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DOE STANDARD

GUIDELINE TO GOOD PRACTICES FOR MAINTENANCE TOOLS AND EQUIPMENT CONTROL AT DOE NUCLEAR FACILITIES

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AREA MNTY

FOREWORD

The purpose of the *Guideline to Good Practices for Maintenance Tools and Equipment Control at DOE Nuclear Facilities* is to provide contractor maintenance organizations with information that may be used for the development and implementation of a rigorously controlled maintenance process directed at establishing maintenance tools and equipment control at DOE nuclear facilities. This document is intended to be an example guideline for the implementation of DOE Order 4330.4A, *Maintenance Management Program,* Chapter II, Element 13, *Maintenance Tools and Equipment Control.* DOE contractors should not feel obligated to adopt all parts of this guide. Rather, they should use the information contained herein as a guide for developing a tool control process applicable to their facility.

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1. INTRODUCTION

1.1 Purpose

This guide is intended to assist facility maintenance organizations in the review of existing methods and in developing new methods for establishing maintenance tool and equipment control for all areas of the facility, including radiologically controlled areas (RCAs). Tools and equipment of the proper type, quality, and quantity should be available for issue and use when needed by the maintenance craftspersons. Adequate tool and equipment control in the facility contributes to worker efficiency, and it also is needed to limit the number of tools introduced into potentially contaminated areas, to minimize the spread of radioactive contamination, and to reduce volumes of solid radioactive wastes. A dedicated supply of tools and equipment should be established for exclusive use within the facility's RCAs. A controlled supply of tools and equipment should be provided to ensure that an adequate quantity is available to avoid delays in maintenance work activities. Good tool control should minimize the risks of (1) personnel contaminations and (2) the inadvertent release to radiologically uncontrolled areas of such potentially contaminated items. Personnel accountability is essential to an effective tool and equipment control program.

An adequate decontamination facility is needed to enable the facility to reuse a wide variety of contaminated tools and equipment and to minimize replacement expenditures. A versatile decontamination facility and program should be used to reduce levels of removable and fixed radioactive contamination on the surface of controlled tools and equipment. Decontamination of tools and equipment also should be used to minimize the contribution of contaminated tools and equipment to solid radioactive waste volumes.

It is expected that each DOE facility may use approaches or methods different from those defined in this guide. The specific guidelines that follow reflect generally accepted industry practices. Therefore, deviation from any particular guideline would not, in itself, indicate a problem. If substantive differences exist between the intent of this guideline and actual practice, management should evaluate current practice to determine the need to include/exclude proposed features. A change in maintenance practice would be appropriate if a performance weakness were determined to exist. The development, documentation, and implementation of other features that further enhance these guidelines for specific applications are encouraged.

Additional information pertinent to the implementation of this guideline may be found in the following DOE Guidelines:

1) DOE-STD-1054-93 *"Guidelines to Good Practices for Control and Calibration of Measuring and Test Equipment (M&TE) at DOE Nuclear Facilities"*

2) DOE-STD-1067-93 *"Guideline to Good Practices for Maintenance Facilities, Equipment, and Tools at DOE Nuclear Facilities"*

3) DOE-STD-1052-93 *"Guidelines to Good Practices for Types of Maintenance at DOE Nuclear Facilities"*

4) DOE-STD-1050-93 *"Guidelines to Good Practices for Planning, Scheduling and Coordination of Maintenance"*

5) DOE-STD-1072-93 *"Guidelines to Good Practices for Facility Condition Inspections at DOE Nuclear Facilities"*

Appendix A is provided for use by facility trainers who provide training regarding this element of DOE Order 4330.4A.

1.2 Background

The information in this guide was developed from commercial and DOE sources. Each facility should select any details applicable, add any additional knowledge or experience that is applicable, and then develop and implement facility-specific processes for establishing maintenance tool and equipment control. Facilities which use existing documented processes should review this guide to identify details which may enhance their existing methods.

1.3 Application

The content of this guide is generally applicable to all DOE nuclear facilities. Portions of the methods outlined may not be applicable to all facilities because maintenance organizations, disciplines, titles, and responsibilities can vary among DOE nuclear facilities. Facility maintenance personnel should (1) verify the adequacy of or (2) improve existing maintenance processes by adapting this guide to their specific facility and individual maintenance disciplines.

2. DEFINITIONS

2.1 Acronyms

a. RCA: Radiologically Controlled Area

2.2 Field Attendant: Person responsible for the issuance and checking in of tools and equipment used in RCAs during major maintenance activities or outages.

2.3 Fixed Contamination: Radioactive material that cannot be readily removed from surfaces by nondestructive means, such as casual contact, wiping, brushing or washing.

2.4 Hot (Discrete) Particle: A small, loose, highly radioactive particle. These particles are highly transportable because of their small size and electrostatic charge.

2.5 Laydown Area: Area on or close to a job site, designated and approved by the facility owner, to be used by maintenance personnel for the materials and equipment used on the maintenance job, for the duration of the job.

2.6 Radiologically Controlled Area (RCA): That portion of the facility administratively controlled because of radiological protection concerns. Radiological Controlled Areas include radiological contamination areas and/or radiological buffer areas as defined within DOE/EH-0256T, "Radiological Control Manual."

2.7 Removable Contamination: Radioactive material that can be removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing.

2.8 Staging Areas: Area designated and approved by the maintenance supervisor, for staging parts, materials, and supplies until a maintenance job is ready to work.

2.9 Tool Storage Areas: Area authorized and controlled for the issuance and storage of tools and equipment designated for use in the facility.

2.10 Tools and Equipment: All noninstalled items commonly used to perform or assist in maintenance work functions within the facility. These items are not normally designed to perform highly specialized tasks and include such items as hand tools, power tools, electric cords, hoses, chain falls, scaffolding, ladders, and calibrated test equipment.

3. MAINTENANCE TOOLS AND EQUIPMENT CONTROL

3.1 Discussion

A system should exist which provides for tool and equipment control within the maintenance organization. This system should include (1) unique identification of controlled items and (2) documentation of their issue and return. Also, the system should provide for storing, issuing, and maintaining tools and equipment in a manner so as to enhance efficient and effective maintenance activities.

Craftspersons should be provided an initial issue of tools of the trade for day-to-day use. On the basis of need, special tools should be drawn from controlled storage and returned as soon as reasonable after completion of the task.

All worn or damaged tools should be repaired or replaced. Tools should be regularly inspected and serviced, on the basis of recall program controls, to ensure that they:

- remain safe to use,
- are in a high state of readiness for use, and
- do not prematurely require replacement.

The process should provide the supervisor with opportunities to exercise an active role in encouraging individual innovation when new and/or special tool and equipment needs exist.

3.2 Scope

This guideline applies to tools and equipment used by maintenance organizations in all areas of the facility, including radiologically controlled areas (RCAs).

3.3 Responsibilities

3.3.1 Maintenance Manager, accountable for maintenance of the facility, is responsible for the establishment of a system for the adequate storage, issuance, and maintenance of tools and equipment.

3.3.2 Maintenance Supervisor

a) Ensures an adequate supply of tools to perform work while preventing the use of unnecessary tools and equipment in the RCAs.

b) Optimizes supplies of tools and equipment available during peak work periods, including considerations for work force usage and for decontamination support available.

c) Enforces standards and processes for the storage, inventory, and control of tools and equipment.

d) Prohibits the uncontrolled introduction of tools and equipment into the RCAs.

e) Trains personnel on an applicable tool control process.

f) Assesses periodically the effectiveness of policies on the control of tools and equipment.

3.3.3 Maintenance Personnel

a) Each individual user of tools and equipment is responsible for the use and temporary storage of these items.

b) All items stored or used within the RCAs are potentially contaminated. Both permanent-facility and contractor personnel should handle and use RCA tools and equipment in a manner so as to minimize the risk of spreading contamination.

c) Each worker is expected to obtain RCA tools and equipment from contaminated-tool storage areas within the RCA and to return them to decontamination facilities or other designated locations upon completion of use.

d) Efforts should be made by each worker to minimize the possibility of contamination of items used in RCAs.

3.3.4 Radiological Protection Responsibilities

The facility radiological protection organization is responsible for monitoring the control and use of RCA tools only as they impact the facility radiologically. This organization should also report major or recurring radiological problems to management. However, the primary responsibility for the control of tools rests with the individuals assigned RCA tools or equipment and their supervisors.

3.4 Guidelines

3.4.1 Storage and Issuance

3.4.1.1 Applicable departments and/or individuals should be assigned responsibility for the proper storage and issuance of tools and equipment.

3.4.1.2 Departments and/or individuals who use and maintain specific tools on a day-to-day basis should receive permanent issuance of these tools. Other tools and equipment should be available for issue on an as-needed basis. For these items, proper storage facilities should be centrally located to shops and normal work areas and should be readily accessible to the craftspersons, to promote worker efficiency. Controls, such as sign-out sheets and tool-control attendants, should be considered for these storage areas to provide accountability and availability of tools. A method should also be established for the storage, issuance, decontamination, and reuse of contaminated tools and equipment.

3.4.1.3 Special tools and equipment sometimes are obtained on a temporary basis from other sources such as a vendor or contractor. A method should be established that identifies the availability and sources for these special tools and equipment so that they are obtainable and ready for use when needed. When these special tools and equipment are on site, they should be controlled in the same manner as facility tools and equipment. The use of vendor and/or outside contractor tools and equipment in the RCA should be controlled, to minimize the possibilities of contamination.

3.4.1.4 Policies governing the control of tools and equipment should be clearly established. Policies and procedures should emphasize personnel accountability and item traceability. These policies should address all aspects of tool control including inventory, issue, tracking, use, and return.

a) An inventory system should be established for tools and equipment. This inventory should be computer-based, compatible with existing facility inventory systems, and adaptable to daily supply changes.

b) A computer-based issuance and tracking system should be established, using a bar-code identification attached to tools or to containers of equipment. Permanent laser-affixed codes should be used where possible to prevent inadvertent loss of

identification. Items should be marked where possible with a unique identification number, to provide a specific tracking mechanism. Preinventoried containers of tools and equipment may be identified as single units if the contents are inventoried and restored after use.

c) Items should only be issued to individuals authorized to withdraw tools. Bar-coded authorization cards that identify the specific user should be used to assign tools and to facilitate tracking thereafter. The identity of the items issued, the name of the user, the location of the job for which the tools are to be used, and the expected date of return should be recorded.

d) All facility departments and contractors should be required to obtain tools and equipment for use in potentially contaminated RCAs from the contaminated-tool storage areas.

e) The return of tools should be tracked against the expected return dates. Tool and equipment use should be recorded to establish use patterns and needed inventory quantities. The computer-based inventory system should be utilized to track the number and flow of stocked items used within the RCA. When items are not returned, the user should be made to account for them.

f) Tools and equipment should be returned to their sources immediately upon completion of use. All issued tools and equipment should immediately undergo operability and radiological evaluations.

g) Worn, defective, or otherwise unusable tools should be removed from work areas as soon as possible, to prevent inadvertent use.

h) The replenishment of tool supplies should be performed only by the responsible coordinating department on the basis of past usage and expected needs. The uncontrolled introduction into the RCA of tools and equipment, should be prohibited.

i) Tools and equipment that need inspection, calibration, or refurbishment by personnel in specific work groups or by vendors may require shipment to special locations elsewhere on site or off site. When those transfers are necessary, the control coordinator should

have records of location and status.

j) Perform an inventory of all maintenance tools and equipment (1) at least annually and (2) after major planned outages. The quantities of tools and equipment should be compared to previous inventories and significant changes investigated. The inventory list should include equipment items such as chain falls, lifting rigs, and scaffolding, as well as all tools. This inventory should be maintained by a single organization which is also responsible for the storage, issuance, and control of tools and equipment.

3.4.1.5 The following items, as a minimum, should be addressed in the storage-and- issuance process.

a) Both potentially contaminated and contaminated items should remain within the RCA until verified by the appropriate authority to be clean and safe to remove.

b) A job-planning process goal should be to ensure that the proper items are available in the quantities required to support scheduled maintenance requirements.

c) Instrument/motor/pump pools should maintain a supply of critical items for designated applications.

d) Reuse of repaired items should be encouraged on the basis of maintaining them in a high state of clean, safe, and reliable readiness.

e) Specialty tools should be identified and stored for ready retrieval.

f) Unusable items should be segregated from normal items for dispositioning and to prevent inadvertent issue for use.

g) Instructions should be developed to define responsibility and accountability for the proper storage and issuance of controlled items.

h) The system should provide for storage areas that segregate items to prevent cross-contamination or wrong selection for issue.

i) The system should provide for designating and controlling storage, laydown, and staging areas.

j) A method should be established which provides for inventory listings of specialty and controlled tools and equipment and which may be used to communicate applicable information to potential users.

3.4.2 Tool and Equipment Maintenance

3.4.2.1 Maintenance tools and other support equipment should be evaluated for inclusion in the preventive maintenance program (see DOE-STD-1052-93, *"Guidelines to Good Practices for Types of Maintenance at DOE Nuclear Facilities").* Inclusion in the preventive maintenance program should enhance the availability and reliability of equipment such as cranes, portable lifting and rigging equipment, welding machines, welding rod ovens, shop machinery, and measuring and test equipment.

3.4.2.2 The following items, as a minimum, should be included in the tool and equipment maintenance process.

a) Regular-issue hand tools should be checked by the user to ensure safe, reliable use.

b) A recall system should be established for the periodic inspection of welding, lifting, hoisting, and rigging equipment, as well as for safety devices and personnel safety equipment. The recall system should also provide for scheduled equipment and tool inspection (including some portable hand tools such as electrical drill motors) on the basis of risk to safety and importance to reliable use.

c) When worn or defective items are identified, a method should be established to remove them from service and to segregate them from normal items to prevent unsafe use.

d) Unrepairable tools and equipment should be disposed of as soon as practical.

e) The system should provide for repair/replace decisions based upon established guidelines for worn/damaged/defective tools and equipment.

f) Instructions should be developed which define responsibilities regarding deficiency-tagged equipment. (See DOE-STD-1072-93, *"Guidelines to Good Practices for Facility Condition*

Inspections at DOE Nuclear Facilities.")

3.4.3 Use of Special Tools and Equipment

3.4.3.1 Instructions should be provided for the use of special tools, test rigs, equipment, lifting and rigging equipment, welding equipment, safety devices, personnel protective equipment, and mock-ups. These instructions should be written so as to improve tool and equipment use and enhance job performance and efficiency. Maintenance supervisors should review proposed special tool and equipment designs to determine cost justification, effectiveness, safety considerations, and the need for reviews by other departments. These tools should be stored and controlled in accordance with the direction provided in this guideline.

3.4.3.2 Applicable training facilities and equipment (including simulators and mock-ups) should be provided, where warranted, to perform needed training in an environment and under conditions expected during normal use. Performance-based training and applicable licensing, when required, should be provided prior to authorized use of the following:

a) Cranes and hoists

b) Forklifts, man-lifts, Verti-Lifts

c) Vehicles

d) Heavy equipment

e) Welding equipment

f) New technology and/or specialty items that require verified skill for safe, effective operation

3.4.3.3 Written instructions should be provided for tools and equipment items when considered important to personnel safety and to encourage continued proper use through improved first-effort performance/efficiency/confidence by the user.

3.4.4 Tools and Equipment in Radiologically Controlled Areas (RCAs)

NOTE: Previous Sections 3.4.1 through 3.4.3 apply to all areas of the facility

(including RCAs); this section provides additional guidelines specific to RCAs.

3.4.4.1 An adequate supply of tools and equipment dedicated for exclusive use in RCAs should minimize the number of unnecessarily contaminated tools used to perform work within the RCA. The control of these tools, including issuance, decontamination, inventory, and repair, should be assigned to a single facility department manager, such as the Maintenance or Radioactive Materials Controls Department Manager. Although it may not be practical to store the total inventory of potentially contaminated tools in a single location, all satellite locations of RCA tools and equipment should be under the control of the same facility department.

a) A sufficient supply of RCA tools and equipment should be established for routine maintenance needs to prevent introduction of additional non-contaminated items. The input and the cooperation of all maintenance work groups are required during maintenance planning to determine the types and numbers of tools and equipment needed. Input should be obtained from maintenance, operations, planning, engineering, radiological protection, and contractor groups. The initiation of an RCA tools and equipment supply system may require a major one-time input of nonradioactive tools from other tool control areas or from facility stores.

b) All RCA tools and equipment should be stored in designated contaminated-tool control storage areas. Positive controls over all contaminated-tool storage areas should be provided, including checking items out and in and continually staffing each tool control storage area during periods of heavy demand. Locked storage, however, should be the minimum acceptable positive control for tool storage areas during low-demand periods. The use of temporary tool storage areas and mobile cabinets should be planned as an effective method for supporting work at specific locations during maintenance activities. The program should ensure facility control over the issue and inventory of RCA tools and equipment.

c) Introduction into the RCA of highly specialized tools previously used in other facility's RCAs should be controlled. Allow access only when approved by the radiological protection manager or designee. Since these specialized items may contain radioactive contamination (including hot particles), thorough radiological surveys should be conducted prior to introducing items into the RCA.

d) If required, tools and equipment should be forwarded for decontamination or repair prior to restocking for further use. Criteria should be established to control whether tools are returned to tool storage areas, decontamination facilities, or field attendants, depending on the radiological conditions of the job. Field attendants, for example, should be assigned to accept used tools from highly contaminated radiological work areas during major maintenance activities.

e) Control all RCA tools and equipment as radioactive material. Controlling these items as radioactive material serves to make workers aware of the potential hazard associated with the use of these tools and to assist the facility in properly retaining each item within the RCA. The following controls should be incorporated:

(1) Potentially contaminated tools and equipment should be handled in accordance with applicable facility procedures.

(2) Mark or label each potentially contaminated item as radioactive material Small hand tools and minor equipment should be uniquely identified by permanent marking to clearly distinguish them from similar items intended for nonradiologically controlled areas of the facility.

(3) Label or mark all containers of temporarily stored RCA tools and equipment such as barrels, toolboxes, "gang" boxes, crates, etc., as radioactive material, along with the identity of the contents, the levels of radioactive contamination, and the radiation dose rates, in accordance with applicable facility procedures.

(4) Designate storage areas for highly radioactive tools and equipment which may cause high-radiation areas. These areas may need to be shielded and locked and should be as remote as possible from traffic areas. High-radiation areas should be controlled as specified in applicable facility procedures.

3.4.4.2 When necessary to remove tools and equipment from the RCA, adequate facility decontamination facilities are necessary to ensure that all tools and equipment are decontaminated and released in accordance with applicable facility procedures.

3.4.4.3 Facility policies should prohibit the release of RCA tools and equipment to uncontrolled areas except where specifically authorized. The release of potentially contaminated tools to uncontrolled areas increases the risk of uncontrolled releases of radioactive materials.

a) The number of tools and equipment unconditionally released to uncontrolled facility areas should be limited. The need to unconditionally release large numbers of tools and equipment in a short time period at the end of major maintenance activities or outages should be prevented. Radiological surveys of large numbers of potentially contaminated tools that are generated during major maintenance activities or outages are time-consuming. Attempting to perform surveys rapidly may result in the release to uncontrolled areas of radioactive material above facility limits.

b) The facilities and equipment provided for the release of items to uncontrolled areas should be of sufficient size and layout to

allow for the accurate assessment of radiological hazards, including radioactive hot particles. All radiological-release surveys of outgoing tools and equipment from the RCA, should be recorded to document compliance with acceptable contamination and radioactive material control policies. Such items should be released only by qualified and authorized personnel and with the items tagged or marked as releasable to noncontrolled areas of the facility. The attached tag or marker should include written approval from both the responsible department and by authorized radiological protection personnel.

3.4.4.4 Dry radioactive-waste containers, as well as collection and sorting areas, should be monitored frequently (after establishing a tool control program) and periodically thereafter. This monitoring should include the recording of tools and equipment found in radioactive-waste receptacles, to determine the extent at which losses of these potentially contaminated items are occurring and to identify the source or reason for the losses. This information should be used to correct the problems as soon as possible. Problems experienced should be included in “lessons learned” to aid future planning.

APPENDIX A

SAMPLE LESSON PLAN

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LESSON PLAN

1. The instructor should be familiar with the following background information:

   a. The site should have a system for the adequate storage, issuance, and maintenance of tools and equipment, including tools and equipment used in radiologically controlled areas (RCAs).

   b. This system or program should address

      - the availability of tools and equipment for the craftsperson,
      - a preventive maintenance program for tools and equipment,
      - a system for returning tools and equipment at the completion of the maintenance activity, and
      - a program for the development of new and specialized tools.

2. To teach this lesson, the instructor needs the following required training and housekeeping items:

   a. Location for the training,

   b. A time period of approximately 30 minute for the training,

   c. Notification of selected employees, and

   d. A copy of the facility's tool and equipment control program.

3. This lesson has the following trainee-enabling objective:

   To outline the program for tool and equipment control, storage, and maintenance.

4. The facility should have a system for the adequate storage, issuance, and maintenance of tools and equipment. Components of this system include the following:

   a. A permanent issuance of tools should exist for individuals or groups of craftspersons who use them on a day-to-day basis and who are responsible for maintaining them. Periodic checks by supervision should be performed to verify the condition of these tools.

   b. Controls should be used, such as sign-out sheets or toolroom attendants, to provide accountability and availability of specialty or seldom-used tools.

   c. Worn, defective, or unusable tools should be segregated, so that they are not inadvertently used.

   d. Tools, equipment, and specialty tools should be included in the scope of a preventive maintenance program.

5. Discuss with the trainees the maintenance tool and equipment control, storage, and issuance policy.

CONCLUDING MATERIAL

Review Activity:

DOE
FM
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Field Offices
AL
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ID
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OR
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SR
OAK
RF

Area Offices
Amarillo
Brookhaven
Fernald
Kansas City
Kirtlant
Princeton

Facilities
ANL
KC Allied Signal
NBL
LBL
LANL
LLNL
ORAU
PANTEX M&H
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PPPL
RF-EG&G
SNL
NV REECo.
NV EG&G
OR OSTI
WHC
ID-EG&G
RF
SLAC
WSRC

Preparing Activity:

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