OAK RIDGE NATIONAL LABORATORY
MICROSCOPY, MICROANALYSIS, MICROSTRUCTURES GROUP
ELECTRON MICROSCOPE TRAINING DOCUMENT
MET-MMS-D1 (3/04)

User's Name: _____

Safety Training Reviewed: _____
MMM Group Leader

NOTE 1

In the following pages "has demonstrated" indicates the trainee has successfully completed a one-on-one, on-the-job training program with their trainer.

NOTE 2

The equipment of the Microscopy, Microanalysis, Microstructures (MMM) Group may be operated only by qualified users. In order to be qualified, a user must be trained by a qualified trainer and demonstrate proficiency in safely operating the equipment. Personnel mixing chemicals must be trained by a qualified trainer and demonstrate proficiency in safely mixing chemicals.

NOTE 3

Each newly established user of the microscope facility must have an established user of the microscope facility as a collaborator (usually the microscopist associated with the research task on which she/he is working). It is the responsibility of the collaborator to establish the degree of microscopy expertise of the new user and to ensure the quality of the microscopy performed.

The undersigned accepts responsibility for the new user as outlined above:

Collaborator: _____
Date

OR,

Based on interactions with the user, observations of his/her microscopy techniques, and discussions of analysis procedures, the collaborator can verify that the new user has sufficient microscopy expertise to perform microscopy (on the instruments for which she/he has been trained) without the guidance of a collaborator.

The undersigned collaborator has evaluated the microscopy abilities of the new user and established that she/he is qualified to perform microscopy independently as outlined above:

Collaborator: _____
Date

Trainee's Signature Initials

Trainer's Signature Initials

1. _____

2. _____

3. _____

4. _____

Indication of training completion will be the training date and the signed initials of the trainee and trainer.

Other notes:

TRAINING REQUIRED IS INDICATED BY "Y" (Y=YES)

1. Specific Training Courses

General Employee Training
ORNL Orientation
M&C Orientation
M&Ms Group Orientation
Radiation Waste Generation
Radiation Waste Inspector
Spill Control
Respirator
Silicon Carbide Whiskers Safety
CPR
First Aid
Chemicals in the Lab
Fire Extinguisher Training
Radiation Worker
SHaRE Orientation

2. General Safety

A. Understands good housekeeping procedures.

B. Understands the four-color diamond hazard label. Knows where to locate Materials Safety Data Sheets (MSDS). (Handbook, www).

C. Understands the need to minimize discharges of Hazardous/Toxic waste to the environment.

D. Understands that waste chemicals will not be disposed of down water drains.

E. Understands that waste chemicals will be periodically disposed of through the Hazardous Waste Program.

F. Understands personal responsibility for reporting spills.

G. Understands that items/equipment know or suspected to contain asbestos require special handling/disposal considerations.

3. Radiation Training

A. Understands that the following sources have been approved to be examined in all electron microscopes and the atom probe:
   1. Alpha
   2. Beta
   3. Gamma
   4. Tritium

B. Understands that TEM specimen holders and specimen holder “O” rings could become contaminated with radioactive materials.

C. Understands the correct safety procedures for cleaning and greasing specimen holder “O” rings. (Never touch “O” rings with hands. Always use lint-free paper.) *Note: 2000FX users will dispose of lint-free paper in the radioactive disposal can in Room 04.

D. Understands the standard operating procedures for handling radioactive specimens contained in applicable REMAGs Standard Operating Guidelines (SOGs) and has been trained and certified by the REMAGs Radiation Officer (RRO) on the following:
   1. Beta radiation and its hazards.
   2. Gamma radiation and its hazards.

E. Has completed:
   1. General Employee Training (GET).
   2. Phase I Radiation Training. (Health Physics).
   3. Phase II Radiation Training. (REMAG RRO).
   4. Rad Worker Training.
   5. Training to detect radiation with a general purpose radiation meter, cutie pie, and geiger counter.

F. Has demonstrated practical compliance with applicable SOGs for examination of radioactive specimens by TEM or APFIM. Knows where the SOGs are filed.

4. Fire Prevention

A. Knows the location of emergency exits, assembly points, and understands the building evacuation alarm systems.

B. Knows the location of fire extinguishers.

C. Knows the location of fire alarm boxes.

5. Liquid-Nitrogen Safety

A. Understands the requirement to use safety glasses when handling liquid-nitrogen.

B. Understands the requirement to use a ladder (one that has been inspected) or approved step-stool if needed, when filling liquid-nitrogen dewars.

C. Understands the correct procedures for filling individual 4 liter dewars at the liquid-nitrogen filling station in Room 03.

6. Beryllium Safety Hazards

A. Understands that many TEM specimen holders have beryllium specimen holding cups, clamping washers, and clamping rings.

B. Understands the four-color diamond hazard label for beryllium, and the beryllium Material Safety Data Sheet (MSDS).

7. Electron Microscope Accessory Equipment

A. Understands that disposable gloves are provided in each microscope laboratory for handling specimen holders and components as required.

B. Has demonstrated the ability to safely operate the following types of specimen holders and equipment:
   1. Single Tilt Specimen Holder
   2. Double Tilt Specimen Holder
   3. Tilt Rotate Specimen Holder
   4. FIM Specimen Holder (ORNL)
   5. Liquid-Nitrogen Cooling Holder
   6. Model 628 Heating Holder
   7. Philips Heating Holder
   8. Philips Straining Holder
   9. Straining Holder (J. Horton design)
   10. Compustage, Single Tilt Holder
   11. Compustage, Double Tilt Holder
   12. Compustage, Double Tilt, Liquid Nitrogen Cooling Holder
   13. FIM Specimen Holder (Fischione)
   14. Film Desiccators
   15. Water Chillers
   16. Transpector Residual Gas Analyzer
   17. Other

C. Has demonstrated the ability to safely operate the Gatan Dry Pumping Station.

D. Has demonstrated the ability to safely operate the South Bay Technology Plasma Cleaner.

E. Has demonstrated the ability to safely operate the Ditabis Image Plate Reader.

8. Philips CM200ST/FEG Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS
   2. Anti-Contaminator

B. Knows where the CM200ST/FEG operating and alignment procedures are filed. Understands that calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. CM200ST/FEG
   2. CM200 STEM System
   3. Film/Image Plate Exchange
   4. Gatan Multiscan Camera
   5. Gatan Imaging Filter
   6. EMiSPEC Vision System
   7. EDS System (Oxford)
   8. Linear Field Compensation System

D. Understands Digital Image/Data archive protocol.

E. Understands the emergency shutdown procedures.

9. Philips Tecnai 20 Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS
   2. Anti-Contaminator

B. Knows where the Tecnai 20 operating and alignment procedures are filed. Understands calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. Tecnai 20
   2. Film/Image Plate Exchange
   3. EDS System (EDAX - TIA)
   4. Model 622 TV system
   5. Gatan Dualview CCD Digital Camera

D. Understands Digital Image/Data archive protocol.

E. Understands the emergency shutdown procedures.

10. Philips CM30/STEM Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS
   2. Anti-Contaminator

B. Knows where the CM30 operating and alignment procedures are filed. Understands calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. CM30
   2. CM30 STEM System
   3. Film/Image Plate Exchange
   4. EDS System (EDAX)
   5. Vacuum (ORNL) Modification
   6. Gatan Imaging Filter

D. Understands Digital Image/Data archive protocol.

E. Understands the emergency shutdown procedures.

11. Philips XL30/FEG Scanning Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS

B. Knows where the XL30 operating and alignment procedures are filed. Understands calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. XL30/FEG SEM
   2. TEXSEM Orientation Imaging Microscopy System
   3. Oxford WDS System
   4. EMiSPEC Vision
   5. Hot Stage
   6. EDS System (Oxford)

D. Understands Digital Image/Data archive protocol.

E. Understands the emergency shutdown procedures.

12. JEOL 6500F Scanning Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS
   2. Anti-Contaminator

B. Knows where the 6500F operating and alignment procedures are filed. Understands that calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. 6500F SEM
   2. EDAX Si(Li) EDS system
   3. EDAX/Vericold Microcalorimeter EDS system
   4. Deben beam blanking system

D. Understands Digital Image/Data archive protocol

E. Understands the emergency shutdown procedures.

13. JEM 2000FX Electron Microscope

A. Has demonstrated the ability to fill the following liquid-nitrogen dewars safely:
   1. EDS
   2. Anti-Contaminator

B. Knows where the JEM 200FX operating and alignment procedures are filed. Understands that calibration may have to be verified by the user.

C. Has demonstrated proficiency in safely operating the following equipment:
   1. JEM 2000FX
   2. JEM 200FX STEM System
   3. JEM EELS
   4. Film Desiccator
   5. Tractor Northern EDS System
   6. Water Chiller

D. Understands the emergency shutdown procedures.

14. Darkroom Operation

A. Understands potential hazards of darkroom chemicals and necessary precautionary actions.

B. Understands the proper procedure to prepare E 19 developer.

C. Understands the proper procedure to prepare Kodax Rapid Fixer.

D. Understands the proper procedure to prepare Photo Flow.

E. Understands the proper procedure to load, develop, and dry microscope film.

F. Understands correct procedures to prepare developer/fixer chemicals