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SPP Number 133
Revision number

OFFICE OF THE CURATOR

SAMPLE PROCESSING PROCEDURE

SPLITTING, POLISHING AND PREPARATION OF POLISHED THIN SECTIONS OF SECONDARY ENCAPSULATED LUNAR DRIVE TUBES

1.0 PURPOSE

This procedure defines steps to be taken in splitting, polishing and preparation of polished thin sections of secondary encapsulated lunar drive tubes in the Thin Section Laboratory (TSL) in the Lunar Curatorial Laboratory (LCL) at JSC.

2.0 RESPONSIBILITY

The responsibility for continued proper adherence to this procedure lies with the TSL NSI Supervisor. This procedure will be monitored by the Curator or Curator's Representative.

3.0 QUALITY

The provisions of the procedure are subject to quality inspection as prescribed in the most recent edition of the Lunar Curatorial Laboratory Quality Control Plan.

4.0 SAFETY

4.1 Flammables are used in this procedure, all precautions should be used to keep all flammable material in closed containers when not in use. When using keep all flames or other ignition devices away from general work area.

4.2 During curing and following hardening, the epoxy is fammable when contacted by an intense flame for a period of five seconds or more. Hence, intense flames should not be allowed to contact the epoxy.

5.0 DEFINITIONS

5.1 Almag oil - Texaco product, used for coolant in sawing and grinding

6.0 REQUIRED EQUIPMENT

6.1 Glass or silica slides

6.2 Hot Plate

6.3 Ingram Thin Section Saw W/Almag Coolant System

6.4 Ingram Thin Section Grinder W/Almag Coolant System

6.5 Glass Plates for Lapping

6.6 1200 Grit Alumia

6.7 Ultrasonic Cleaner

6.8 190° or 200° Proof Alcohol

6.9 Bond Paper (Polishing)

6.10 Diamond Paste, 3μ, 1μ, 1/4μ, Particle Size

6.11 Plastic Boxes (Assorted Sizes)

6.12 Petrographic Scope With Transmitted and Reflected Light

6.13 Bench Top Cut-off Saw

6.14 Belt Sander with Almag Coolant System

6.15 290 and 600 Grit Silicon Carbide Cloth Belts

6.16 Kerosene

6.17 Almag Oil (Texaco)(Coolant Used in Lab)

6.18 Diamond Lap (320 Grit)

6.19 Silicon Carbide (15 micron)

6.20 Araldite 506 Resin

6.21 Versamid 140 Hardener

6.22 Balance

6.23 Polishing Table

7.0 PROCEDURE

7.1 Splitting of Core

7.1.1 Upon completion of secondary encapsulation (SSP #102) check core for sharp edges and straightness. Remove any sharp edges with a smooth single cut file being careful not to chip epoxy.

7.1.2 Weigh encapsulated core and record weight on F-6. Prepare a data pack and obtain split numbers from Data Center.

7.1.3 Have S.O. present to verify cutting plan and C.O. instructions. .....Date/Time_____

7.1.4 Place Felker cutoff saw in fume hood in TSL Lab, with appropriate fixtures.

7.1.5 Extend the one and 0.5 cm scale lines approximately 1 cm to the outer portions of the core. A vibratory etcher is used to scribe these marks.

7.1.6 Take pre-cut photos of encapsulated core using Linhoff camera and special fixture located in TSL. Photos should be shot at 1:1 and orientation cube plans cm-scale are to be included in photos.

7.1.7 Set up Felker saw with .015 blade and collers. (Use collers of proper size to allow core to be cut with a single pass).

7.1.7.1 Place core in the special fixture designed to allow core to be moved smoothly into the blade. Use teflon spacer and aluminum strip to align core to be cut along a line that connects the ends of the centimeter scale marks in the central portion of the secondary encapsulation.

7.1.7.2 Have S.O. check this alignment...Date/Time_____

7.1.7.3 Adjust saw blade to a position where it will just mark the top of the encapsulated core. If the alignment is correct for the length of the core, proceed with cutting. If not, realign.

7.1.8 Cut core using a very slow even pressure and backing out of cut about .5 cm every .5 cm of cutting to clear blade. Use 190 or 200 ethyl alcohol to cool the blade (gravity feed 5 gal. container placed above saw).

7.1.9 Post cut photos to be taken as in 7.1.5 plus an additional 2 sets of pie shot photos.

7.1.9.1 Weigh both pieces and record on F-6.

7.1.9.2 Take a complete set of oven lapping photos of exposed core using special fixture provided on the ultra-phot with the 2.5X lens (both pieces).

7.1.10 Polish the larger section according to the polishing procedure in 7.2.

7.1.11 After polishing is complete re-weigh polished core segment and record on F-6.

7.1.12 Place polished core in fixture on the ultra-phot and rephotograph using 2.5X lens but slightly larger power. See step 7.1.9.2.

7.1.13 Place larger section of the core in the special fixture as in 7.1.7.1. The core section is aligned for a cut to be made along a line that connects the other ends of the centimeter scale marks of the secondary encapsulation.

7.1.13.1 Have S.O. check this alignment...Date/Time_____

7.1.14 Proceed as in 7.1.7.3; 7.1.8; 7.1.9; 7.1.9.1 and 7.1.9.2.

7.1.15 After cutting reweigh the center section and the section cut from it.

7.1.16 The approximately 1 cm wide center section with one side polished is the reference section. Place this section in a plexiglass container with a suitable amount of aluminum foil packing material. The container is sealed in a poly bag, purging bag with GN_2 for 15 minutes before final sealing.

7.2 Polishing of Core Center Reference Portion

7.2.1 Weigh the larger portion of the core from step 7.1.10.

7.2.2 Starting with 240 grit silicon carbide and large glass plate, hand grind core face using circular motion until entire surface is free of saw marks and smooth.

7.2.3 Clean core in 200 proof ethyl alcohol and stainless steel tray and clean glass plate and recharge with 15μ grit repeat step 7.2.2 hand grinding.

7.2.4 Clean as in step 7.2.3 and recharge glass with 1200 grit repeat step 2 hand grinding.

7.2.5 Clean as in step 7.2.3 and dry with alcohol and lint free wipes. Proceed to polishing room and place special polishing wheel on its spindel.

7.2.6 Polish this core segment on the 14 inch lap using 3μ and then 1μ diamond paste. Clean the core segment in 200 proof ethyl alcohol between each μ size of polishing compound.

7.3 Cutting Core for Sections

7.3.1 If C.O. calls for segmenting of the first split of the core proceed as follows:

7.3.2 Using marked photos as a map guide mark this core portion at areas to be cut, using Diamond scribe (Caution: Do not scribe on exposed core surface).

7.3.3 Set up Felker cut-off saw as in step 4 and 6 of core cutting procedure and bolt special 3/8" aluminum plate into place on saw stage.

7.3.4 Have S.O. verify cut locations and prepare F-6 document core weight prior to cutting...Date/Time_____

7.3.5 Cut segments using method described in step 7.1.8 of core cutting procedure.

7.3.6 Take post-cut photos of core segments using Linhoff. (Exploded view of all segments per step 7.1.6 of core cut procedure).

7.3.7 Using special fixture provided take photos of each individual core segment, (shoot all 6 sides). Use ultra-phot and 2.5X lens.

7.3.8 Produce sections, following procedure of Standard Petrographic Thin Sections SSP #

Originator: Pratt Johnson
Pratt Johnson

Approval: M B Clarke
Curator

Concurrence:
Manager, Lunar Curatorial Laboratory

Concurrence: Michael A. Reynolds
Contamination Control Officer

Concurrence: James E. Hebert
Quality Assurance