NYE COUNTY NUCLEAR WASTE REPOSITORY PROJECT OFFICE

TECHNICAL PROCEDURE

TITLE: THIN SECTION PREPARATION PROCEDURE	Revision: 0 Date: 06-16-00 Page: 1 of 6
PROCEDURE No.: TP-8.2	SUPERSEDES: DRAFT, 02-17-95
APPROVAL Project Manager Date 12.11.00	CONCURRENCE Principal Investigator Date Project Quality Assurance Officer Date 15 DEC 2000

1.0 PURPOSE

The purpose of this procedure is to document the process for the preparation of thin sections from rock and sediment samples. Thin sections are used for geological analysis on Scanning Electron Microscopes (SEM), Petrographic Microscopes, Binocular Microscopes, Electron Microprobes, and for other geological analysis.

2.0 SCOPE

This procedure covers all geologic thin sections prepared from samples obtained by the NWRPO independent oversight drilling program.

2.1 APPLICABILITY

This procedure applies to NWRPO principal investigators (PI) or designated staff and contractors preparing thin sections from rock and sediment samples. Samples that are sent out to a special thin section laboratory and are not prepared in house will follow the procedure of that laboratory.

The external procedure will be sent to GMI prior to making thin sections. A thin section request form will be filled out for samples that are sent out for preparation.

2.2 TRAINING

Any person preparing thin sections must be skilled enough to produce thin sections that are acceptable for the intended use. The preparer will be trained to this procedure before conducting work, and will document they have read and understand this procedure. Documentation of training will be submitted to the NWRPO Quality Assurance Records Center (QARC).

3.0 DEFINITIONS

3.1 Thin Section - A rock or sediment sample that has been mounted on a glass slide, thinly ground and used for various microscopic studies of rock composition. For the purpose of this procedure, the term thin section refers to standard petrographic thin sections, as well as grain mounts, SEM and microprobe mounts, smear slides, sediment and other rock mounts.

4.0 RESPONSIBILITIES

4.1 The relevant NWRPO Principal Investigator is responsible for the preparation of this procedure.

4.2 The Project Quality Assurance Officer is responsible for oversight of the review, issuance, and change control of this procedure.

4.3 The On-Site Geotechnical Representative or designee is responsible for the implementation of this procedure.

5.0 PROCESS

General - It is of critical importance in this procedure that sample identification information is accurately transferred to the thin sections. Thin sections must be handled under chain-of custody restrictions.

Sample Traceability - Samples are tracked by use of the thin section logbook and thin section request forms.

Sample Storage - When samples are not in use, they are to be stored in a thin section sample container marked for NYE COUNTY SAMPLES - THIN SECTIONS.

5.1 INITIAL PREPARATION

5.1.1 There is no requirement for unusual environmental conditions.

5.1.2 The requester fills out a Thin Section Request Form (attachment 1). Sample preparation is documented on the Thin Section Request Form, which is retained in the files. Any procedural deviations from this procedure shall be noted on this form.

5.1.3 Set sample in an open sample tray with one clean glass slide.

5.1.4 Mark the sample number on the glass slide with a diamond scriber. Check the sample number against the mark on the glass slide to ensure that the sample ID is correct.

5.1.5 Grind the sample to a flat surface using only diamond abrasive and either as dry or with distilled water. Never use tap water as the sample may be chemically investigated. Sample grinding will be by hand on a flat plate or by wheel. If the sample requires stabilization prior to grinding, stabilize the sample with epoxy. Return the sample to the glass slide.

5.1.5.1 Epoxy stabilization will be in a plastic using Epon 815-diethylene triamine or other similar material. Record this action on the Thin Section Request Form. Ensure the glass slide stays next to the sample.

5.1.5.2 Coat the sample with the epoxy.

5.1.5.3 Let the epoxy cure at room temperature.

5.1.6 Final grinding (lapping) of the surface to be mounted on the glass slide will be using at least a 400-mesh diamond plate. 600 mesh to 12,000 mesh can be used to polish the surface. Use only distilled water. Lapping can be by glass or metal diamond impregnated plate or by diamond impregnated wheel.

5.1.7 Use 10-power magnification or more to observe the progress of the grinding and polishing. This can also be done by hand lenses or by microscope.

5.2 MOUNTING

5.2.1 Ensure the sample is dry prior to actual mounting. Prepare an epoxy resin such as Buehler resin 20-8130-032 with the hardener 20-8132-008 (index of refraction 1.58). Follow the instructions on the container of the epoxy being used for the mounting. Make sure that air bubbles are not added to the epoxy during mixing. Place the epoxy on the glass slide and

add the sample to the glass slide. Press the two together by hand. Place the slide in its sample box to let it cure. Or alternatively:

5.2.2 Ensure the sample is dry prior to mounting. Place the sample on a hot plate (at about 150 degrees F). Place the glass slide on the same hot plate. When the sample is dry and the glass is warm, place Lakeside-70 on the glass slide. Use enough Lakeside-70 to cover the area of the polished face of the sample. When the Lakeside-70 resin is melted press the sample to the glass plate and push out any air bubbles that occur. Let the sample and glass slide cool down.

5.3 GRINDING AND LAPPING TO FINAL THICKNESS

5.3.1 Grind the sample mounted on the glass slide by hand or by wheel using diamond impregnated metal plate or wheel. Use 80 to 200 grit size until the thickness of the sample is about the same as the glass slide. Use only distilled water.

5.3.2 Use 400 to 600 diamond grit by plate or by wheel to lap to the final thickness.

5.3.3 Check the thickness of the sample by using a binocular or petrographic microscope. The sample thickness desired will be recorded on the thin section request form.

5.3.3.1 For a petrographic thin section the sample should be 30 microns or less.

5.3.3.2 For an SEM grain mount (for surface texture analysis) there will be no grinding at all. The sample will be mounted with a fresh surface exposed.

5.3.3.3 For a grain mount for SEM/EDX analysis the surface will be about 50 microns.

5.3.3.4 For a microprobe mount the thickness will be about 50 microns.

5.3.3.5 For a rock mount for SEM/EDX analysis the thickness will be about 50 microns. If the sample will be used for petrographic microscope analysis also the thickness will be 30 microns or less, but there will not be a cover glass.

5.4 COVERING

5.4.1 Clean the surface of the section using distilled water or Isopropanol. Dry the section in air.

5.4.2 Use an epoxy similar to Buehler epoxy (see step 5.2.1).

5.4.3 Let sample dry

5.3 DATA ACQUISITION METHODOLOGY AND LIMITATIONS

Preparation of thin sections requires a high level of skill and training, which can only be gained from extensive practice. Even a competent preparer may not always produce the required results. The ultimate determiner of the quality of a thin section must be made by the requester who decides if the thin section is suitable for its end use.

6.0 REFERENCES

NWRPO Quality Assurance Program Plan
Manufacturer's mixing requirements for epoxy's used in this procedure.

7.0 RECORDS

Thin Section Request Form
Copies of Thin Section Logbook

8.0 ATTACHMENTS

Thin Section Request Form

THIN SECTION REQUEST FORM

Name:_____
Organization:_____
Date Submitted:_____

NWRPO Sample:_____

I. TYPE OF MOUNT (check one): _____ Special_____

_____ Glass Rectangular - petrographic size _____ Glass Rectangular- Large

II. THICKNESS REQUIRED:_____

III. POLISHING REQUIRED: _____
_____
_____

IV. SPECIAL INSTRUCTIONS:_____
_____
_____

V. SAMPLE NUMBER:_____

VI. REMARKS:

Samples received in Sample Prep. Lab.:

_____ _____
Signature **Date**
NWRPO QA Level _____

Completion of thin section: _____
Date

Samples sent out for preparation (name of lab.)**:**
_____
_____
QA Procedure # of outside lab.:_____

Attachment A- Thin Section Request Form