

WORK CONTROLS

1.0 SCOPE

This performance assessment guide for work controls will be used to carry out the oversight responsibility of the U.S. Department of Energy (DOE) Brookhaven Group. This guide was prepared to assist in conducting performance-based assessments of prime contractors and subcontractors to ensure that their work controls programs identify, disposition, and take corrective action on issues that affect satisfactory facility performance. The goals are to ensure that laboratory employees and the public do not experience injuries and illness as a result of work controls safety activities and that there is little or no economic loss to the Government.

Work controls assessments will be directed at DOE prime contractors and subcontractors working at DOE sites. DOE line management must ensure that contractors comply with DOE Orders and Federal and State regulations. Information developed from this assessment will determine the degree to which this is being done as well as the effectiveness of the laboratory's program.

2.0 ATTRIBUTES AND LINES OF INQUIRY

This section provides lines of inquiry to help assess whether the organization has implemented a program that ensures that work controls requirements are incorporated into line activities. This section will be used to evaluate the laboratory's line organization.

2.1 A formal, well-defined work request (or work order) system is in place to cover work performed, regardless of whether the jobs are repetitive or one-time tasks. The work request system ensures that jobs are identified, logged, planned and scheduled, performed, tested, formally accepted, and documented in a "user-friendly" manner.

- Is a work request (order) system established that clearly identifies the work needed and provides instructions to perform the work?

- Do the work request forms (work package) for facilities provide procedures and guidance for performing the work and allow documentation for:
 - Number sequencing?
 - Equipment and component identification?
 - Description of symptom, problem, or work requested and the responsible person identifying them?
 - Identification of crafts required?
 - Dating of document package?
 - Job priority?
 - Personnel safety?
 - Identification of the safety class of equipment or components or qualification requirements (such as environmental and natural phenomena qualifications)?
 - Applicable Technical Specification/Operational Safety Requirements, time restraints, and associated limiting conditions for operation?
 - Identification of special process requirements (such as special work permits, special work instructions, special training, and personnel qualification requirements)?
 - Work instructions, hold-points to allow inspections, special requirements, use of special materials or tools, test instrument ranges, accuracy, and cleanup requirements?
 - Required postmaintenance testing, inspections, and acceptance criteria?
 - Work supervisor or appropriate person in charge?
 - Applicable operating and maintenance procedures?
 - Description of work performed, as-found conditions, repairs made, cause-of-failure evaluations, identification of special tools and parts, calibration data, set points, adjustments made, and as-left conditions?
 - Cost code to which work performed is to be charged?

- Final reviews and sign-offs by maintenance, quality control, and other groups in the review process?
- Does the work request system provide a method for tracking work in process?
- Is a procedure established for performing and documenting emergency maintenance?
- Does the work request (order) system provide for control of modifications, in-service tests, preventive maintenance (PM), and surveillances?

2.2 A system of formal job planning and estimating is used to identify the required support, permits, hold-points, work procedures, and material requests that determine the total scope of work and address task sequencing and steps to completion. Outage planning promotes optimum outage performance by providing integration and coordination of all work elements.

- Are planning maintenance activities accomplished by a dedicated planning staff or by maintenance supervisors at facilities with small staffs? If done by a supervisor, does the workload allow time to supervise work in progress?
- Are adequate procedural controls established and implemented to ensure adequate job planning?
- Is in-depth work planning used to identify the required support and detailed scoping necessary to accurately schedule daily maintenance?
- Is involvement of such required support groups as operations, engineering, radiation protection, security, and quality control coordinated to effectively support the maintenance effort?
- Does preplanning obtain such necessary support items as special tools, other equipment, repair parts, and materials required to accomplish the work when needed?
- Does the planning process normally include such items as:
 - Definition of the problem and identification of the work scope?
 - Identification and review of necessary procedures, drawings, vendor manuals, and maintenance history?
 - Identification of needed and available data for use in analysis of maintenance problems?

- Procurement of necessary repair parts, materials, tools, and equipment?
 - Assessment of manpower and skill requirements?
 - Identification and review of resources, including other tasks scheduled to occur in the immediate area during the same time period?
 - Identification of initial facility conditions and prerequisites for work to be accomplished?
 - Identification of quality control and technical inspection requirements?
 - Establishment of equipment restoration and postmaintenance inspection or testing requirements?
 - Review of work instructions of work packages for completion; and
 - Identification of applicable maintenance and operation procedures?
- Are pre- and post-job briefings performed, as appropriate, to inform personnel on work to be performed and identify lessons learned?
 - Is advance planning performed and routinely updated for scheduled and unscheduled outages?
 - Are considerations such as work priority, work procedures and instructions, facility/system conditions, length of outage required, staging of documents and material, and coordination of support activities included in the advanced planning?
 - Is management of outages and planning for outages performed to minimize the duration of these conditions and to use the available time effectively?
 - Are pre-outage milestones established and timely corrective actions taken when milestones are not being met?
 - Does outage planning include the identification of necessary personnel to support the outage and consideration of contingencies that may occur?
 - Are elements of outage work separated into manageable segments that can be accomplished by a typical work unit on a definite schedule and entered into a tracking system to allow completion status to be monitored?

2.3 Work-hours required to perform a planned job through the utilization of estimating, the application of engineered standards, the use of job slotting techniques, or other industry-recognized methods are established to allow the determination of cost estimates, establishment of reasonable schedules, and measurement of productivity.

- Are planners trained in the use or application of work performance (time) standards?
- Are work performance (time) standards used, where possible, as one basis for job-cost estimates?
- Are work performance (time) standards used as time estimates to ensure that schedules for each job in the daily and weekly schedules are accurate?
- Are the standards reviewed and periodically updated based on actual times taken to perform the work?
- Are job-slotting techniques or other industry-recognized simplified methods used for applying time standards?
- Are travel or delay times that are used for planning derived from records or work sampling, where possible, or developed by the planner for the specific circumstances?
- Are productivity measurements obtained from the use of work performance (time) standards and reported as performance indicators?
- Are work utilization measurements obtained through the work-sampling process, reported as a performance indicator, and employed in conjunction with the maintenance backlog indicator to manage staffing levels with respect to the work backlog?

2.4 A systematic method of determining job priority or the importance of the work item to be performed is established and is based on safety, environmental, and facility concerns.

- Are the following items considered when assigning priorities: personnel safety; equipment repair urgency/limiting conditions of operations; operability of redundant equipment; critical path equipment; facility conditions required for equipment repair; repair or replacement parts status; and personnel availability?
- Are preventive maintenance and surveillance priorities established commensurate with personnel and facility safety, environmental protection, programmatic consideration, and value?

- Are corrective maintenance priorities established based on facility objectives and the relative importance of the equipment?

2.5 Maintenance procedures and other work-related documents (e.g., drawings and instructions) are used to provide appropriate work direction and to ensure that maintenance is performed safely and efficiently.

- Are compliance requirements for a given procedure clearly stated in the procedure or in other overall guidance and thoroughly communicated to each craftsman? (The normal two levels of compliance are: step-by-step compliance without deviation; or general intent compliance.)
- Are preparation, review, approval, and revision of procedures and other work-related documents properly controlled?
- Do documents used in lieu of procedures (such as excerpts from vendor manuals) receive the same level of review and approval as required for procedures?
- Are procedures and other work-related documents (such as vendor manuals, drawings, reference materials, and posted job performance aids) used in support of maintenance and are they technically accurate and up to date?
- Are procedures readily available and clearly identified?
- Are maintenance procedures established and utilized as necessary for the conduct of maintenance activities commensurate with the activity's importance to safety and security?
- Are new and revised procedures reviewed or verified for technical accuracy prior to use and checked or validated to ensure usability and correctness prior to or during initial use? (Validation is done in a shop or training environment on a mockup or simulator or by the craftsperson and supervisor during the first use of the procedure.)
- Are procedures clear, concise, and do they contain adequate information for users to understand and perform their activities effectively?
- Are portions or steps of other documents that are used or referred to when performing a procedure specifically identified in the procedure?
- Are technical details such as setpoints, control logic, and equipment numbers consistent among procedures, drawings, and system descriptions?

- Are human factors considerations incorporated into procedures to promote error-free performance?
- Are cautions, warnings, and hold-points (such as quality checks) included in the procedures, as needed?
- Is a policy governing the use of procedures and a procedure writer's guide implemented? Does the guidance include:
 - Procedures with purpose and scope?
 - Consistent formats for organization, instruction step format, caution and note format, and page format?
 - Methods to generate clearly understood text and ensure consistent use of illustrations?
 - Actions to be taken when procedures conflict or are inadequate for the intended tasks, or when unexpected results occur?
 - Allowances for identification and verification of steps that can be performed out of the written sequence?
 - Requirements for use of procedures in hazardous situations, such as working in locations where friable asbestos is present?
- Are temporary changes to procedures, if used, controlled through appropriate review and authorization prior to use and do they ensure user awareness of applicable temporary changes?
- Does a formal program exist to review procedures periodically for technical accuracy, human-factors considerations, and the inclusion of in-house and industry operating experience?
- Is a feedback mechanism provided for the maintenance personnel to change and/or improve the usability of the procedure(s)?
- Do the maintenance procedures provide systematic guidance to craftsmen; are they technically correct, complete, and up to date; and are they presented utilizing sound human factors principles?

- Does the maintenance procedures program document how procedures are to be prepared, verified, validated, reviewed, approved, controlled, updated, revised, and used?
- Does the maintenance procedures program specify where these procedures are to be located?

2.6 Scheduling and coordinating of corrective and preventive maintenance and modifications are performed in such a way that maintenance activities are conducted in the proper sequence, efficiently, and within prescribed time limits.

- Does an outage schedule provide for work element completion and testing and also provide management with information necessary to control outage activities?
- Are maintenance activities scheduled and coordinated avoid unnecessary removal of equipment and systems from service and provide better manpower utilization?
- Does the maintenance work-scheduling process incorporate a tracking system for identifying maintenance work requests being performed and postmaintenance testing?
- Is scheduling of daily activities based on accurate planning estimates to improve the use of craftspeople's time on the job?
- Is a priority system used to schedule work?
- Are weekly and/or daily job-scheduling meetings conducted and the resulting work schedules published?
- Are maintenance activities scheduled to ensure appropriate supervision and support is available?
- Are facility personnel, especially facility managers, apprised of scheduled maintenance activities that affect them, thus ensuring proper activity coordination?
- Does scheduling consider only those planned activities with complete work packages and with all materials and equipment for the job?
- Within the total available work hours, is time allotted for small call-in jobs, urgent jobs, or other unforeseen events?
- Is timely feedback of work progress to schedulers, supervisors, and management used to modify weekly and/or daily schedules, as necessary?

- Are planned and forced outages scheduled in a manner ensuring that required maintenance is performed within the time limits available and that opportunities for performing other needed maintenance are maximized?
- Does the outage schedule provide for the completion of work elements and testing and does it provide management with a clear, concise, and understandable method of tracking completion of outage milestones?
- Are supporting schedules developed where necessary?
- Are outage schedules updated on a timely basis to reflect changing conditions?
- When necessary, are deviations from the outage plan and schedule communicated to the proper level of management for action?

2.7 Postmaintenance testing is performed to verify that equipment, systems, and components fulfill their design function when returned to service following maintenance. The tests performed are commensurate with the maintenance work performed and the importance of the equipment to facility safety and reliability.

- Is postmaintenance testing performed, as appropriate, after corrective and preventive maintenance activities?
- Is the rigor of the testing performed based on the work done and the importance of the component or equipment to safe and reliable facility operation?
- Is the postmaintenance testing program clearly defined?
- Are test requirements identified by the appropriate technical authority?
- Is responsibility for determining postmaintenance test requirements assigned to functional groups such as operations, maintenance, and technical support?
- Is the scope of the postmaintenance testing program determined to help ensure that appropriate levels of testing are applied to facility equipment and that redundant or unnecessary testing is minimized?
- Is the status of equipment that has undergone maintenance tracked to ensure that all testing is completed prior to work closeout?

- Are proper postmaintenance tests conducted, the results documented, and the resulting data verified to have met acceptance criteria and obtained appropriate sign-offs?
- Is equipment that is important to reliable facility operation tested in accordance with approved procedures?
- Are postmaintenance test results documented and reviewed to ensure proper system/equipment performance prior to returning the system to service?
- For tests involving the participation of more than one support group, is one individual responsible for coordinating appropriate personnel (e.g., operations, engineering, and maintenance) to perform postmaintenance testing, review results, and take corrective action, as necessary?
- Is maintenance rework identified and documented?
- Are corrective actions, including periodic reviews for generic implications, taken to minimize rework?
- Is newly installed or modified systems/equipment verified to be in good working order by maintenance staff prior to operational acceptance by the facility staff?

2.8 Maintenance backlog (all outstanding corrective maintenance) is monitored to ensure that the condition of the facility is maintained consistent with the facility's mission.

- Is the maintenance backlog of work measured in estimated person-hours and the number of work requests? Is this used to adjust staffing, as required?
- Is the maintenance backlog monitored to ensure that proper priority is given to facility conditions important to safety, environment, and facility mission?
- Is deferred critical facility maintenance work documented and justified in writing by management?
- Is a maintenance work request considered part of the backlog from the time the work is identified until all actions are complete, including postmaintenance testing and administrative reviews? Is control maintained by identifying and verifying the status of all valid work requests?
- Is backlog reduced on the basis of prioritization and work significance?

- Is an analysis of maintenance backlog performed and does it consider items such as the following: ratio of preventive to total maintenance; ratio of emergency to non-emergency maintenance; and number of person-hours required to reduce backlog to zero?
- Are budget and labor levels evaluated against both the planned maintenance and the amount of work in the backlog?
- Is the total amount of backlog documented each fiscal year in the site maintenance plan?
- Are performance measures established to monitor the overall condition of the facility against the amount of work in the backlog?

2.9 An equipment repair history and vendor information program is established and maintained to provide historical information for maintenance planning and to support the maintenance and performance trending analysis of facility systems and components.

- Is equipment repair history used to support maintenance activities, upgrade maintenance programs, optimize equipment performance, and improve equipment reliability?
- Does the maintenance history program define what data are to be collected, how the data are to be recorded, and how the data are to be used?
- Are maintenance history records maintained for systems, equipment, and components that affect safe and reliable facility operations or that could improve productivity and result in cost savings?
- Is a cost-effective equipment history program in place, including only the equipment that warrants special evaluation based on its initial cost, cost to maintain, and impact on facility safety or operations?
- Are maintenance records closely correlated with the current issue of the facility master equipment list?
- Is the facility master equipment list a compilation of system and equipment and does it provide an engineering data base?
- Are maintenance history records considered in planning for corrective maintenance, modifications, and preventive maintenance, and development of facility life-cycle plans?

- Are maintenance history records readily available for use by supervisors, work planners, and maintenance or plant engineers?
- Is maintenance history periodically and systematically reviewed to identify equipment trends and persistent maintenance problems and to assess their impact on facility reliability?
- Do equipment maintenance and repair history files contain items such as the following: equipment and component identification, maintenance records, diagnostic monitoring data, vendor information (or a reference to this information), corrective and preventive maintenance or modification information, and spare parts information?
- Is the maintenance record a chronological list of all maintenance repair work and materials expended on a piece of equipment or component?
- Is equipment repair history data used for such activities as failure analysis, conduct of maintenance assessments, preventive maintenance, outage planning, budget preparation, reviews of DOE-wide experience, and plant life extension?
- Is vendor information that is obtained from suppliers controlled and indexed for ready retrieval?
- Are personnel using vendor manuals provided with technically adequate documents that can be relied on to provide the best available information?
- Is there a controlled vendor manual or information issuance program consisting of a controlled master set and verified satellite copies available for checkout?

3.0 STANDARDS AND REQUIREMENTS

3.1 Specific DOE Orders and Standards.

- DOE O 232.1A, "Occurrence Reporting and Processing of Operations Information."
- DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."
- DOE 2300.1B, "Audit Resolution and Followup."
- DOE 2321.1B, "Auditing of Programs and Operations."

- DOE 3790.1B, "Federal Employee Occupational Safety and Health Program, Chapter VIII."
- DOE 4330.4B, "Maintenance Management Program."
- DOE 5700.6C, "Quality Assurance."

3.2 Title 10 CFR Requirements.

- 10 CFR 830.120, "Quality Assurance for DOE Nuclear Facilities."

4.0 GUIDANCE TO ASSESSOR

This assessment guide is intended to assist in conducting a performance assessment of work controls. It is not to be considered as all inclusive, inflexible, or limiting reasonable assessment concentration when lines of inquiry responses dictate that an area must be more thoroughly probed.