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SECURITY
COMPLEX**

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MAINTENANCE PLANNING GUIDE

BWXT Y-12

Prepared by
R. A. Jago

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Prepared by
Y-12
Oak Ridge, Tennessee 37831
BWXT for the
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/s/ Jane A Nations Date:01/16/2007

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SIGNATURES

Approvals:

/s/ Rob Jago

Maintenance Planning - Section Manager (Rob Jago)

01/16/2007

Date

/s/ Steven K. Little

Maintenance Program Support - Department Manager (Steven K. Little)

01/16/2007

Date

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REVISION LOG**(Page 1 of 1)**

Revision Date	Description of Change	Section / Pages Affected
04/01/05	Guide developed	All
08/03/05	Editorial, non-intent changes (grammatical)	All
08/03/05	Updated manual to comply with Y18-012, <i>Integrated Work Control Manual</i>	All
08/03/05	Incorporated Appendices A and B to show work package examples	53 – 63
01/17/06	Added more detailed instructions to clarify existing wording. Also, added instructions for a Post Work Functional Check and a Post work Test.	All
01/25/06	Added Section 2.0 “Estimating”	8 – 9
08/17/06	Updated manual to comply with Y18-012, <i>Integrated Work Control Manual</i>	All
12/01/06	Allow Subject Matter Experts to approve Troubleshoot and Repair requirements	18 – 22
12/01/06	Editorial, non-intent changes and clarifications	All
01/16/2007	Added additional guidance on Ordering Materials	10
	Changed the Procedural reference for Dispatched Work from Y18-012 to Y/IA-422	12
	Added guidance on jobs dealing with Man-Made Mineral Fibers	41

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ACRONYMS AND ABBREVIATIONS

AHJ	Authority Having Jurisdiction
ALARA	As Low As Reasonably Achievable
CCEDS	Configuration Control Equipment Data Sheet
CMP	Planning Complete (SAP work order status)
CONOPS	Conduct of Operations
CW	Complex Work
DW	Dispatched Work
ES&H	Environmental, Safety and Health
HIW	Hazard Identification Worksheet
IH	Industrial Hygiene
JHA	Job Hazard Analysis
JS	Job Supervisor
LO/TO	Lockout/Tagout
MEL	Master Equipment List
MMMMF	Man-Made Mineral Fiber
MRA	Management Requirements Assessment
MSDS	Material Safety Data Sheet
MW	Minor Work
OSR	Operational Safety Requirement
PM	Preventive Maintenance
PIC	Person in Charge (when more than one JS is involved)
PPE	Personal Protective Equipment
PWT	Post Work Test
RadCon	Radiological Control
RP	Responsible Planner
RWP	Radiological Work Permit
SAR	Safety Analysis Report
SB	Safety Basis
SE	System Engineer
SFP	Shop Floor Paperwork
SME	Subject Matter Expert
SSC	Structure, Systems, and Components
TSR	Technical Safety Requirement
TS&R	Troubleshoot and Repair
WMC	Work Management Center
WO	Work Order

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1.0 INTRODUCTION

1.1 Overview

YIA-417, *Maintenance Planning Guide* provides maintenance planning guidance for the Y-12 Integrated Work Control Process that is identified in [Y18-012, Integrated Work Control Manual \(IWCM\)](#). This document provides practical, easy-to-follow instructions on how to plan maintenance work at Y-12. This guide is for use by maintenance planning personnel at the Y-12 National Security Complex operated by BWXT Y-12, L.L.C.

The *Maintenance Planning Guide* is divided into sections by functional topics of interest. Each section will complement the principles defined in [Y18-012](#). Examples are provided as visual aids.

Y-12 maintenance and service work is planned, using the graded approach based on hazard and complexity. There are three basic planning methods: Dispatched Work, Minor Work and Complex Work. Figure 1.A illustrates this graded approach based on hazard and complexity as it applies to work planning.

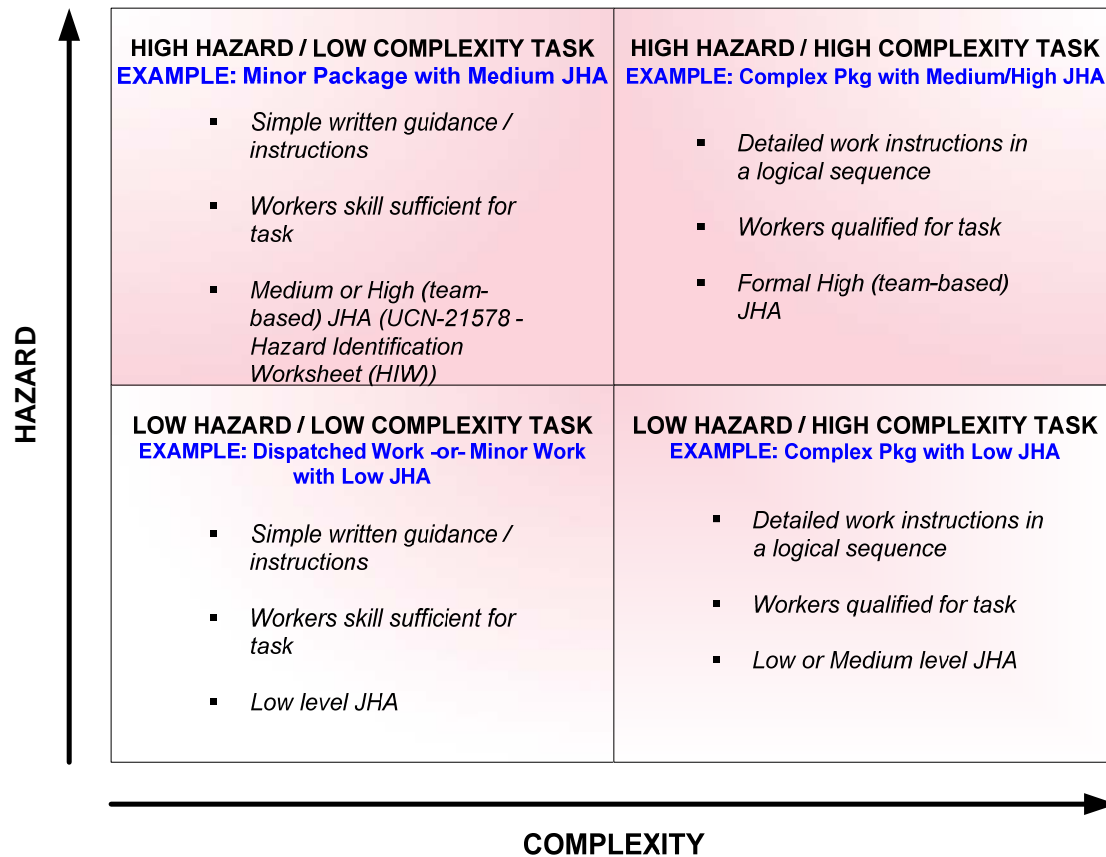


Figure 1.1.A Graded Approach to Planning

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2.0 ESTIMATING

2.1 Overview

Labor Estimating is the practice of predicting the amount of time and the disciplines required to perform a defined scope of work.

The WMC utilizes estimates to:

- Develop resource-loaded schedules
- Provides a prioritized list of jobs for planning
- Provide weekly resource-loaded schedules to job supervisors (JSs)
- Track weekly schedule adherence

The Responsible Planner (RP) should adhere to the following guidelines:

- All jobs will be estimated in SAP by completing the "number" and "duration" fields for each operation on the OPERATIONS tab of the Order [Example 2.1.A].
- All new jobs should receive a Rough Order Magnitude (ROM) estimate for each discipline within 48 hours of order creation. The ROM estimate also goes on the OPERATIONS tab of the Order with each associated task.
- Estimates will be in whole hours (1, 2, 16, etc.).
- Estimates will utilize the RP's knowledge and experience, published estimating standards, or previously completed jobs that are similar in scope.
- Additional input may be obtained from workers and job supervisors (JS).
- Each estimate will consider the time necessary to complete the following tasks:
 - Walkdowns
 - Planning activities
 - Locating, transporting, and staging materials
 - Job briefs
 - Travel to and from the job site
 - Entry into and exit from security areas
 - Work start approval
 - Donning and doffing of PPE
 - Hands-on work
 - Job site preparation and cleanup
 - Nominal personal time associated with the job
- Each ROM estimate must be revised as information about the job is obtained and before releasing the job for scheduling.

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Example 2.1.A Estimating Operations within a Work Order**Description:** Install a disconnect switch in the attic of building X. See John Doe for details.

Operation	Work Center	Long Text	Number	Duration
10	R16220CA	Carpenters: Install Scaffolding	2	6
20	R16250EL	Electricians: Install Disconnect	2	5
30	R16220CA	Carpenters: Remove Scaffolding	2	4

2.2 Estimation Tools

Use the following resources to develop an estimate:

- Published estimating standards (Should be used when available and applicable to the job, but are not mandatory)
- Previously completed jobs that are similar in scope
- Professional experience
- Knowledge of structures, systems, and components (SSCs)
- Walkdowns
- Craft workers and/or Job Supervisor (JS)

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3.0 ORDERING MATERIALS

3.1 Overview

The purchasing of parts and materials is required for many work orders (WOs). Materials required to complete a work order or to replenish benchstock that was used to complete a work order should be ordered from within the work order screen in SAP (Transaction IW32 under the Components tab). Refer back to the IWMS SMOS Planner Estimator Training for questions about this process. Materials may also be ordered via the [YBuy](#) user interface located on the Y-12 Homepage. If YBuy is used then ensure the work order number is used in the Cost Object field.

SSC or subcomponent parts shall be replaced with identical (“like-for-like”) parts, if available. Any substitute SSC or subcomponent part shall be “equal to” or “better than” the original part, per [Y15-003, *Equivalency Evaluation Process*](#). Follow Y15-003 when identical replacement parts are not available for a given SSC. Material substitutions must be performed under a complex work order. Like-for-like replacements or engineering equivalencies may be performed under a minor work order.

When parts and materials have been delivered, verify accuracy of items delivered (part number, size, material type, etc.) and check for suspect or counterfeit items. If delivered items are correct then stage them in a safe location. Change the WO status to “Planning Complete” (CMP) in SAP, as appropriate.

Create a job kit by placing parts/materials into boxes or bins (if needed) and staging all items in one group (job kit) within the staging area. If parts/materials are utilized from shop materials (benchstock), then physically control the parts/material by boxing or tagging them with the WO number. (Tagging the parts/materials ensures that the parts/materials are available for the specified job.) Write the WO number either on each box or on a tag attached to individual items. Include in the WO instructions the location of the staging area and job kit. Ensure that any materials with a shelf life are also identified in the WO instructions along with their expiration date.

Ensure that special handling is provided when applicable.

Use the SAP List or [UCN-21285, *Material and Spare Parts*](#) to identify the parts and materials required to complete the work request.

3.2 Safety Related Parts and Materials

SSCs designated as grade 1 or 2 (in accordance with [Y15-001, *Grading Criteria for Y-12 Facilities and Systems*](#)) are referred to as Safety Related in this guide. Replacement parts or materials for Safety Related components or sub-components must be listed on an approved Configuration Control Equipment Data Sheet (CCEDS) in accordance with [Y15-002, *Configuration Control Equipment Data Sheets*](#). The CCEDS form is [UCN-20770](#).

Procure the items that meet the requirements established in [Y60-701, *Procurement Quality*](#), [Y60-702, *Division Technical Review of Procurement Documents*](#), and [Y60 705, *Acquisition, Control, and Traceability of Safety SSCs*](#), as applicable. Ensure that the documentation that was attached to the items in controlled stores is included in the work package instructions.

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After the CCEDS has been completed and is routed for planning, record the required information from the CCEDS in the material list (SAP List or [UCN-21285, Material and Spare Parts](#)). Procure the Safety Related item(s) as specified on the CCEDS AND place the CCEDS in the work package instructions.

Use **HOLD POINTS** in the WO instructions to verify that all safety related materials or spare parts installed during the execution of the job are the ones specified in the work package instructions.

Examples 3.2.A HOLD POINT for Safety Related Materials

HOLD POINT:

Job Supervisor/Craft, verify and sign below that the replacement part for Valve 10001001 is listed on the CCEDS with the identified model number and matching specifications before proceeding with step 4.09.

Job Supervisor/Craft Signature

Badge

Date

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4.0 DISPATCHED WORK AND MINOR WORK

4.1 Dispatched Work

Dispatched Work (DW) involves a work scope that is predefined in [Y/IA-422, List of Pre-Approved Dispatched Work](#). The scope of DW will provide enough detail for the performance of work. Formatted work instructions are not used for DW.

If the WMC should send a dispatched WO through planning, then ensure the scope is sufficient to describe the work to be performed and any limitations that may apply before sending the WO to the JS.

It is the responsibility of the RP to order either the materials required to perform work or benchstock materials that were used during work execution.

4.2 Minor Work

The criteria for work to be planned and performed as minor work (MW) are located in [Y18-012, Table 3.1 Planning Process Screen](#).

MW involves a work scope that is bounded by written criteria, such that workers can perform the work using existing skills or qualification with minimal work instructions. Although the scope generally provides enough detail for the performance of the work, written work steps may be used to provide further clarification. Create and develop the scope so it is sufficient to describe:

- A comprehensive description of the minor maintenance work expectations
- The exact location and master equipment list (MEL) unique identification number (if there is one) for SSCs involved in the work
- Boundaries and limitations of requested work
- The functional tests and acceptance criteria necessary to demonstrate that the SSC has been restored to operation
- Direct correlation between the defined scope and all operations associated with the WO
- Hazards and associated controls from the Hazard Identification Worksheet (HIW) that was completed during the scoping walkdown
- The logical order in which the work should be performed
- The responsible person for each work step or action statement

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Example 4.2.A Minor Work Order Scope Statement**Work Order Description**

Vacuum Station 2 roughing pump will not run (caused by power outage). Need Outside Machinists to replace the roughing pump. Jane Doe is Operations contact (576-1234).

Scope Statement

Vacuum Station 2 roughing pump: remove and replace the #2 roughing pump on IMOM station

Operations: Turn system off at control panel, furnish new pump, dispose of removed pump.

Outside Machinist: unplug power cord to pump. Remove and replace roughing pump.

Functional check: Roughing pump runs and does not leak water. If functional check is satisfactory then initial below. If unsatisfactory, then document failure and return package to planning.

Initial

Date

4.3 Format for Shop Floor Paperwork

1. SHOP PAPERS

- a. Order page.
- b. Include signature page where required.

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5.0 MODEL WORK

5.1 Overview

Model Work maximizes efficiency in the repetitive work process. Activities that have very similar work scopes with similar hazards and controls should be made into model work packages to prevent the need for re-planning each time the activity is performed. Model work packages are pre-approved as adequate for the requested work scope prior to issuance. A model work package can be used for either many different pieces of equipment with the same types of components or a single piece of equipment that has recurring work. Follow the [model work packages link](#) to view existing documents. Contact your maintenance planning supervisor (MPS) if you have a question concerning existing models or if you would like to add a model work package to the list.

Once a model work package has been approved for use it may be incorporated into an SAP Task List. Within SAP, task lists are associated first with a *Group* name and then with an incremental counter number. The *Group* name should be derived from the Master Equipment List (MEL) abbreviation for *Object Type*. One *Group* name may have many associated task lists. Each task list under a *Group* will have an incremental number assigned automatically (1, 2, 3...). Each task list is allowed both a forty character short text description and a long text description field. The forty character description should mirror the following format: Equipment type/abbreviation → Description of equipment → PM/CM → Backlog. Leona Lewis (LN9) is responsible for approving *Group* names and may be consulted for help in this area.

5.2 Requirements

The appropriate MPS will review and approve all model work packages prior to inclusion into the Model Work Package Manual used by the WMC. Prior to approval, the MPS will verify compliance with applicable Work Control procedures ([Y18-012](#); [Y73-045](#), [Job Hazard Analysis Manual](#), etc.) and the following:

- Scope
- Identified hazards and controls
- Post Work Test (PWT) criteria
- Formatting
- Signature space for JS to approve model work package
- HOLD POINT and Signature usage
- Material List

The MPS will review (quarterly) the Model Work Package Manual within each WMC to ensure that current revisions of approved model work packages are included. A signature sheet will be required in each manual.

The MPS will use the most current [Work Package Review Check Sheet](#) to review (quarterly) a sampling of completed model work package. This review will facilitate the continuous improvement of the repetitive complex work process by identifying areas needing improvement and areas of misuse.

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6.0 COMPLEX NEW WORK

6.1 Overview

Complex work without a pre-approved model work package is categorized as New CW and usually requires more detail than MW along with the coordination and support of multiple craft disciplines. CW can also include details, requirements, or measurements beyond the normal craft knowledge, thus requiring detailed work instructions. [Y18-012, Chapter 3 Plan Work](#) provides the basic structure for planning a complex WO.

Corrective maintenance, fabrication work, routine/repetitive work and some operational activities where craft support is required may be developed as CW. CW may involve performing a modification requiring engineering design.

Drawings should be used, when available, to assist in adequately planning maintenance work for identification of the hazards and controls, to understand the system and the effects the work may have upstream and downstream of the component, identification of the correct components and to avoid delays. If the system is not understood, craft workers may become confused as to the work to be performed. In the event that needed drawings are not available or supplied, contact your MPS for further guidance.

6.2 Work Order Development

Collect information related to the work scope, facilitate the Job Hazard Analysis (JHA), perform required walkdowns, and seek guidance from subject matter experts (SMEs) on the following topics:

- The safety of personnel, the general public, and the environment
- The protection of equipment and material.
- Inadvertent, incorrect, or omitted actions that could cause system operation shutdown or could impact Technical Safety Requirements (TSR)/Operational Safety Requirements (OSR)
- Applicable codes or technical specifications that cover the equipment to be repaired
- Limitations identified in vendor information and design
- Unusual alarms that could occur or are expected to occur as a result of the performance of work
- Actions that could result in automatic shutdown or activation of any engineered safety features
- The reduction of personnel or environmental exposure to radiation, contamination, electrical shocks, dangerous chemicals, fire hazards, confined spaces and moving or rotating equipment
- The applicable Material Safety Data Sheet (MSDS)
- Any preparatory field activities that must be completed before proceeding with the specific task instructions

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- Confirming that proper nomenclature is used in accordance with the Conduct of Operations (CONOPS) manual and used consistently throughout the document
- Equipment identification numbers or other nomenclature found on the equipment in the field matches the equipment specified in the WO
- Confirming the correct system lineup before work commencement
- Specific training or qualification requirements specific to the WO
- Performance of an outage
- Material list
- Impacts to emergency preparedness
- Required design change
- Lessons-learned
- Potential error causing situations
- Technical resources including Manufacturer's data, ANSI standards, ASME standards, IEEE standards, and others as applicable

All complex WOs, regardless of specific details, should contain the following information:

Subsection	Description
1	Purpose and Scope
2	Prerequisites and Pre-Job Briefing
3	Precautions and Limitations
4	Work Package Instructions / Contingency Planning
5	Attachments / References
6	Comments

Specific criteria per subsection can be found in [Section 9.0, Formatting](#). Each subsection is covered under the corresponding subsection number (9.1, Purpose and Scope, 9.2 Prerequisites..., etc.).

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7.0 TROUBLESHOOT AND REPAIR WORK ORDERS

7.1 Overview

Troubleshoot and repair (TS&R) WOs are to be used when the proper repair method is unclear or when trying to correct the root problem and not just the symptom of the problem. Work package instructions should be written to troubleshoot the problem in order to identify the conditions that cause the failure, steps to repair the deficiency, and documentation of the corrective action taken to prevent recurrence.

The SCOPE statement of TS&R packages MUST clearly establish BOUNDARIES. It is important to control intrusive field TS&R work. If guidelines are not included in the work package then the scope of work may be exceeded, JHA boundaries and controls may be unclear or exceeded, or unauthorized repairs and modifications could result in further complicating the root problem.

The following guidance does NOT apply to TS&R WOs performed on SSCs, such as radiation detection, computers, EIR traffic, breakers, numerical controls/computerized numerical controls, pumps, and instruments. These SSCs are usually planned as MW and should incorporate the applicable guidelines from [section 7.2](#) along with conditions (“As Found” and “As Left”) and specific criteria for the functional test. The RP should write the functional test to validate that the work requested in the scope has been completed.

The following activities do NOT impair the proper functioning of SSCs and are thus exempt from Section 7.

- Non-intrusive field troubleshooting
 - Vibration sampling/analysis
 - Fluid sampling/analysis
 - Temperature probe monitoring/analysis
 - Infrared thermographic monitoring/analysis
- External visual inspections
- Painting
- Lubrication
- Monitoring voltage and current that does NOT require any physical disconnect

7.2 Work Package Guidelines

Establish the boundaries for performing intrusive field TS&R in the work package instructions by limiting activities based on equipment boundaries, SSC boundaries, and/or JHA hazard and control boundaries.

Define the scope of repair work, such that it clearly establishes boundaries, is directly related to the diagnostics performed, and remains within the bounds of the WO hazards and controls.

Based upon the diagnostics performed, ensure that the repair includes a bound materials list and incorporates post work testing and return to service criteria.

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After developing the troubleshooting boundaries and methodology, review the draft work instructions with SMEs (system engineer (SE), equipment owner, operations personnel responsible for the equipment, etc.), training, Safety Basis (SB) documentation, vendor manuals, equipment manufacturers, procedures, applicable system/circuit drawings, and vendor drawings, as needed.

Insert a step that instructs the performers to stop work and return the WO to the RP to rework the JHA hazards and controls, if problems or conditions are encountered that were not anticipated or covered under the JHA, or the boundaries of the intrusive TS&R need to be modified or changed as the job progresses.

Insert a step that requires the performer to record the following conditions:

- As-found and as-left conditions of the affected SSC
- Abnormalities observed during equipment operation (e.g., bearing noise, loose conductors, signs of overheating, smoke, vibration)
- Lifted leads in accordance with [Y15-187, *Integrated Safety and Change Control Process*](#)
- Troubleshooting results and/or repairs
- Installation of a Lockout/Tagout (LO/TO)

Insert a step that instructs the performers to tag and retain parts removed during the intrusive TS&R if the Maintenance and/or System Engineers intend to conduct further investigation and analysis.

Insert a step allowing performers to replace electric circuit cards as needed.

Initiate a new WO for any follow-up corrective or preventive maintenance (PM) beyond the scope of the original troubleshoot and repair WO or the boundaries of the JHA.

7.3 Post Work Testing and Return to Service

Follow the guidance provided in [Y18-012, Chapter 4, *Develop Post-Work Test & Return to Service Requirements*](#) for developing the PWT and return to service requirements.

If the WO is a troubleshooting work order, the SE/SME will determine the PWT requirements after the troubleshooting and repairs have been completed. The RP will leave a lined section in the WO instructions for the SE/SME to write in the PWT requirements followed by a signature and date line.

The RP inputs a space in the work order to record the data specified by the SE/SME, including ID and calibration of any instruments or other equipment required to complete the PWT.

Example 7.3.A Instrument ID and Calibration		
Instrument(s)	ID Number	Calibration Due Date
Biddle 500 V megger	135790	08/14/05
Fluke 29 Multimeter	246891	06/01/05

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Example 7.3.B Example of Troubleshoot and Repair Work Package Instructions

Scope: Troubleshoot and repair loud, high-pitched squeal on A/C unit Y-F-920103-HVAC-001; 9201-3, 1st floor, Northwest corner, room 101. Mechanical troubleshooting shall be confined to A/C unit. Electrical troubleshooting shall not go past 1st protective device (e.g., breaker or disconnect). (*Note to RP: Ensure the boundaries are clearly annotated in the scope.*)

- 1) Craft(s) (*RP specify*), troubleshoot to identify problem on A/C unit Y-F-920103-HVAC-001. Document the as-found condition. Include any abnormalities observed (e.g., bearing noise, loose conductors, signs of overheating, smoke, vibration, loose belts, etc.):

- 1.a) Document any lifted leads:

- 2) Document Repairs (*Note to RP: If SSC is Grade 1 or 2 then SE must specify repairs to be made in the space provided below and a signature/date line must be added.*)

_____ Date: ___/___/___

(System Engineer's Signature)

- 2.a) Material(s) used during repair

- 3) SE/SME to document Post Work Testing and Return to Service Requirements below:

PWT Requirements: _____

RTS Requirements: _____

_____ Date: ___/___/___

(SE/SME's Signature)

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Example 7.3.B Example of Troubleshoot and Repair Work Package Instructions

- 3.a) Authorization is given for the performance of PWT on equipment # HVAC-001.
(Note to RP: PWT Authorization is only required when deemed necessary by Operations.)

_____ Date: ___/___/___
 (Authorizing Manager's Signature)

- 3.b) Perform PWT as specified in Step [3] (*RP Update number*) on equipment #: HVAC-001.
 Test Results: [] Satisfactory [] Unsatisfactory

 _____ Date: ___/___/___
 (PWT Performer's Signature)

- 4) System/equipment has been returned to service per SME's instructions in Step [3] (*RP Update number*).

 _____ Date: ___/___/___
 (Shift Manager/Building Manager's Signature)

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8.0 MULTI-CRAFT WORK PACKAGES

A multi-craft work package is a WO that requires more than one craft discipline to perform the requested work. Multi-craft WOs are planned using criteria from Sections 4, 6, and 9, but with added coordination of and detail to the logical sequence of work, numbering of work steps, **HOLD POINTS**, etc.

Use the principles defined in [Y18-012](#) and also in this *Maintenance Planning Guide* to formulate a multi-craft work package. For a pre-formatted document, follow the link to [EXAMPLE MULTI-CRAFT SAMPLE WORK INSTRUCTIONS](#). After saving the document on your computer, the generic text should be replaced with job-specific information.

Instruct the worker to sign the Shop Floor Paperwork when an operation is complete. It is also acceptable to provide a signature/badge/date space in the work instructions.

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9.0 FORMATTING

The acceptable standard font for WO instructions is Times New Roman 12. Sections 9.1 through 9.6 are mandatory fields in a complex WO. Sections 9.1 through 9.6 may be applied to MW as needed.

9.1 Purpose and Scope

The Purpose and Scope subsection provides space for the planner to write a description of the job scope, include a “what, where, and why” statement and main task steps. A purpose and scope is required in all work orders. This is the “scope of work” statement that includes sufficient detail to enable the worker performing the job to understand work performance requirements, including:

- The symptoms of the problem.
- Customer requirements: Define the expected result of the work to be performed.
- The boundaries/limitations of the work to be performed.
- Specific scope definition. Do not allow broad work scopes that would give the perception of usage as a blanket WO.
- Unique SSC numbers or identifiers to ensure that the work is clearly identified, including deficiency tag numbers and room numbers.
- Systems/Processes affected by work.
- The person/organizational position that will authorize work to commence, SSC Engineer (if assigned to WO), requester, and alternate contact names and phone numbers.

Example 9.1.A Purpose and Scope

1. Purpose and Scope

Replace the broken fan belt and sheave on exhaust fan Y-F-920103-HVAC-EF-001, located at the top of the wall in northwest corner of Room 107. See requestor D. Building Manager (555-5555) for work start or L.A. Fallon (555-5556) for additional information.

Example 9.1.B Specific Scope Statement

Original draft of Work Scope:

Replace steam valve SV-BOI-02 located above Boiler No. 1.

More detailed Work Scope statement could be as follows:

Steam valve SV-BOI-02 (10000010) is leaking around the stem. SV-BOI-02 is located in building 9301-4, adjacent to the north mezzanine, above Boiler No. 1. See requestor D. Building Manager (555-5555) for work start or M. R. Utility (555-5556) for additional information.

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9.2 Prerequisites and Pre-job Briefing

The Prerequisites section identifies tasks or conditions, in addition to the pre-job briefing and workability walkdown, which must be completed or established before the WO is worked in the field. Provide adequate information to assist the building/operations manager in reviewing the WO for operational access authorization. The initial conditions and prerequisites are in step or list format.

Example 9.2.A Examples of Initial Conditions and Prerequisites (other than pre-job briefing and workability walkdown)

- Lockout/Tagout of Hazardous Energy Source.
- Completion of a component alignment sheet in accordance with Conduct of Operations, “Chapter 8-Control of Equipment and System Status.” (SSC Grade 1, 2 and Vital Safety Systems)
- Radiation Work Permit completed.
- Radiological support/surveys.
- Industrial hygienist sampling.
- Required notifications such as personnel at other site areas affected by the work.
- Outage initiated and open.
- Confined Space Entry Permit completed.
- Authorization to begin work.
- Required facility initial conditions such as exhaust fans running or positive pressure established.
- Required SSC condition(s) configured to avoid a violation of Safety Analysis Report (SAR) requirements, Operational Safety Requirements (OSR), Technical Standard Specifications (TSS), Technical Safety Requirements (TSR), or Technical Specifications (TS).
- Materials received and staged.
- Mockups, Dry Runs, or Drills completed.
- Special tools/equipment staging requirements, such as a crane or emergency response equipment.

Identify any **special** requirements to be covered by the JS during the pre-job briefing. The SAP Shop Floor Paperwork (SFP) includes a check box to indicate what type of pre-job briefing was performed. If needed, instruct the JS and performers to complete a workability walkdown before commencing work. They may perform the workability walkdown at the time of WO performance because of job site conditions, such as radiation levels.

Example 9.2.B Pre-job briefing and Walkdown

Job Supervisor to hold a Pre-Job Briefing and (if needed) workability walkdown with the crew to ensure the workers understand the scope of work to be performed, the work instructions are clearly defined, and review the JHA with the hazards involved and the controls to mitigate the hazards in the JHA. The Job Supervisor is to sign the Pre-Job Briefing Checklist upon completion of the briefing.

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Identify special training for the crew performing the work (beyond basic craft training) and special or unique skills required to perform this job (e.g. training in proper use of special test equipment or qualification beyond the normal craft skills). Special training should be identified before or in the step in which the training is required. The appropriate SME may approve alternate training completed in lieu of the training identified. If all steps or crafts do not require the training to complete the entire job scope, then identify the craft or task steps for which the performer is expected to have the training. The special training/skill requirements are listed in table format.

Example 9.2.C Example of Special Training Format	
Special Skill/Training	Craft(s)
Confined Space Training	All Crafts
HEAT Training	Electricians
Scaffold Competent Person	Carpenter

Example 9.2.D Examples of Special Skills and Training	
• Confined Space Trained	• Aerial Lift Operator Qualified
• At Risk Worker Fall Protection Qualified	• Incidental Overhead Crane/Hoist Rigging Qualified
• Portable Ladders	• Facility/Process/System Specific training
• Powder Activated Tool	• Compressed Gas
• Asbestos Awareness	• Personal Protective Equipment
• Halon Extinguishing Systems Awareness	• Clean Agent Extinguishing Systems Awareness
	• Laser Training
• Certified Refrigeration Worker	• Radiation Worker Training
• Respirator Fit Training	• Back-Flow Prevention Training
• Relay Maintenance Training	• Thermography Training
• HEAT Training	• Lead Training
• Working in Hazardous Temperatures - Heat Stress	• Working in Hazardous Temperatures - Cold Stress
• Scaffold Competent Person	

Mockups, Dry Runs, or Drills can yield three important benefits: training, meeting ALARA (As Low As Reasonably Achievable) goals, and work process validation. The use of mockups, dry runs, or drills is considered for tasks where more than one of the following conditions exists:

- High radiation levels.
- High radioactive contamination levels.
- Hazardous/toxic chemicals.
- Harsh/hazardous environment (heat, cold, noise).

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- Task not routinely performed or personnel are not familiar with the specific work task(s).
- Complex work.
- Sensitive/vital equipment is involved where work must be performed correctly the first time.

Mockups, dry runs, and drill instructions should be listed in table format with the craft(s) required to participate listed beside each step.

Example 9.2.E Mockup/Dry Run/Drill Instructions	
Mockup – Dry Run – Drill Instructions	Crafts
Establish high radiation area similar in size to job site area with boundaries, signs and barriers.	RadCon Technicians
Set-up electrical panel simulator in “simulated” high radiation area.	Electricians
Perform pre-job briefing including review of RWP.	All crafts
Don anti-c’s and respirator as per RWP and enter high radiation area.	Electricians
Open electrical panel and replace circuit breaker.	Electricians
Don anti-c’s and respirator.	Electricians
Proceed to survey station and frisk.	Electricians
Perform post dry run review.	All Crafts

Develop a list of special tool/equipment requirements that each craft person need to perform the job. These special tools and equipment are listed in table format [Example 9.2.E and Example 9.2.F]. This includes tools or equipment that:

- Are not normally expected to be readily available to the worker.
- Require checkout from a tool crib or other equipment pool.
- Require proof of satisfying quality requirements, such as a calibrated test instrument.
- Require special staging to meet contamination or access control requirements.
- When a calibrated/inspected tool/equipment is used, ensure that there is a step in the Work Instructions for the JS to record the M# and calibration/inspection date or record on Data Sheets.

Example 9.2.F Special Tools Section Format	
Required Special Tools and Equipment	Location
Calibrated Voltmeter	Bldg. 523 Tool Crib
Bucket Truck	Bldg. 524
Traffic Barricades	Bldg. 525

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Example 9.2.G Special Tools and Equipment List

- | | |
|--|--|
| <ul style="list-style-type: none"> • Bucket Truck • Scissor Lift • Man-Lift • Fall protection gear • Calibrated volt-meter • Calibrated megger • Calibrated torque wrench • Special Fabricated Tools | <ul style="list-style-type: none"> • Air compressor • Generator • Special Chemicals • Power tools • Hydraulic Pumps • Sump Pumps • Slings & Rigging |
|--|--|

9.3 Precautions and Limitations

Write precautions and limitations to inform the performer of hazardous conditions to be avoided and boundaries not to be exceeded. Include hazardous conditions that may exist or be encountered during the task. Do not use action steps in this section. If action is required by performers to respond to precautions or limitations, insert the precautions or limitations immediately prior to the action steps in the task instructions in the form of **WARNINGS, CAUTIONS, or NOTES**.

Consider the following when preparing precautions and limitations:

- The safety of personnel and the general public
- The protection of equipment and material
- ALARA considerations
- Exposure reduction of personnel or environment to:
 - Radiation or contamination
 - High temperature or high-pressure fluids
 - Dangerous chemicals, poisons, or asbestos
 - Electrical shocks
 - Excessive noise levels
 - Confined space hazards
 - Moving equipment or parts of equipment
 - Fire hazards
 - Fall hazards
- Limitations identified in approved vendor information
- Limitations identified in applicable design documents
- Unusual alarms affecting facility availability that may occur or are expected to occur as a result of the performance of the task

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- Mechanical or electrical bypasses (lifted leads, jumpers, and fuse removals) used in the performance of the task
- Electrical and mechanical interlocks involved in the performance of the task and those interlocks that are to be conformed to or overridden
- Administrative direction provided by other levels of management
- Actions that result in automatic actuation of any engineered safety feature
- Undesirable consequences of omission of each precaution or limitation statement if these consequences are not obvious

Those precautions and limitations that affect facility equipment operation or entry into Limited Condition of Operation (LCO) should be grouped in a single subheading titled “facility effects”, or similar, to facilitate work package instructions review by operations.

Example 9.3.A Precautions and Limitations

Precautions and Limitations:

1) **Facility Effects:** Disabling Fire Panel 4-93 results in the facility entering a Limited Condition of Operation (LCO), and requires posting of a fire watch at the time specified in the work package instructions.

2) Steam valve SV-BOI-02 contains high-pressure steam. Ensure zero pressure within steam line No. 2-891 located above Boiler no. 1, per the work package instructions, prior to commencing repairs listed in these work package instructions.

3) Line RW-2-87 contains radioactive fluid that exposes those present in the area to high radioactive doses. Limit stay times in this area to ALARA, as specified in these work package instructions.

4) Steam valve SV-BOI-02 is located in Vault 4-78, which is a **CONFINED SPACE** that may not contain sufficient air for safe breathing. Observe the precautions and limitations imposed by the Confined Space Permit required by these work package instructions.

9.4 Work Package Instructions and Contingency Planning

The most clearly understood work package instructions include the needed information at the proper steps within the work package instructions, thus eliminating the need for work performers to shift between work package instructions and attachments. If possible, avoid attachments to work package instructions, since they require the worker to shift between the work package instructions and the attachment in order to perform the work. If attachments must be included, then list the attached instructions, drawings, forms, vendor manuals, or other documents used directly in the performance of the task, but avoid “information only” attachments. Additional work package documents will be filed in the WO history file in the appropriate WMC.

When feasible, the required controls, mitigations and documentation are incorporated into a single set of work package instructions, precluding the need to refer to a separate permit or procedure. The intent is to consolidate the craft directions, **HOLD POINTS**, survey requirements and permit information into the work package instructions whenever possible. These

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considerations minimize the need for the craft to jump between different documents when performing the work. Some permits or documents may not allow this and should be included as separate documents (attachments) into the work package instructions.

Work instructions can be one of the following three types:

- Unnumbered instructions for low hazard complex work
- Numbered step instructions for more complex work
- Project work instructions, which will be numbered and very detailed for the entire project or phase

The planner's objectives are to:

- Write work package instructions that are clear and precise, technically accurate and complete, and can be performed as written without unnecessarily increasing risk.
- Write instructions that are void of format or other administrative errors that could contribute to human performance errors.
- Specify the responsible craft for each work step or group of work steps and clearly state the actions.

Insert the required provisions of any permits into the work package instructions immediately prior to the affected work step(s). If this is not possible or practical then reference the permit immediately prior to the affected step(s). Permit numbers can be referenced in work package instructions as needed.

If appropriate, include the allowable sequence for performing steps. Critical steps and error-prone activities (such as the possibility of incorrectly orienting or installing a part) are identified in the instructions. Appropriate checks, reviews, and approvals are imbedded in critical steps or segments of the instructions to ensure they do not result in errors.

For PM WOs, provide a blank to record the "as found" condition of the equipment if necessary. If more than one component is listed on a common PM WO, insert blanks to record the as found condition for each component. IF a procedure, memo, etc. is being replaced by "approved" work package instructions, then Work Package Instruction approval must be established with the signature /badge/date of the RP and SME or equipment owner/customer, as a minimum. A unique document identification number may be assigned as needed.

Develop specific task instructions with input from the following, as appropriate:

- Work Management Center
- Maintenance
- Engineering
- Operations/Production
- Crafts
- Safety SMEs
- Quality

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- Other organizations required by the JHA

WO input that the RP obtains from the Work Coordinator includes:

- Code requirements
- Configuration change work package instructions
- Criticality safety information
- Drawings and sketches
- Fire barrier requirements
- Management Requirements Assessment (MRA) for PMs and revisions
- PWT instructions and data required with acceptance criteria.
- Required **HOLD POINTS**.
- Safety related materials and parts requirements.
- Temporary modification information.
- Unreviewed Safety Question Determination (USQD)
- Welding specifications.

Develop work instructions that use minor tasks whenever possible. The detail of the work steps should increase as the levels of hazard and complexity increase. **Hazard controls should be placed prior to the single step or group of steps that they reference.**

Instruction to perform a LO/TO is included either in this section of the WO or in the specific step of the work package instructions if required by the work sequence. If a LO/TO is required, a **HOLD POINT** is provided for the JS or Issuing Authority to sign for verification of the LO/TO.

Complex WOs will be step-by-step compliant (in sequential order, without deviation) unless otherwise specified as general intent (may be completed in any logical order). The following tasks are always step-by-step compliant instructions:

- Isolating/restoring energy source, including lockout/tagout instructions included in the work instructions instead of the prerequisite section.
- Tasks that must be completed before another craft/organization perform their assigned task. This excludes tasks that can be performed in parallel by separate crafts.
- **HOLD POINTS** requiring witness, inspection, verification, data collection, or onsite SME evaluation and input.

A WO may be comprised of both step-by-step and general intent work steps. If both step-by-step and general intent work steps are used in a WO, the RP should:

- Indicate by use of a **NOTE** preceding the affected work steps or group of steps that allow general intent compliance in the body of the WO. The worker performs general intent tasks in a logical sequence to complete the work using standard industry practices and past experience.

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- Indicate by the use of a **NOTE** preceding the affected tasks, when the worker will continue using a step-by-step sequence.
- All steps prior to a **HOLD POINT** must be complete before proceeding past the **HOLD POINT**.
- A new **NOTE** designating that general intent work steps are acceptable for the following task steps must be inserted after a **HOLD POINT**.

Example 9.4.A Indicating both general intent and step-by-step work steps

NOTE: Tasks X.3.1 through X.3.8 may be worked out-of-sequence within the prescribed work scope and environmental, safety, health, and quality requirements for this WO.

[This would be the location for instructions to tasks X.3.1 through X.3.8.]

NOTE: Perform work step-by-step sequentially for tasks X.4 through X.9.

[This would be the location for instructions to tasks X.4 through X.9.]

Use conditional action steps to direct the performer to an applicable step, or to bypass the applicable step. Conditional action steps are used when the performer bases a decision upon the occurrence of a condition or a combination of conditions. Conditional action steps use the following terms:

- IF or WHEN to present the condition
- THEN to present the action
- OR or AND to present more complex conditions
- NOT to negate the condition

Examples of when the planner uses a conditional step include:

- To provide direction for when a step may not be performed, "N/A" is acceptable to be entered in the blank.
- To identify required repair actions following a step-by-step evaluation that identifies the reason for failure for a piece of equipment.
- To specify the allowed required adjustment to a component during a PM that identified a parameter out-of-specification

When writing a conditional step, describe the condition first and then describe the action to be taken if that condition exists. The conditional terms are emphasized. By convention, conditional terms are usually capitalized and underlined.

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Example 9.4.B Conditional Action StepIF the contacts need to be repaired,THEN remove the contact pieces from the breaker, make repairs, and reinstall pieces.IF work steps 2.3 to 2.5 correct the valve failure,THEN mark steps 3.1 to 3.4 not applicable and proceed to step 4.0.

Use equally acceptable alternative action steps, when it is beneficial for more than one action step to be acceptable. It is important to ensure that only one alternative is performed.

Example 9.4.C Alternative Action StepPerform **ONLY ONE** of the following actions:

Set switch S-7 to the “ON” position and switch S-9 to the “OFF” position

N/A**OR**

Set switch S-9 to the “ON” position and switch S-7 to the “OFF” position

✓

Provide a signature/badge/date line for work steps that require witness, inspection, verification points, or data collection, including:

- Specific interim and final witness, inspection, or verification points, as identified by Engineering, Environmental, Safety and Health (ES&H) discipline, or Quality.
- Identification of steps that could initiate an equipment shutdown, transient, initiation, or interruption of any process action.
- The first craft group verifying and accepting the LO/TO or clearance at an appropriate place in the WO.
- Identification of steps that inform Operations personnel of expected alarms or equipment operations.
- Specific safety **HOLD POINTS** such as radiological control (RadCon) **HOLD POINTS** as identified by Radiological Safety, or air quality monitoring as identified by Industrial Hygiene (IH).
- Authorization of activities cited or credited in Authorization Basis (AB) documents.
- RCRA operating record.

Use an initial space for the JS to identify completion of a section of work steps that must be completed before turning over the WO to another craft.

Multiple craft signature/badge/date lines or a single JS signature/badge/date line can be inserted when oversight is appropriate for verifying completion of a grouping of steps

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simultaneously performed by several crafts or when transition to another task requires the coordination of multiple job supervisors.

Example 9.4.D Multiple Craft Signatures	
XX.0 Pipefitter work is completed in work steps X3.0 to X7.0.	
Pipefitter Signature: _____	Badge # _____ Date: __/__/__
Outside Machinist work is completed in work steps X8.0 to X12.0.	
Outside Machinist Signature: _____	Badge # _____ Date: __/__/__
<u>OR</u>	
XX.0 Craft work has been completed in work steps X3.0 to X12.0.	
PIC Signature: _____	Badge # _____ Date: __/__/__

Provide a space for initials when a signature is not required.

Example 9.4.E Use of Initials	
Electrician, initial in space to the right upon completion of each work step.	Initial below
Install junction box on East wall of utility room as shown on sketch.	_____
Install indicator light socket on cover of junction box.	_____
Route conduit from control panel to junction box.	_____
Pull in wiring from control panel to junction box and terminate.	_____

When necessary, the planner provides clear direction for vendors or service subcontract providers performing work to identify scope and handoff points.

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Example 9.4.F Both Subcontractor and Y-12 Responsibilities

Wheeler Electric Job Responsibilities:

1. Verify zero energy after lockout/tagout in place.
2. Install gutters and disconnect switches.
3. Pull in wiring from PP-XYZ-001 to gutter.
4. Install wiring from gutter to disconnect switches and terminate.
5. Hand-off job to BWXT crafts after switches, gutters and wiring installed and complete.

BWXT Electrician Job Responsibilities

1. Perform lockout/tagout on Panel PP-XYZ-00 and verify zero voltage.
2. Megger test on new wiring after Wheeler personnel complete work.
3. Release lockout/tagout.
4. Closes disconnect switches and verify correct operation of water heaters.

Hazards and Hazard Controls:

The preferred hierarchy for selecting hazard controls is to select engineered controls as first preference over administrative controls and personal protective equipment.

Hazard controls that do not apply to the entire work order are listed in the work instructions immediately preceding the affected work steps. The wording of the hazards and hazard controls in the JHA needs to be customized to fit the exact work being performed. DO NOT cut-and-paste the wording from the JHA if it is not an exact fit for the work being performed. Review lessons-learned, post job reviews and authorization basis requirements (from system / process engineer) to identify additional mitigation needs. JHAs with several controls listed should be brought to the attention of the appropriate supervisor. If there are no hazards or hazard control requirements, then indicate by stating "No hazards have been identified."

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Example 9.4.G Hazards and Mitigation Requirements

Hazard: Working outside – Extreme cold temperatures and adverse winter weather conditions.

- Controls:**
- Job Supervisor determines stay times according to Y12 – XXX.
 - Never work craftsman alone
 - Job Supervisor to monitor work activities
 - Wear weather appropriate clothing

Hazard: Working at heights – A bucket truck will be used to perform work activities.

- Controls:**
- Wear fall protection gear
 - No work in hazardous weather conditions including: snow, rain, icing or sustained wind speed above 25 MPH or gusts above 35 MPH
 - Proper use of outriggers
 - Barricade truck to protect public

Hazard: Zero energy check on circuit above 50 volts.

- Control:**
- Flash protection clothing as required by flash protection boundary limits
 - Check meter before and after zero energy check

Hazard: Working on an isolated electrical circuit above 50 volts.

- Control:**
- Electrical energy isolation
 - Lockout/Tagout of circuit

Hazard: Working overhead – potential danger of striking or being struck by overhead object.

- Control:**
- Maintain safe body position
 - Wear hardhat

Hazard controls required after learning on-site conditions will be identified in the WO instructions.

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Example 9.4.H Documentation of Onsite Hazard Controls

XX.0 After vault is opened, the Industrial Hygienist should sample the vault atmosphere for gasses and Oxygen content. IH should then determine type of breathing protection to be used by the Confined Space Entrants.

Air Sample Results: _____

Instrument: ID _____ Calibration Date: ____ / ____ / ____

Breathing Protection to be used by Confined Space Entrants:

Job Supervisor: _____ / ____ / ____

Signature

Badge #

Date

NOTES, CAUTIONS, and WARNINGS draw attention to information and work steps within the instructions that are essential to safe and compliant performance of work. They usually consist of the conditions, design limitations, performance requirements, practices, and procedures to be complied with to avoid loss of life, personal injury, health hazards, procedural non-compliance, damage to equipment and erratic job performance.

There are distinct differences in the definitions of **NOTES, CAUTIONS, and WARNINGS** within the context of this planning guide. Use the following guidelines:

- **NOTES** alert users to clarification information.
- **CAUTIONS** alert users to potential hazards to equipment (error prone activities).
- **WARNINGS** alert users to potential hazards to personnel.
- Review potential hazards and WO steps requiring clarification to determine where **NOTES, CAUTIONS, and WARNINGS** may be beneficial.
- **NOTES, CAUTIONS, and WARNINGS** are positioned in the WO so that they are complete on one page and are immediately preceding the WO step / task to which they apply.
- **WARNINGS** precede **CAUTIONS** when more than one type is used at the same point in the WO.
- **WARNINGS** and **CAUTIONS** precede **NOTES** when more than one type is used at the same point in the WO.
- Action steps will not be included in **NOTES, CAUTIONS, or WARNINGS**.
- **NOTES, CAUTIONS, and WARNINGS** are written as short, concise statements. Write them as statements rather than as commands to distinguish them from action steps.
- Ensure that **WARNINGS** and **CAUTIONS** provide a description of the hazardous condition, the consequences of failing to heed the **WARNING** or **CAUTION**, and critical time considerations.

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- **NOTES** present information that assists the user in making decisions or improving task performance.
- Include only one topic in **WARNINGS** and **CAUTIONS**.
- Number each **NOTE**, **CAUTION**, and **WARNING** when more than one exist at the same point in the WO.
- If a **NOTE**, **CAUTION**, or **WARNING** applies to the entire WO then place the information in Subsection 3 – Prerequisites and Pre-job Briefing.
- Avoid the overuse of **NOTES**, **CAUTIONS**, and **WARNINGS**.
- **WARNINGS** and **CAUTIONS** are placed in a box with the word **WARNING** or **CAUTION** capitalized, in bold text, and centered. The text is in bold font and blocked [see Example 9.4.J and Example 9.4.K].
- The word **NOTE** is capitalized in bold font.

Example 9.4.I NOTE Format

NOTE: Work order steps 4.01 to 4.05 must be completed before performing work steps 4.11 to 4.20.

Example 9.4.J WARNING Format**WARNING**

This is a pressurized system. A face shield and safety glasses must be worn while inspecting for leaks.

Example 9.4.K CAUTION Format**CAUTION**

Operating the generator system at speeds less than 700 RPM for longer than 10 minutes with the exciter regulator in operation may cause damage to the exciter regulator field.

Example 9.4.L CAUTION Statement**CAUTION**

Touching the insulation covering on the pipes surrounding the valve when manipulating the valve for replacement may introduce foreign matter into the pipes.

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Example 9.4.M CAUTION Statement for Error Likely Situation**CAUTION**

Electro-Static Discharge protection required before handling electronic components. Failure to use ESD protection may result in component failure.

Insert a **HOLD POINT** in the work package instructions to identify the point beyond which work must **NOT** proceed until the requirement for the **HOLD POINT** has been satisfied. **HOLD POINTS require a signature/badge/date in order to release them. HOLD POINTS** will be positioned so that they are complete on one page and are immediately preceding (or a part of) the work step to which they apply. The words **HOLD POINT** are capitalized and bolded with the text in normal font.

Example situations requiring a **HOLD POINT**:

- The ET&I Inspector or the worker to verify and document in the WO, during field maintenance, that a valve set point has been set no higher than the maximum allowable pressure stated on the nameplate of the associated pressure vessel.
- Documenting a weld inspection prior to proceeding.
- Notifying an electrical inspector for new electrical installations.
- Holding for a RadCon survey.
- Inspecting an excavation and making recommendations for required shoring.
- SME (safety, engineering, quality) involvement during work performance, when appropriate [see Example 9.4.O].
- Lockout/Tagout requirements

Example 9.4.N HOLD POINT Format**HOLD POINT:**

Job Supervisor, contact RadCon to survey removed piping before it is taken out of area. Once surveyed, determine proper disposal method.

Survey is complete and piping will be placed in [cold metal waste OR hot waste].

Job Supervisor: _____ / ____ / ____

Signature

Badge #

Date

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Example 9.4.O HOLD POINT Requiring SME Involvement		
HOLD POINT:		
X1.0 Job Supervisor, after completion of excavation contact Excavation Competent Person to inspect excavation and make recommendations for required shoring.		
X2.0 I have inspected the excavation located at CFA-617 and my recommendations are listed here:		

Excavation Competent Person:		
_____	_____	____/____/____
Signature	Badge #	Date

If the applicable permit is being referenced and not included in the work instructions, then the SME can record data and sign the permit. The **HOLD POINT** would then be for the JS to review the permit and sign the work instructions to allow the release of the **HOLD POINT**.

Insert the **HOLD POINT** as a step before the work step requiring the specified protection for high-risk hazard mitigation and exposure monitoring/evaluation [see Examples 9.4.P and 9.4.Q]. An exposure assessment or other on-site hazard evaluation may be required to determine appropriate Personal Protective Equipment (PPE) or other safety controls before work can proceed. Specific hazard mitigation controls, such as air sampling and radiological **HOLD POINTS**, need to be identified every time in the work package instructions when its specific use is mandatory.

Examples 9.4.P HOLD POINT for LO/TO		
HOLD POINT:		
Job Supervisor to ensure LO/TO is performed per Y73-107 “Lockout/Tagout for personnel Protection.”		
LO/TO Permit Number _____ Single Source _____		

Job Supervisor Signature	Badge	Date

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Examples 9.4.Q HOLD POINT for Operations**HOLD POINT:**

Job Supervisor to ensure **Operations** has drained and purged the material in the system
Prior to starting work on the identified valve.

Job Supervisor Signature

Badge#

____/____/____

Date

PPE requirements are obtained from the JHA, exposure assessments, or by direct input from the appropriate SME. The SME provides direction when to include PPE use requirements as part of the work step. Any PPE conflicts will be resolved per [Y73-116, Personal Protective Equipment Program](#).

Identify the craft expected to use the PPE. If multiple crafts are involved within the work scope and the work instruction, task steps will not list when PPE use is required. The identified PPE is required for craft involved with the WO if there are no specific crafts listed for the PPE or if the PPE requirements are not incorporated into a specific task step. PPE use not listed in this subsection is donned as skill-of-the-craft and is reviewed by the JS during the pre-job briefing.

Example 9.4.R Format for PPE Use by Multiple Crafts

PPE	Craft(s)
Class 0 gloves when performing voltage checks	Electricians
Hard hat when in construction area	All Crafts
Fall protection gear when working in bucket truck	Outside Machinist
Anti-Cs when working in high radiation area	All Crafts

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Example 9.4.S Examples of PPE

- | | |
|--|---|
| <ul style="list-style-type: none"> • Fall protection harness • Fall protection lanyard • Flash protection clothing including: • Nomex clothing • Face shield • Leather gloves • Protective Apron • Nitrile Rubber Gloves • Class 00 Gloves • High Voltage Gloves | <ul style="list-style-type: none"> • Goggles • Hard Hat • Respirator • Anti-C clothing • Rubber boots • Chemical suit • Chemical goggles • Leather chaps • Welding helmet • Cutting goggles |
|--|---|

Specify either before or in the applicable work step when PPE use beyond standard craft issue is required, and when use of the PPE is not required for performance of the entire WO. The applicable ES&H SME provides direction when to include PPE use requirements as part of the work step.

The RP is responsible for ordering any PPE beyond craft standard issue (gloves, hard hats, respirators, clothing, shoes, safety eye wear, etc.)

Example 9.4.T PPE Requirements for Single Step

PPE Required for work step X1.0

- Rubber boots
- Rubber gloves with liners
- Chemical suit
- Chemical goggles

PWT requirements are developed by the SE/SME. Return to Service conditions are developed by the RP. Examples and requirements of both PWT requirements and return to service conditions are governed by [Chapter 4 of Y18-012](#).

Insert the SE/SME's PWT steps in the work instructions following the last step of maintenance repair work. Then insert the appropriate Return to Service work instruction steps. [\[See examples of PWT steps and Return to Service steps in the Integrated Work Control Manual, Appendix 4-A, "Examples of Post Work Test and Return-to-Service Requirements."](#)

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Provide instructions for waste disposal and make arrangements for waste disposal/coordination with the Building Manager or Operations Environmental Officer/Waste Coordinator in facilities/areas not owned by Maintenance to ensure prompt removal. Also include, as appropriate, instructions in the Work Package for the disposition of any resulting combustibles or other trash.

The Maintenance Field Waste Form is one means for disposing of waste. The Clean Sweep Program provides a turnkey service to maintenance customers to dispose of materials generated from WOs (clean waste) as part of the work activities.

IF the maintenance activity involves the removal of man-made mineral fiber (MMMMF), such as fiberglass insulation, man-made mineral fiber and fiberglass ceiling tile, Fiberfrax, calcium silicate, Perlite, and foam glass insulation:

- Ensure the work instructions require a RadCon survey of the material for disposal before it is removed or packaged.
- Include a **HOLD POINT** in the work instructions to verify that RadCon has surveyed the MMMF prior to bagging the MMMF. Include the following information in the **HOLD POINT**:
 - Work order number
 - Building
 - Specific location of removal of MMMF
 - RadCon results of survey
 - RadCon technician's name and badge number

IF the maintenance activity involves a lift, THEN ensure the lift is evaluated by the JS and worker that will perform the work, utilizing the JHA process, as necessary. Document the lift method in the work package instructions.

IF the maintenance activity involves welding:

- Submit to the Field Welding Engineer a Weld Documentation Request form with supporting information in accordance with [Y17-015, Welding Program Manual](#).
- Ensure that the Field Welding Engineer reviews the work package instructions.
- Ensure the work package instructions require the MS to place the Weld Inspection Report and Rod Issue Slip in the work package instructions in accordance with Y17-015.
- Ensure that welding inspection requirements are specified in the work package instructions and that the work package instructions require the Job Supervisor to place the Weld Inspection Report in the work package instructions.

IF the maintenance activity involves a new electrical installation, alteration, or modification then:

- Plan the job in accordance with Y18-012 with electrical guidance from [Y73-528, Electrical Safety Instruction](#) and request guidance from the Electrical Inspector or the Plant Authority Having Jurisdiction (AHJ) prior to issuing the work package instructions.
- Specify the known voltages of the system/component in the work instructions for all electrical work packages involving voltages greater than 50 volts. If the exact voltage is unknown, then clearly state, in the work instructions, that the voltage is unknown.

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Dispatched work, calibrations, and preventative maintenance jobs are exempt from this requirement, at this time.

- Ensure that code compliance inspections are included in the work package (in most cases this would be best if included in the post test and work close-out section of the work package; for maintenance work packages, this insures that the electrical inspector has a job package for the performance of the inspection).
- The step to perform the electrical inspection should be done before the LO/TO is released so the inspector can perform inspections on de-energized equipment. Other testing should not take place until the inspection is complete.
- A **NOTE** should be inserted in the work package to notify the Electrical Authority Having Jurisdiction (AHJ) 24 hours in advance, if possible.
- A **HOLD POINT** (including signature/badge/date) should be inserted for the electrical inspector to verify that the new electrical installation, alteration, or modification meets code requirements.
- The AHJ will provide the supervisor with notification of corrective actions that must be taken, if necessary, to comply with NEC Code. Once the corrections are made, the supervisor can request re-inspection.
- Once the inspection is complete, the AHJ will notify the supervisor of satisfactory completion of the electrical inspection and that notification can be included in the completed work package.

IF the maintenance activity involves fire barrier penetration in accordance with [Y73-378, Safe Conduct of Excavation/Penetration Work](#), THEN initiate a request from Engineering for Excavation/Penetration Permits.

IF interferences are identified for maintenance activities, THEN ensure that work package instructions include steps for their removal and subsequent reinstallation.

IF maintenance activities require the use of lubricants, THEN ensure that the correct lubricants are specified in work package instructions. If there are questions regarding the correct types of lubricants, THEN contact the Maintenance Engineering Lubricants Specialist.

IF the work activities involve the maintenance or adjustment of safety valves or relief valves, THEN include instructions or an approved procedure for performing the task.

IF the work activities involve maintenance or adjustment of safety or relief valves for pressure vessels, THEN the work package instructions must include a **HOLD POINT** for the ET&I Inspector or the worker to verify and document in the job step during field maintenance that the VALVE SET POINT is no higher than the maximum allowable pressure stated on the nameplate of the associated pressure vessel.

IF the maintenance activity has an existing approved Quality Control Inspection Plan, THEN attach a copy of the plan and include steps in the work package instructions to identify inspection, notification, and **HOLD POINTS**.

IF the maintenance activity involves a special technique or process, THEN ensure that these requirements are addressed in specific steps in the work package instructions.

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IF the maintenance activity involves the torque and/or detensioning of fasteners on a Grade 1 or 2 SSC, THEN ensure that the work package instructions include proper torque values and sequences.

IF the maintenance activity involves a change to a component ASME Code Nameplate, THEN ensure that the work package instructions state that the "original nameplate should not be changed, defaced, or removed." In addition, a new nameplate should be installed using wire or banding. If the new nameplate is for a change in a set point to an ASME Code Class safety or relief valve, ensure that the work package instructions include the requirements for the new nameplate to contain at a minimum the following information:

UNITED STATES DEPARTMENT OF ENERGY

PROPERTY _____

MFG. SERIAL _____

NEW SET POINT PRESSURE _____

WO _____

DATE RESET _____

9.5 Attachments and References

Utilize available technical manuals and other technical information that provides value-added content.

If an approved work document (such as construction plans, technical procedures, detailed operating procedures, or standard operating procedures) covers all of the scope of work then the work package instructions should state to perform the procedure. For Example, "Electricians, perform procedure Y18-XXX on equipment # XXXXXXXX." If only part of an approved work document applies to the scope of work then copy and paste or rewrite the steps from the document into the work package instructions.

If work is to be done in accordance with an attached document, then specify the precise steps of the attachment that are to be performed. Highlight the applicable portions of the attachments that the craftsperson will be using, if beneficial. Some conditions when the RP may direct the worker(s) to follow a referenced or attached document are:

- Scope of work for the complex WO can be performed entirely as minor work and the referenced document provides adequate distinction between steps that are step-by-step compliant or general intent.
- The referenced document is a vendor supplied, routinely updated maintenance manual normally kept in ready use for the crafts at the shop to perform expected repairs on equipment or components removed from system service. Avoid referencing shop manuals in complex WOs for in-field repairs.
- The bulk, classification, or legal nature of the referenced document precludes its direct incorporation into the work steps (e.g., large drawings, subcontractor requirements

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manual, classified information, procedures that must be performed and kept as records, etc.).

Take the time to find out the answers to technical questions before finishing the instructions. If there are technical questions then contact Maintenance Engineering for list attachments first, and then list references.

Use bullets before each attachment and/or reference (unless working within SAP long text). Use ascending, uppercase alphabet letters for attachments.

- Attachment A – Pre Job Briefing
- Attachment B – Post Job Briefing
- Reference Y73-107 – Lockout/Tagout
- Reference Y73-116 – Personal Protective Equipment

Example 9.5.A Referencing a Document
XX.0 Install the control panel cabinet onto the North wall of the boiler house control room in accordance with “Engineering Standards XXXX”

Example 9.5.B Attaching a Document
XX.0 Install the control panel cabinet onto the North wall of the boiler house control room following the dimensions shown on Drawing no. 456321 (attached).

9.6 Comments

This is where the supervisor and/or craft record any useful information on job performance, parts or materials used, minor hazard concerns, better ways to perform work, etc.

Example 9.6.A Comments
6.0 Comments

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9.7 Format for Shop Floor Paperwork

1. SHOP PAPERS

- a. Order page.
- b. Signature page.

2. WORK PACKAGE INSTRUCTIONS

- 1.0. Purpose and Scope.*
- 2.0. Prerequisites and Pre-job Briefing. *
- 3.0. Precautions and Limitations. *
- 4.0. Work Package Instructions/Contingency Planning. *
(Includes "Post Work Test" and "Return to Service")
- 5.0. Attachments/References. *
- 6.0. Comments. *

3. ATTACHMENTS (essential documents only)

- a. Prints, drawings, sketches, etc.
- b. Permits required in Work Package Instructions.

* IF NEEDED.

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10.0 ADDITIONAL GUIDANCE

10.1 Processing Work Orders during Computer Outage

When SAP is unavailable, the work coordinator or work window manager will provide the RP with the job scope and cost object. The RP will process the work request by hand writing the information on blanked out SAP shop floor paperwork* and attaching any work instructions, vendor information, etc. as you would on a computer generated WO. If a JHA is needed and the JHA system is offline, then utilize the information located at the bottom of the JHA homepage on creating a manual JHA. (The RP will write a "NOTE" across the top of the hand written WO that instructs the work coordinator to input a notification/WO for the work coordinator/work window manager/RP to process in the SAP system, the next business day). The work coordinator or work window manager will process their work as usual.

The responsible MPS will follow-up on the next business day to ensure that a notification/WO was entered into SAP and processed.

*"Blanked" out copies are located on the "Y" drive and/or in a folder located in the MPS's office or other designated area. There will also be JHA blanks located with the blank SAP paperwork. The MPS will assign a unique number to the work order, beginning with the MPS user ID.