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Rev	Date	Description	POC	RM
0	06/23/16	Initial issue	Tobin Oruch, *ES-DO*	Mel Burnett, *CENG-OFF*
1	05/25/17	Clarifications for existing (in-use) software, other minor clarifications.	Tobin Oruch, *ES-DO*	Lawrence Goen, *ES-DO*

1.0   PURPOSE AND APPLICABILITY

This section describes the "how, when, and who" for using, maintaining and retiring software.

See Table 21.6-1 for a summary of this section (for both SSC software and Non-SSC software). Applicability is per Chapter 21 applicability in SOFT-GEN.

2.0   KEY DEFINITIONS AND ACRONYMS

See SOFT-GEN for key definitions and acronyms.

3.0   SSC SOFTWARE

3.1   Use and Maintain SSC Software

A.   <u>How</u>.

    1.   Control the software to ensure that the use remains consistent with the software design and approved acceptance test results. For ML-1 through ML-3 software in addition to the applicable controls from other chapter sections[1], ensure the following controls are established; and documented on the SDWS and/or in this chapter prior to software approval for use (SWAU). Use and maintain the software using these controls until the software is retired.

        a.   Application documentation,

        b.   Access control specifications,

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[1] Includes identification and documentation of software in a software summary (ref. SOFT-GEN). For existing software (also referred to as in-use or legacy software) that is non-compliant, initiate a PFITS action to resolve deficiencies (see SOFT-GEN *Article 1.0* for details).

c.   Computer system vulnerability protections,

d.   Problem reporting and corrective action,

e.   In-use tests,

f.   Configuration management,

g.   Inventory, and

h.   Supporting quality assurance program controls.

2.   Process and retain documentation in accordance with the SRLM's governing document control and records management process and/or as described in the SWDS. Ensure the correct SWID (obtained when completing Form 2033) is part of the documentation record number. See AP-341-402, *Engineering Document Management in Operating Facilities for details.*

3.   Use the following to implement the aforementioned controls. See IEEE Std 12207, *Systems and Software Engineering – Software Life Cycle Processes* and ANSI/ANS-10.8, *Non-Real-Time, High-Integrity Software for the Nuclear Industry – User Requirements* for additional guidance.

a.   **Software Application Documentation.** Application documentation for SSC software is a general term comprised of the following main categories.

1)   **Operation and Maintenance (O&M) Documentation.** Software shall be controlled in accordance with approved procedures and instructions (i.e., O&M instructions). They are required for all ML levels. The O&M documentation must be sufficiently detailed and usable to allow a competent individual trained in the use of the software to use the program without undue difficulty and/or likely misuse. *O&M manual(s) should be listed on the SWBL.*

2)   **Licenses and Registrations**.[2] As applicable, maintain license documentation and other registrations, including maintenance contracts, as appropriate to promote proper software use. As applicable, document licenses on the SWBL. As applicable, document license and registration maintenance protocols on the SWDS.

3)   *Operational Event Documentation. Operational event documentation should be retained for ML-1 and ML-2 software to support software maintenance, cybersecurity protection and assessments. Operational event documentation is generated as part of the software operation. It is dependent on the software design. Event documentation may include system startup, shutdown, changes, logons, logon failures, logoffs, self-diagnostic test results, tamper attempts, and/or other information. As applicable, indicate event documentation review and retention protocols on the SWDS.*

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[2] Licenses and registrations are used to ensure the validity of the software, prevent suspect/counterfeit items (S/CI), and to maintain knowledge of software errors, issues, updates, etc.

Activity No.	SQM Activity	ML[1]			Implementation Detail			ESM Ch. 21 Ref.[5]
		1, 2	3	4	How	When	Who[2]	
1	Use and maintain the software	R	Gr	Gr[3]	▪ Use and control the software to ensure that the use remains consistent with the software design and approved acceptance test results ▪ Maintain software application documentation ▪ Licenses and registrations ▪ Use and maintain access controls ▪ Use and maintain vulnerability protections ▪ Report problems and take corrective actions ▪ Perform in-use tests ▪ Maintain configuration management (e.g., maintain software baseline, Software Data Sheet [SWDS] and software change documentation) ▪ Maintain inventory(ies)[4] ▪ Implement supporting quality assurance program controls (e.g., training/qualification and assessments)	▪ Upon software approval for use (SWAU) and until the software is retired ▪ In-use testing and assessments as specified on the SWDS (at a min., when installed on a different computer or after significant changes)	▪ SU (for use) ▪ SRLM (for maintenance)	SOFT-GEN SOFT-V&V SOFT-INV SOFT-MAINT
2	Retire the software	R	R	R	▪ Prevent from unintended or routine use ▪ Terminate software agreements and/or licenses ▪ Remove from the inventory(ies) as applicable[4] ▪ Where practical and/or where a future need may exist, retain as a record	▪ When no longer required for routine use or (AFU)	▪ SRLM	SOFT-INV SOFT-MAINT

Table 21.6-1 SOFT-MAINT Summary
(This table is a summary only and does not include all requirement details. See text for details.)

[1] ML = Management Level; R = Required; Gr = Required but graded.

[2] SU = Software User; SRLM = Software Responsible Line Manager. The SU and SRLM may be the same person.

[3] In-use testing is not required for ML-4.

[4] See SOFT-INV for details.

[5] Ref. = ESM Chapter 21 section name.

4) ***Application Logs****. Application logs are lists (or logs) that provide information that describes who, what baseline revision, when and where (e.g., facility) the software was used. Application logs should be maintained for ML-1 and ML-2, Non-SSC software when such traceability above that provided by the software inventory is required. Application logs may be retained as part of the ES-Div software inventory (possible future capability) or through other means. As applicable, provide application log protocols on the SWDS.*

b.   **Access Control Requirements.** For all ML levels, establish and implement access controls in accordance with P218, *Cyber Security Access Controls*. Address the security of the computer system and the critical data that may reside on the system. For ML-1 through ML-3 software, document access controls on the SWDS and as required, in the governing software procedures. See SOFT-GEN for SWDS details.

c.   **Computer System Vulnerability Protections.** For all ML levels, establish and implement computer system vulnerability protections as required by PD210, *Cybersecurity Program* and CIO-P100, *Cyber Security Risk Management Plan.* Base controls on consequence of loss, confidentiality, integrity, and availability. As required, contact an Information System Security Officer (ISSO) to assist with identifying and implementing computer system vulnerability controls. As appropriate, implement the following protections that may be designed into the program, established as part of the O&M procedures, and/or as specified on the SWDS:

1)   Access timeouts after a specified time of inactivity,

2)   Recovery/contingency protocols, including retention of backups of system data. (The SWBL serves as the backup for the software – computer programs and documentation needed to run the software), and

3)   Software tools to verify pedigree authenticity and/or detect tampering associated with suspect/counterfeit items (S/CI).

d.   **Problem Reporting and Corrective Action.** For all ML levels, follow the problem reporting and corrective action processes in SOFT-GEN.

e.   **In-Use Tests.** Perform in-use testing of ML-1 through ML-3 software as specified in this section and the SWDS. In-use testing is not required for ML-4 software unless otherwise specified by the SRLM.

1)   Perform in accordance with procedures to confirm acceptable performance in the operating environment. Integrate governing SSC work controls.

2)   Perform in accordance with the applicable test planning and testing requirements of the SOFT-V&V section.

3)   Demonstrate required performance over the range of operation of the controlled function or process.

4) Document test procedures and frequency on the SWDS. Specify test frequency using the following:

    i.   Perform testing after the computer program is installed on a different computer.

    ii.   Perform testing when there are significant changes, as determined by the SRLM, in the operating system/environment

    iii.   Perform periodic testing where computer program errors, data errors, computer hardware failures, or instrument drift can affect require performance (consider manual and/or automatic self-check tests).

    iv.   Perform testing when required by procedure (e.g., AP-341-801, Post Modification/Post Maintenance Testing)

    v.   Perform testing based on the risk of failure of the computer program. For ML-1 and ML-2 software, at a minimum, an annual test is recommended.

f.   **Configuration Management.** Perform the following:

1) Follow configuration management and interface control processes in SOFT-GEN. Maintain completeness and accuracy of the software baseline and SWDS.

2) Where practical, use and maintain software versions that are compatible with prior versions of the software and associated hardware (sometimes referred to as backward compatibility) to minimize interface issues.

3) As required by the SRLM, ensure data produced by the software is adequately retained (backed up) so that it may be readily retrieved if needed.

g.   **Inventory.** For all ML levels, maintain complete and accurate software inventories in accordance with the SOFT-INV.

h.   **Other Quality Assurance (QA) Controls.**

1) Implement other quality assurance (QA) controls in accordance with the governing quality assurance program (e.g., training, assessments, etc.). These other QA controls must be used in conjunction with the software-specific controls of ESM Chapter 21 to provide a comprehensive software QA program. Selected LANL documents that provide controls for the ESM software QA program are listed below for reference:

    i.   SD330, *LANL Quality Assurance Program* (e.g., P330-3, and P330-6, P330-8, P840-1), and P805, *Export Control*;

    ii.   P341, *Facility Engineering Processes Manual* (e.g., AP-341-402, AP-341-502, AP-341-507, AP-341-510, AP-341-605, AP-341-504, AP-341-611, AP-341-613, AP-341-703, AP-341-801, AP-341-802, AP-341-901);

iii.   [P342](#), *Engineering Standards* (e.g., [ESM](#) Chapters 1, 7, 8, 12, and 15); and,

iv.   [P343](#), *Facility Engineering Training and Qualification Manual*.

2)   As applicable, document software-specific training/qualification requirements on the SWDS and complete training/qualification to promote proper use of the software.

3)   Document software assessment methods and frequency on the SWDS. Various engineering administrative procedures (e.g., [AP-341-510](#), *Field Walk-down, Data Gathering, and Inspections*) or LANL processes (e.g., [P330-3](#), *Quality Audits*) may be used to perform software assessments.

B.   <u>When</u>. For ML-4 software, use and maintain software after installation and testing in accordance with the SDWS and this chapter. For ML-1 through ML-3 software, use and maintain after SWAU. For all ML levels, use and maintain until the software is retired. For ML-1 through ML-3 software, perform in-use testing and assessments as specified on the SWDS. At a minimum, perform in-use tests when installed on a different computer or after significant changes.

C.   <u>Who.</u> The Software Users (SUs) are responsible for using the software within the software limitations and in accordance with the software SWDS/O&M requirements. The SRLM is responsible for establishing the use and maintenance requirements and maintaining the software.

3.2   Retire SSC Software

A.   <u>How</u>. Retire software and prevent it from unintended or routine use. Perform the following, as applicable, to retire all ML levels of software:

1.   Terminate software support including registrations, agreements and/or licenses.

2.   Remove the software.

3.   Remove safety software information from the Institutional-level Safety software inventory per [QPA-DO-FSD-001,](#) LANL *Safety Software Inventory Procedure*.

4.   Cancel or revise affected documents per the governing document control process. *Guidance: Also, close all open error and software change requests, regardless of their state.*

5.   Where practical and/or where a future need for the software may exist, retain the retired software baseline (which includes the computer program files) as a record. Retain in accordance with the governing quality assurance records management procedure. Retired software should be retained such that it is retrievable and can be readily installed in the event it is necessary to "rollback" to the software. Retain support software as required to rollback.

6.   Cancel or revise affected training courses/plans.

B.   <u>When</u>. Retire software when the software is no longer required for routine use and/or when it is no longer approved for use.

C.   <u>Who.</u> The SRLM is responsible for retiring software.

4.0   NON-SSC SOFTWARE

4.1.   Use and Maintain Non-SSC Software

Follow Subsection 3.1 with the following clarifications:

A.   ES-Div: Before using, verify that the software, including correct version, is listed as approved for use (SWAU) on the ES Division Non-SSC Software Inventory on the ES-Div Website. If not listed, contact the SRLM or Engineering Services Software Coordinator (ESSC). Do not use LANL Non-SSC software unless it is listed as SWAU on the ES-Div Non-SSC software inventory website or SWAU is otherwise provided by the SRLM in writing.

B.   ES-Div: Before using, the SU must verify that he/she is authorized to use the software by reviewing the ES-Div software inventory website. If the SU is not shown as an authorized user for the software, contact the SRLM or ESSC. Do not use the software unless authorization is shown on the website or SWAU is otherwise provided by the SRLM in writing.

C.   SSC-related administrative procedures/processes do not apply.

D.   Use the Non-SSC change process in SOFT-GEN (instead of AP-341-507).

E.   For "Simple and Easily Understood" software, document the determination of "Simple and Easily Understood" software in the calculation where the software was used and review and approve the software (individually verify) with each use as part of the calculation per SOFT-V&V.

4.2.   Retire Non-SSC Software

Follow Subsection 3.2 with the following addition:

A.   ES-Div: Remove safety and non-safety software from the ES Division Non-SSC Software Inventory in accordance with ESDO-AP-002, *Engineering Service (ES) Software Inventory Instructions*.