

FREER GALLERY OF ART
RECORD OF LABORATORY EXAMINATION

Number: 19.46
Location: I-GG-22
Date in:

Category: Jade Object: Cylindrical ring
Attribution: Chinese; date: ~~How~~ Neolithic
Owner: FGA

Reason for Examination: Prior to exhibition
Color(s):) see FS
veining:) see FS

Examiner: EWF
Date begun: 7/28/80

*Hardness: 6.5 (hardest area)

Mineral identification

Provisional (from appearance & hardness): Nephrite

Certain (from X-ray diffraction)

~~XXXXXXXXXX~~ Film # Date:)

Working; any evidence:
if hole, drilled from 1 side:
2 sides:

Condition

Breaks: one crack (noted on FS), goes completely through
Repairs: no
Alteration: no
a few chips on edge

Incrustation: no

over →

Special handling needed: No

Weight:

Accessories received:

Inscriptions, seals etc:

Distinguishing marks: Incised decoration

*Hardness: Nephrite: 6-6.5
Jadeite: 6.5-7

CARDS 9-25-80
SUMMARY 8/4/80
VAULT CARD
or 8/4/80
FOLDER SHEET

10/13/82

Identification of mineral by X-ray diffraction
requested by J. Murray

Mineral is pale greenish-white, with some
dark brown areas which might
represent part of the rind of a boulder

All areas have hardness 6.5

Pale greenish-white sampled to right of accession #
for X-ray diffraction

Film F2898, Nephrite (Actinolite)

CARDS	<input type="checkbox"/>	
SUMMARY	<input checked="" type="checkbox"/>	10/22/82
VAULT CARD	<input checked="" type="checkbox"/>	
OF		X 10/22/82
FOLDER SHEET		

Jade Material - Observations and analysis

LRN:

Accession No. F19.46

Period Neolithic
Culture Liangzhu

Checklist name Bracelet

Object term

Mineral(jade) nephrite
Color light green, yellowish green with brown patches
Hardness + (discoloration parts are lower than blade) (Sampling showed the jade to be hard -JD)
Texture fine massive nephrite with dark brown patches
Mineral Inclusions none
Veining features -
Burned surface -

<u>Translucency</u>	++/-	<u>Munsell-Unaltered</u>	2.5GY8/6
<u>Color</u>	+	<u>Munsell-Altered</u>	-
<u>Luster</u>	+	<u>Munsell-discoloration</u>	10YR3/2
<u>Class of Alteration</u>	I		

XRD

FTIR sample taken Nov.7,95 D-W; 4/30/97-JD; no res. 12/5/98

SEM sample taken Nov.7,95 D-W;4/30/97-JD

FTIR done

SEM done

Fe to Fe+Mg ratio

Si sample possible

Sample location at the boarder with discoloration. Resampling of approx. 1 mg for FTIR and small sample for SEM of unaltered clean greenish-yellow jade done along inside edge of rim at lower area near brown area.

XRF Data

<u>SiO2</u>	56.17	<u>MnO</u>	0.056
<u>CaO</u>	12.139	<u>FeO</u>	0.441
<u>K2O</u>	0	<u>Cr2O3</u>	0.043
<u>TiO2</u>	0.051	<u>NiO</u>	0
		<u>MgO.Al2O3</u>	31.1

Comments discoloration at the boarder of one side only
discoloration is a thin layer at the surface only

Date in 9
Date mod 12/22/98

F19.46.

EDXRF ANALYSIS
SPECTRACE INSTRUMENTS

JADE/Spectrum #241

PROCEDURE : NEPHRITE - HE
FILTER USED : NO FILTER
ATMOSPHERE : AIR
COUNT RATE RANGE : MED
ANALYSIS METHOD : FUN. PARAMS.

TUBE VOLTAGE : 15 KV
TUBE CURRENT : 0.99 MA
LIVETIME : 100 SEC
PRESET COUNT : 0 K

TIME : 3:02 am

DATE : 10/31/95

SAMPLE	ELEMENT	CONCENTRATION	ERROR
F19.46.1	SiO2	56.170 %	+/- 0.4726
	K2O	N D	
	CaO	12.139 %	+/- 0.0750
	TiO2	0.051 %	+/- 0.0122
	CR2O3	0.043 %	+/- 0.0086
	MNO	0.056 %	+/- 0.0068
	FeO	0.441 %	+/- 0.0105
	NiO	N D	
	C	0.000 ADDED	
	MGO	31.100 DIFF	

uno there d area

1719.46

JADE / Spectrum #242 EDXRF ANALYSIS
SPECTRACE INSTRUMENTS

PROCEDURE : NEPHRITE - HE
FILTER USED : NO FILTER
ATMOSPHERE : AIR
COUNT RATE RANGE : MED
ANALYSIS METHOD : FUN. PARAMS.
TUBE VOLTAGE : 15 KV
TUBE CURRENT : 0.99 MA
LIVETIME : 100 SEC
PRESET COUNT : 0 K

TIME : 3:06 am

DATE : 10/31/95

SAMPLE	ELEMENT	CONCENTRATION	ERROR
F19.46.2	SI02	52.027 %	+/- 0.4703
	K2O	N D	
	CAO	11.206 %	+/- 0.0726
	TIO2	0.051 %	+/- 0.0116
	CR2O3	0.021 %	+/- 0.0081
	MNO	0.075 %	+/- 0.0063
	FE0	0.375 %	+/- 0.0101
	NIO	N D	
	C	0.000 ADDED	
	MGO	36.245 DIFF	

unaltered area

F19.46

EDXRF ANALYSIS
SPECTRACE INSTRUMENTS

JADE/Spectrum #243

PROCEDURE : NEPHRITE - HE
FILTER USED : NO FILTER
ATMOSPHERE : AIR
COUNT RATE RANGE : MED
ANALYSIS METHOD : FUN. PARAMS.

TUBE VOLTAGE : 15 KV
TUBE CURRENT : 0.99 MA
LIVETIME : 100 SEC
PRESET COUNT : 0 K

TIME : 3:10 am

DATE : 10/31/95

SAMPLE	ELEMENT	CONCENTRATION	ERROR
F19.46.3	SI02	62.278 %	+/- 0.4778
	K2O	0.034 %	+/- 0.0290
	CAO	13.363 %	+/- 0.0791
	TIO2	0.084 %	+/- 0.0129
	CR2O3	0.034 %	+/- 0.0092
	MNO	0.083 %	+/- 0.0072
	FE0	0.604 %	+/- 0.0124
	NIO	N D	
	C	0.000 ADDED	
	MGO	23.520 DIFF	

brown area around rim

EDXRF ANALYSIS
SPECTRACE INSTRUMENTS

PROCEDURE : NEPHRITE - HE
 FILTER USED : NO FILTER
 ATMOSPHERE : AIR
 COUNT RATE RANGE : MED
 ANALYSIS METHOD : FUN. PARAMS.

TUBE VOLTAGE : 15 KV
 TUBE CURRENT : 0.77 MA
 LIVETIME : 200 SEC
 PRESET COUNT : 0 K

TIME : 11:29 am

DATE : 4/30/97

SAMPLE	ELEMENT	CONCENTRATION	ERROR
F19.46.1	STOP	56.216 %	+/- 0.1623
	K2O	N D	
	CaO	14.217 %	+/- 0.0318
	TiO2	0.072 %	+/- 0.0048
	CR2O3	0.046 %	+/- 0.0036
	MNO	0.088 %	+/- 0.0028
	FeO	0.516 %	+/- 0.0043
	NiO	N D	
	C	0.000	ADDED
	NSO	23.846	DIFF

Duplicate analysis

F19.46

EDXRF ANALYSIS
SPECTRACE INSTRUMENTS

PROCEDURE : NEPHRITE - HE
FILTER USED : NO FILTER
ATMOSPHERE : AIR
COUNT RATE RANGE : MED
ANALYSIS METHOD : FUN. PARAMS.

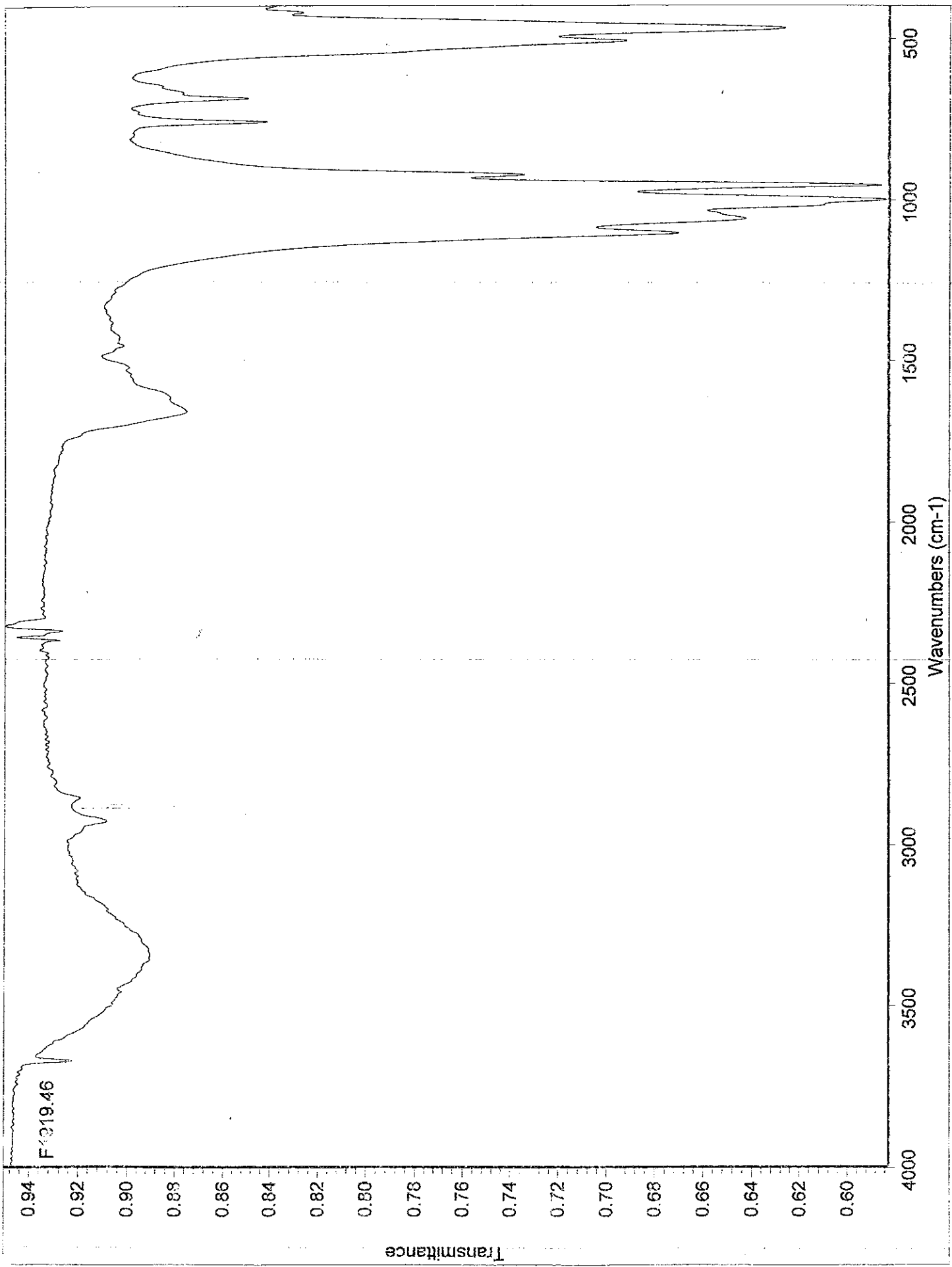
TUBE VOLTAGE : 15 KV
TUBE CURRENT : 0.99 MA
LIVETIME : 200 SEC
PRESET COUNT : 0 K

TIME : 11:35 am

DATE : 4/30/97

SAMPLE	ELEMENT	CONCENTRATION	ERROR
F19.46.2	SiO2	57.711 %	+/- 0.1638
	K2O	0.136 %	+/- 0.0115
	CaO	14.953 %	+/- 0.0328
	TiO2	0.090 %	+/- 0.0050
	CR2O3	0.046 %	+/- 0.0037
	MNO	0.083 %	+/- 0.0029
	FeO	0.774 %	+/- 0.0051
	NiO	N D	
	C	0.000 ADDED	
	MGO	26.208 DIFF	

Duplicate analysis



IR Analysis Wen, G 1997