIPTION (articles 1-1 to 1-7), MACROSCOPIC DESCRIPTION (2-1 to 2-8), MINERAL COMPOSITIONS (3-1 to 3-3), and MICROSCOPIC DESCRIPTION (4-1 to 11). Most of articles in the mineral composition and microscopic description were set up mainly for classification of chondrites, because about 90% of Antarctic meteorites are chondrites. Therefore, these articles in Table 1 are not enough for classification of achondrites and stony-irons, and detailed description for these meteorites will be presented as comments in article 11 (Table 3).

Thirdly, the Committee decided to start the classification of Yamato-79 series, because this series includes 4093 meteorites most of which are not classified.

This is the third report of the Committee to present the classification of about 200 Antarctic meteorites mainly ranging from Yamato-791600 to Yamato-791962 thin sections of which were ready. Hereafter, the Committee will continue to present new results as soon as possible.

The Committee will make a data base for description and classification of Antarctic meteorites belonging to NIPR, which include all data given by the Committee. All of the data will be available to all meteorite researchers who request it.

Table 1. The manual format for classification and description of Antarctic meteorites.
Select one or two heads for each article in MACROSCOPIC and MICROSCOPIC DESCRIPTIONS.

Articles	with or without heads

GENERAL DESCRIPTION

1-1 Meteorite name
1-2 Group and type
1-3 Weight of meteorite in grams
1-4 Dimension in cm
1-5 No. of thin section used for classification
1-6 Tentative pairing due to the field occurrence
1-7 Bulk chemistry; Is there the major element chemical composition?

MACROSCOPIC DESCRIPTION (observation by naked eyes)

2-1 Degree of fragmentation; what is the degree?
1: complete, 2: half, 3: fragment
2-2 Shape of meteorite; how is the shape?
1: rounded, 2: subrounded, 3: angular, 4: other
2-3 Fusion crust; how much is the fusion crust in a real percent of the surface?
1: complete(>80%), 2: half(80-20%), 3: less(<20%), 4: free
2-4 Evaporite; is it recognized on the meteorite surface?
1: free, 2: slight, 3: remarkable
2-5 Fracturing index; what is the degree?
1: A(free), 2: A/B, 3: B(moderate), 4: B/C, 5: C(remarkable)
2-6 Interior structure; how is the structure?
1: massive, 2: porous, 3: breccia, 4: other
2-7 Interior color; what is the color?
1: black, 2: brown, 3: brassy, 4: green, 5: gray, 6: other
2-8 Xenolithic clast; is it recognized?
1: free, 2: rare, 3: many

MINERAL COMPOSITION (using an EPMA)

3-1 Average composition of olivine in fayalite mole% and the range
3-2 Average composition of low-Ca pyroxene in ferrosilite mole% and the range
3-3 Average composition of plagioclase in anorthite mole% and the range

MICROSCOPIC DESCRIPTION (observation under microscope)

MODE AND CHONDRULE SIZE

4-1 Fine-grained matrix in volume %; the matrix in chondrites is defined to be aggregates of minerals smaller than several microns across. Then, chondrule fragments and isolated mineral fragments, which are larger than about 10 microns across, are excluded.
1: free, 2: <20%, 3: 20-50%, 4: 50-80%, 5: >80%, 6: pass
(select 1 for equilibrated chondrites, 6 for achondrites and stony-irons)

4-2 Chondrule average diameter in mm; apparent sizes of a few tens of chondrules were measured for unequilibrated chondrites with petrologic types 2 and 3.
1: free, 2: <0.4mm, 3: 0.4-0.9mm, 4: >0.9mm, 5: pass
(select "pass" for equilibrated chondrites, achondrites and stony-irons, and "free" for CI group)

4-3 Modal ratios of metal and sulfide were estimated under a microscope; metal is taken as a total of metal and limonite.
1: metal is more, by a factor of 2 or more, than sulfide.
2: metal is nearly equal to sulfide.
3: metal is less, by a factor of 2 or more, than sulfide.
4: magnetite is identified.
5: chromite or ilmenite is the major opaque mineral.
6: graphite is identified.
7: no opaque mineral.

CRYSTALLINITY OF CHONDRULE GROUNDMASS

5-1 Metamorphic plagioclase (or maskelynite) grains, larger than several microns across, is identified under a microscope; igneous plagioclase which crystallized directly from chondrule residual melts is excluded.
1: not present, 2: present but minor, 3: common, 4: pass (select "pass" for achondrites and stony-irons)

5-2 Crystallinity of chondrule groundmass; for the case of chondrites, the following number corresponds roughly to the petrologic types.
1: free from chondrule. (CI group)
2: phyllosilicate is identified in chondrule groundmass. (CM group etc.)
3: clean glass, as well as devitrified or cryptocrystalline groundmass, is observed in chondrule groundmass. Except shock-induced glass and fusion-crust glass. (petrologic type 3)
4: no glass, but most are devitrified or cryptocrystalline. (petrologic type 4)
5: recrystallized groundmass, including metamorphic plagioclase larger than several microns across, as well as devitrified and cryptocrystalline ones, is observed. (petrologic type 4)
6: recrystallized groundmass, commonly including plagioclase, is common, but devitrified and cryptocrystalline ones are not observed. (petrologic type 6)
7: chondrules outlines disappear by recrystallization. (petrologic type 7)
8: pass for achondrites and stony-irons.

SHOCK FEATURE

6-1 Olivine extinction; how many large olivine grains show undulatory extinction under crossed Nicols in grain number %.
1: olivine-free,
2: <20%,
3: >20%,
4: mosaic extinction of olivine, as well as undulatory one

6-2 Crack and opaque vein;
1: free,
2: crack, thinner than a few microns, is observed,
3: opaque vein, wider than a few microns, is observed,
4: brecciated vein, including many mineral and/or rock fragments, is observed

6-3 Shock-darkened and shock-melt pockets, or partially melt glass;

1: free,

2: shock-darkened pocket is observed,

3: shock-melt pocket is observed,

4: meteorite experienced partial melting, and glass due to the melting occurs locally but not as pockets.

6-4 Degree of shock;

1: slight, corresponding to 1 or 2 for the terms 6-1, 6-2, and 6-3.

2: moderate, corresponding to 3 for the term 6-1 or 6-2, or both.

3: heavy, corresponding to 4 for the term 6-1, 4 for the term 6-2, or 3 or 4 for the term 6-3.

BRECCIA

7 1: non-breccia, including chondrites with brecciated veins.

2: monomict breccia

3: fine-grained massive breccia consisting mainly of fine-grained silicates of several to a few tens of microns, often including metal-sulfide spherules.

4: polymict breccia, including clasts of different groups or petrologic types.

INCLUSION AND XENOLITH

8 Ca- and Al-rich inclusion (CAI), amoeboid olivine inclusion (AOI), or xenolith is observed or not.

1: not,

2: CAI or AOI is observed,

3: xenolith is observed

TERRESTRIAL WEATHERING

9-1 Limonite veins are observed or not.

1: not,

2: minor; vein narrower than 50 microns is observed,

3: remarkable; vein wider than 50 microns is observed

9-2 Staining is estimated by the proportion of yellow or brown area in percents.

1: free, 2: slight(<20%), 3: remarkable(>20%)

9-3 Weathering Degree is estimated by the method of Ikeda and Kojima (1991, Proceedings Of NIPR Symp. Antarc. Meteor. No. 4, 307-318) for chondrites; volume ratios of limonite to metal in a metal-limonite grain are measured for large grains under a microscope, and they are averaged to obtain the weathering index.

A: <7.5%, A/B, B: 7.5%-35%, B/C, C: >35%, pass ("pass" is for meteorites free of metal grains)

FUSION CRUST

10 Fusion crust is observed under a microscope or not. If any, the average width of crust (fusion-glass zone + opacitized zone) is measured.

1: free, 2: thin(<0.5mm), 3: thick(>0.5mm)

NOTEWORTHY DESCRIPTIONS

11 Comments noteworthy to describe are given in sentences, and they are summarized in Table 3.

===

Table 2. Classification of Antarctic Meteorites from Yamato-791001 to Yamato-79XXXX.

Meteorite	1-1	791001	791002	791003	791004	791005
Group, Type	4-4					
	5-3					
Weight (g)	1-3					
Dimension (cm)	1-4					
Thin section	1-5					
Tent. Pairing	1-6	no				
Bulk Comp.	1-7	no				
Fragmentation	2-1					
Shape	2-2					
Fusion	2-3					
Evaporite	2-4					
Fracturing	2-5					
Structure	2-6					
Color	2-7					
Xenolith	2-8					
Ol (Fa Mole%) Range	3-1	(	)			
Low-Ca Pyx Range	3-2	(	)			
Pl Range	3-3					
Matrix	4-1	1				
Chond. Size	4-2	5				
Metal, Sulf.	4-3	1				
Pl	5-1	1				
Groundmass	5-2	4				
Ol-extinct.	6-1	2				
Crack, Vein	6-2	1				
Shock pocket	6-3	1				
Shock Degree	6-4	1				
Breccia	7	1				
CAI, Xenolith	8	1				
Limonite	9-1	3				
Staining	9-2	3				
Weath. Index	9-3	B				
Fusion Crust	10	1				
Comments	11	no				

Table 3. Comments for Articles 1-6 (tentative pairing) and 11(noteworthy descriptions) in Table 2.

Meteorite	Comments
Y-79XXXX:	
Y-79YYYY:	
Y-79ZZZZ:	

REQUIREMENTS AND PROCEDURES FOR RESEARCH USING THE JAPANESE NIPR ANTARCTIC METEORITE COLLECTION

Requests for research samples are welcome from all qualified scientists. In general, requests are reviewed and considered by the Committee on Antarctic Meteorite Research (CAMR) of the National Institute of Polar Research (NIPR), which meets one to two times each year. Consortium-type sample requests may also be submitted. After a request is approved, samples are sent to the researcher from the Curator of Antarctic Meteorites, NIPR.

NIPR SAMPLE ALLOCATION POLICIES

I. Basic guidelines for allocation of meteorites at NIPR

1. All samples are provided on a loan basis, and remain the property of NIPR.
2. The pristine mass of the meteorite other than small rare meteorites after allocation must be at least 2/3 of the original mass. Pristine mass is defined as that portion of a specimen which has never been allocated, after initial polished thin section (PTS) preparation.
3. The pristine mass of small rare meteorites (less than 50 grams) after allocation must be at least 80% of the original mass. Rare meteorites are defined as meteorites other than type 4-6 ordinary chondrites, including rare type portions of large meteorites.
4. Allocations of any rare meteorite should generally be limited to samples less than 1 gram.
5. The term of the PTS loan will be for no more than 12 months. PTS should be returned promptly upon completion of the proposed research period.
6. PTS of any small meteorite (less than 5 grams) will not be, in general, loaned out but will be available for on-site use by scientists visiting NIPR.
7. Allocations will not be allowed until the meteorite has been announced and typed (classified) in a published issue of Meteorite News or an NIPR catalog.
8. Allocation from any meteorite that is under consortium study will generally not be permitted.
9. Investigators are strongly encouraged to limit requests to not more than 10 samples per request/review cycle. Higher numbers of samples may be approved, but in general, only 10 samples will be eligible for expeditious allocation processing. Investigators who request more than 10 samples should designate a subset for high-priority processing. A request for a chip for analysis plus a corresponding thin section for petrologic study of the same meteorite or clast will generally be counted as a single request, in relation to the 10-sample limit.
10. Investigators are encouraged to use NIPR sample request forms. However, all sample requests that fully comply with the following guidelines will receive careful consideration. Requests should consist of three parts:
    a. Background information: title of the research project; for the requesting scientist, his or her name, affiliation and position (e.g., University of Paris, Professor), and office address, including phone and preferably FAX and email; and for any coinvestigators, their name, affiliation, and position.
    b. A text section, explaining the general nature and purpose of the proposed research, and including details on the justification for each individual sample request.
    c. A summary table, with columns for each of the following information categories:
        (1) Specimen name (e.g., Yamato-86032, or Y-86032).
        (2) Preferred weight (the weight of sample you believe is justified for the proposed research).

(3) Minimum weight (estimated weight below which the proposed research would not be worth pursuing; in general, approved allocations will be at or very near the *preferred* weight).
(4) An instruction regarding preferred sampling site (e.g., fusion crust, inner part, outer part, central, etc.).
(5) Sample form (e.g., single chip, cube, plate, fragments, many grains, powder, PTS, etc.).

II. Guidelines for expedited allocation by the Curator of the NIPR

The following guidelines set forth the conditions under which the Curator of Antarctic Meteorites at NIPR can allocate samples without review and approval by the CAMR. If the Curator has any doubt about the allocation of any sample, the request should be referred to CAMR.

1. Allocation of polished thin sections except for destructive analysis
   The original mass of the meteorite must be larger than 5 grams for type 4-6 ordinary chondrites or over 10 grams for all other meteorites.
2. Allocation of samples in a form other than PTS
   a. The total available pristine mass of the meteorite at NIPR must be larger than 20 grams for type 4-6 ordinary chondrites or over 50 grams for all other meteorites.
   b. Allocations of up to 5 grams or 1 weight % of the original mass of type 4-6 ordinary chondrites (whichever is less) can be made by the Curator.

SAMPLE DISTRIBUTION

1. Sublease (transfer) of sample is not permitted, except to persons listed as coinvestigators on the written request for samples. If sublease to a person not originally listed as coinvestigator becomes necessary, a new written request must be submitted to the Curator of Antarctic Meteorites.
2. Promptly upon completion of the proposed research, unused or remaining meteorite samples must be returned to the Curator of Antarctic Meteorites, NIPR.

REPORTING RESULTS

1. Research results should be reported promptly, preferably by presentation at the annual NIPR Symposium on Antarctic Meteorites, and/or full-length publication in the Proceedings of the NIPR Symposium on Antarctic Meteorites. The Symposium is held once each year, customarily in early June. Papers submitted to the Proceedings are evaluated by the Editorial Committee of the NIPR, guided by two reviews for each paper.
2. For the reference of the Curator of Antarctic Meteorites, investigators are requested to send three copies of each full-length paper published on allocated samples, and one copy of each abstract about them, to the Curator. Reference copies of articles and abstracts published through NIPR are not necessary.

Mail requests to:

Dr. Hideyasu Kojima
Curator, Antarctic Meteorite Research Center
National Institute of Polar Research (NIPR)
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173-8515, Japan
Phone: (81) 03-3962-2938, FAX: (81) 03-3962-5711
E-mail: curator@nipr.ac.jp

Send requests to: Antarctic Meteorite Research Center, National Institute of Polar Research, 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173-8515, Japan, Phone (81) 03-3962-2938, FAX (81) 03-3962-5711, E-mail curator@nipr.ac.jp No.

NIPR Research Program for Antarctic Meteorites

Research project:

Date: Period of the project (months):

Principal investigator

Name: Signature ______________________

Affiliation & position:

Office address:

Phone: ext. FAX:

E-mail:

Coinvestigator(s)

Name(s):

Affiliation(s) & position(s):

Description of research plan and justification for sample request:

(continue)

	specimen name	preferred weight	minimum weight	sampling instructions	sample form
	(e.g., Y-86032)	(e.g., 0.25 g)	(e.g., 0.1 g)	(e.g., interior)	(e.g., chip(s))
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

received

Send requests to: Antarctic Meteorite Research Center, National Institute of Polar Research, 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173-8515, Japan, Phone (81) 03-3962-2938, FAX (81) 03-3962-5711, E-mail curator@nipr.ac.jp No.

received

General	*Meteorite*	1-1	Y-791058	Y-791336	Y-791497	Y-791538
	Group & Type	1-2	Stony-iron	H4	How	Ure
	Weight (gr.)	1-3	19.46	1.47	7.04	419.03
	Dimension (cm)	1-4	3.0x1.8x1.6	1.2x0.9x0.7	2.3x1.8x1.8	8.0x5.3x4.8
	Thin Section No.	1-5	51-1	51-1	51-1	71-1
	Tent. Pairing	1-6		no		no
	Bulk Comp.	1-7	no	no		yes
Microscopic	*Fragmentation*	2-1	1	1	3	1
	Shape	2-2	2	3	3	3
	Fusion Crust	2-3	4	1	2	2
	Evaporite	2-4	1	1	1	2
	Fracturing	2-5	A/B	A	B	A/B
	Structure	2-6	1	1	1	1
	Color	2-7	5	5	5	2
	Xenolith	2-8	1	1	1	1
Mineral Comp.	*Olivine, Fa*	3-1	4.4	18.0		
	Ol. Range		4.0-4.9	17.4-19.1	33.4-51.6	7.1-8.7
	Low-Ca Pyx., Fs	3-2	6.8	16.4		
	Pyx. Range		5.4-7.6	14.8-22.3	16.0-56.9	7.2-7.6
	Plagioclase, An	3-3				
	Pl. Range		12.2-15.8		89.0-95.4	
Microscopic	*Matrix*	4-1	6	1	6	6
	Chond. Size	4-2	5	5	5	5
	Metal, Sulfide	4-3	1	1	5	6
	Meta. Pl	5-1	4	1	4	4
	Chondrule Gdm	5-2	8	4	8	8
	Ol-extinct.	6-1	2	3	5	2
	Crack, Vein	6-2	1	2	5	5
	Shock Pocket	6-3	1	2	5	5
	Shock Degree	6-4	1	2	2	2
	Breccia	7	1	1	4	1
	CAI, Xenolith	8	1	1		
	Limonite	9-1	3	2	1	2
	Staining	9-2	3	3	2	2
	Weath. Index	9-3	pass	B	pass	pass
	Fusion Crust	10	1	2	1	1
	Comments	11	no	no	yes	yes

General	Meteorite	1-1	Y-791573	Y-791602	Y-791603	Y-791604
	Group & Type	1-2	How	H6	Dio	H5
	Weight (gr.)	1-3	134.33	3.35	5.09	297.44
	Dimension (cm)	1-4	5.8x4.0x3.6	1.2x1.1x1.0	1.5x1.4x1.2	7.2x5.6x4.4
	Thin Section No.	1-5	81-3	51-1	52-1	71-1
	Tent. Pairing	1-6			yes, Y-75032	
	Bulk Comp.	1-7	yes		no	
Macroscopic	Fragmentation	2-1	1	1	3	2
	Shape	2-2	2	2	2	2
	Fusion Crust	2-3	2	4	3	4
	Evaporite	2-4	1	1	1	1
	Fracturing	2-5	A/B	A	A	B
	Structure	2-6	1	1	1	1
	Color	2-7	5	2	1	2
	Xenolith	2-8	1	1	1	1
Mineral Comp.	Olivine, Fa	3-1		18.8		18.6
	Ol. Range		11.0-24.8	18.2-19.6		15.7-19.6
	Low-Ca Pyx., Fs	3-2		16.6		16.1
	Pyx. Range		13.9-63.3	15.6-19.0	29.3-32.8	15.8-16.5
	Plagioclase, An	3-3				
	Pl. Range		81.4-95.2		88.9-92.0	
Microscopic	Matrix	4-1	6	1	6	1
	Chond. Size	4-2	5	5	5	5
	Metal, Sulfide	4-3	5	1	5	1
	Meta. Pl	5-1	4	3	4	2
	Chondrule Gdm	5-2	8	6	8	5
	Ol-extinct.	6-1	5	2	5	3
	Crack, Vein	6-2	5	1	4	2
	Shock Pocket	6-3	5	1	4	1
	Shock Degree	6-4	2	1	3	2
	Breccia	7	4	1	2	1
	CAI, Xenolith	8		1		1
	Limonite	9-1	1	2	1	3
	Staining	9-2	2	3	1	3
	Weath. Index	9-3	pass	B	pass	C
	Fusion Crust	10	1	2	1	1
	Comments	11	yes	no	yes	no