

Quality Report SQAS91-001

**Abstracts of the
Nuclear Weapons Complex
SOFTWARE QUALITY ASSURANCE
Requirements Documents**

June 1991

*Software Quality Assurance Subcommittee
of the
Nuclear Weapons Complex Quality Managers*

United States Department of Energy
Albuquerque Operations Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.

Abstract

This document contains abstracts of requirements documents (DOE orders, Sandia Laboratory Engineering Procedures, and etc.) that reference computer software. All of the requirements documents are unclassified though they may govern software that is classified. While the abstracts attempt to capture the important information in the requirements documents, the original documents should be consulted for detailed information.

ACKNOWLEDGEMENT

This document , "Abstracts of the Nuclear Weapon Complex Software Quality Assurance Requirements Documents", was prepared for the Department of Energy (DOE) by a Working Group of the Nuclear Weapons Complex (NWC) Quality Managers' Software Quality Assurance Subcommittee (SQAS).

The following SQAS members have contributed to the production of this document:

Elaine Liebrecht, Chair	Mound	William James	RF
Bob Cooper, Editor	LLNL	Steve Klover	RF
Katherine Boissiere	DOE/AL	Travis Moyer	SR
Cynthis Cannon	RF	Willie Nelson	Mound
John Vic Grice	KCD	JohnPuckett	SR
Tina Heath	Y-12	Lynnne Wienecke	DOE/AL/IMD
Jan Hodges	RF		

DOE Site Abbreviations

Several of the requirements documents refer to DOE NWC sites with the following abbreviations:

KC, BX	Allied Signal, Kansas City, MO
LA, LANL	Los Alamos National Laboratory, Los Alamos, NM
LL, LLNL	Lawrence Livermore National Laboratory, Livermore, CA
MD, Mound	EG&G Mound Applied Technologies, Miamisburg, OH
OR, Y-12	Martin Marietta Energy Systems, Inc., Oak Ridge, TN
PP, GEND	General Electric Co., Neutron Devices, Pinnellas Plant, Largo, FL
PX	Mason & Hanger Silas Mason Co., Pantex Plant, Amarillo, TX
RF, RFP	Rocky Flats, EG&G Rocky Flats, Inc., Golden CO
SA	Sandia National Laboratories, Albuquerque, NM
SL	Sandia National Laboratories, Livermore, CA
SNL	Sandia National Laboratories
SR	Westinghouse, Savannah River Site, Aiken, SC

Contents

Document No.	Date	Title	Page
QC-1 Revision 5	6/1/89	"Quality Criteria"	1
QC-2	2/2/90	"Quality Criteria"	2
NUREG-0856	6/83	"Final Technical Position on Documentation of Computer Codes for High Level Waste Management"	3
AL 5700.6B Revision 2	7/7/89	" General Operations Quality Assurance"	4
NQA-1A-1989	3/31/90	"Quality Assurance Program Requirements for ANSI/ASME Nuclear Facilities"	6
NQA-2 Pt. 2.7	5/31/90	"Quality Assurance Requirements of Computer Software for Nuclear Facility Applications"	8
DOE 1330.1C	1/12/90	"Computer Software Management"	10
DOE 1360.2A	5/20/88	"Unclassified Computer Security Program"	12
DOE 1360.3A	7/11/83	"Automatic Data Processing Standards"	13
DOE 1360.4A	10/7/87	"Scientific and Technical Computer Software"	14
DOE 1370.2	5/20/85	"Computer-Aided Design, Engineering, and Manufacturing Resources"	15
DOE 5637.1	1/29/88	"Classified Computer Security Program"	16
EP401022 Issue G	11/30/77	"Equipment Qualification System"	17
EP401040 Issue G	9/12/85	"Drawing System"	19
EP401043 Issue F	6/10/85	"Acceptance Equipment Program Definition"	21

Contents (Continued)

Document	Date No.	Title	Page
EP401301 Issue A	8/28/89	"Numerical Index of Active Computer Integrated Manufacturing (CIM) and Engineering Procedures"	23
EP401302 Issue A	8/28/89	"Management of Computer Integrated Manufacturing Projects"	24
EP401303 Issue A	8/28/89	"Management Plan for Development of CIM Software Shared within The NWC"	25
EP401304 Issue A	8/29/89	"CIM Configuration Management Plans"	27
EP401305 Effectivity Plans" Issue A	8/28/89 28		"CIM

QC-1, Revision 5
(Abstract)

"Quality Criteria"

6/1/89

N. S. Dienes, Bruce G. Twining

Weapons Related

Keywords: acquisition, development, maintenance, verification, validation, configuration management, documentation, review, audits

Scope: QC-1 outlines the minimum quality requirements for DOE production and design agencies responsible for procurement and/or production of weapon and weapon-related software. QC-1 applies to all DOE sites involved in the above activities.

QC-1 requires SQA activities on software that controls: production processes or equipment; testing or inspection processes or equipment; calibration of standards and measurement devices; the function of weapon components or provides analysis capability to determine product acceptability.

Abstract: A software quality assurance program is to be designed to ensure that software used is consistent with applicable specifications and directed towards preventing software errors from occurring. The extent of software quality assurance activities required is determined by the risk associated with failure of the software to meet established requirements. The program should address as a minimum 1) organization, tasks and responsibilities, 2) verification and validation, 3) configuration management, 4) software documentation, and 5) reviews and audits.

QC-2
(Abstract)

"Quality Criteria"

2/2/90

N. S. Dienes, Bruce G. Twining

Weapons Related

Keywords: research, design, development, test

Scope: QC-2 establishes minimum quality criteria for research, design, development and associated test activities within the nuclear weapons program. QC-2 applies to all DOE sites involved in the above activities. QC-2 applies to all DOE contractors performing these nuclear weapons activities in support of weaponization.

Abstract: Systems shall be established for controlling and assuring the quality of software. Measures shall be applied to the acquisition, development, use and maintenance of software to assure its quality and proper use. Design Control, Test Plans, and Technical Reviews are required activities to assure that the results of the research and development process meet customer requirements and expectations.

NUREG-0856

(Abstract)

"Final Technical Position on Documentation of Computer Codes for High Level Waste Management"

6/83

S. A. Silling

High Level Waste Disposal

Keywords: waste disposal, computer codes, documentation, mathematical models, numerical methods, verification, validation, configuration management

Scope: NUREG-0856 gives guidance for the content of documentation of computer codes which are used for high-level waste disposal. The guidelines cover theoretical basis, programming, and instructions for use of the code.

Abstract: NUREG-0856 was developed to provide NRC a basis for evaluating high-level waste management systems computer codes for waste management licensing. The document provides guidelines for documentation of the codes used by the applicant in performing the analyses submitted in support of a license application under 10 CFR 60. Utilization of sound physical and mathematical principles and theoretical documentation is emphasized. The documentation called for is divided into five categories:

- 1) Software Summary
- 2) Description of Mathematical Models and Numerical Methods
- 3) User's Manual
- 4) Code Assessment and Support
- 5) Continuing Documentation and Code Listings

The documentation on Code Assessment and Support describes to what extent and how the code has been validated and verified. It also addresses configuration management requirements.

AL 5700.6B, Revision 2
(Abstract)

"General Operations Quality Assurance"

7/7/89

B. Twining

Non-Weapons Related

- Keywords:** general operations, non-weapons, quality assurance, quality program plan, procedure, audit, corrective action, management appraisal, trend analysis, quantitative criteria, NQA-1
- Scope:** AL 5700.6B provides the AL policy, establishes requirements, and assigns responsibilities for quality assurance for AL activities in accordance with DOE order 5700.6B, "Quality Assurance". This order applies to AL headquarters divisions or offices engaged in support activities or general operations, AL area offices, AL project offices, and AL contractors. The provisions of AL 5700.6B apply to 1) all programs identified as non-weapons or general operations activities which include, but are not limited to those directed toward siting, design, construction, testing, operation, maintenance, modification, and decommissioning of facilities; 2) development and production of non-weapons materials, components, and systems; and 3) the acquisition of general operations (non-weapons) research, development, and technology data.
- Abstract:** Quality assurance programs, quality program plans, and implementing procedures shall be maintained which prescribe the system of management controls on activities, services, and items to ensure achievement of quality objectives of programs. Quality program plans shall be developed through the judicious and selective application of appropriate requirements of National Consensus Standard ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities", which shall apply to general operations or support activities. The extent of NQA-1 quality assurance requirements imposed shall be commensurate with the scope, complexity, safety/risk analysis, and importance of the project or activity.

The objective of AL 5700.6B is to 1) establish requirements for a cost-effective quality assurance program; 2) to assure that a

system of management controls is in place which contributes to the achievement of program objectives in a safe, reliable, and predictable manner; and 3) to coordinate and standardize the quality assurance program of AL to ensure uniform performance and ensure consistent application of policy orders, procedures and standards.

An effective quality assurance plan shall include, as a minimum: 1) assignment of organizational responsibility and authority for activities affecting quality, 2) definition of quality and quality assurance objectives and requirements, 3) implementation of procedures and work instructions, 4) implementation of independent verification of quality attainment and quality assurance program effectiveness, and 5) implementation of early detection and correction of deficiencies.

All contractor organizations must 1) develop, implement, and maintain quality assurance programs, 2) develop and implement a training program to assure understanding of quality assurance program objectives and procedures, 3) provide a copy of their primary quality program plans to AL, 4) maintain an index of all subordinate quality program plans, 5) provide information regarding their internal audit program to AL, 6) conduct an annual management appraisal of their quality assurance program, 7) develop and implement a root cause and trend analysis program to aid in preventing recurring problems, and 8) develop meaningful quantitative criteria which indicate the effectiveness of their quality program.

ANSI/ASME NQA-1A-1989
(Abstract)

"Quality Assurance Program Requirements for Nuclear Facilities"

3/31/90

American Society of Mechanical Engineers

Non-Weapons Related

Keywords: quality assurance program, basic requirement

Scope: NQA-1 sets forth requirements for the establishment and execution of quality assurance programs for the siting, design, construction, operation, and decommissioning of nuclear facilities. NQA-1 applies to all DOE sites involved in non-weapon related work. The activities include: 1) the performing functions of attaining quality objectives, 2) the functions of assuring that an appropriate quality assurance program is established, and 3) the function of verifying that activities affecting quality have been correctly performed. The application of NQA-1, or portions thereof, shall be specified in written contracts, policies, procedures, or instructions.

Abstract: The following are the basic requirements of NQA-1:

1. Organization - The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented.
2. Quality Assurance Program - A documented quality assurance program shall be planned, implemented, and maintained in accordance with the standards of NQA-1, or portions thereof.
3. Design Control - The design shall be defined, controlled, and verified.
4. Procurement Document Control - Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services.

5. Instructions, Procedures, and Drawings - Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.
6. Document Control - The preparation, issue, and change of documents that specify quality requirements or prescribe activities shall be controlled to assure that correct documents are being employed.
7. Control of Purchased Items and Services - The procurement of items and services shall be controlled to assure conformance with specified requirements.
8. Identification and Control of Items - Controls shall be established to assure that only correct and accepted items are used or installed.
9. Control of Processes - Processes affecting quality of items or services shall be controlled.
10. Inspection - Inspection required to verify conformance of an item or activity to specified requirements shall be planned and executed.
11. Test Control - Tests required to verify conformance of an item or computer program to specified requirements and to demonstrate satisfactory performance for service shall be planned and executed.
12. Control of Measuring and Test Equipment - Tools, gages, instruments, and other measuring and test equipment used for activities affecting quality shall be controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits.
13. Handling, Storage, and Shipping - Handling, storage, cleaning, packaging, shipping and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.
14. Inspection, Test, and Operating Status - The status of inspection and test activities shall be identified either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are

performed and to assure that items which have not passed the required inspections and tests are not inadvertently installed, used, or operated.

15. Control of Nonconforming Items - Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use.
16. Corrective Action - Conditions adverse to quality shall be identified promptly and corrected as soon as practical.
17. Quality Assurance Records - Records that furnish documentary evidence of quality shall be specified, prepared, and maintained.
18. Audits - Planned and scheduled audits shall be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness.

NQA-2, Pt. 2.7
(Abstract)

**"Quality Assurance Requirements of Computer Software for
Nuclear Facility Applications"**

May 31, 1990

American Society of Mechanical Engineers

Non-Weapons Related

Keywords: software, software life cycle, verification, validation, configuration management, documentation, procurement

Scope: NQA-2, Pt. 2.7 provides requirements for the development, maintenance, use and security of computer software, as applied to the design, construction, operation, modification, repair, and maintenance of nuclear facilities. It supplements the requirements of ANSI/ASME NQA-1 and shall be used in conjunction with the requirements of NQA-1.

Abstract: Individuals or organizations involved in the development, maintenance, and use of computer software shall have in place written policies and procedures that shall assure that the requirements of Part 2.7 are implemented in a consistent manner. Quality assurance functions shall be maintained with the authority to assure that software meets or exceeds specified requirements.

The following are the activities that comprise a software life cycle: 1) requirements, 2) design, 3) implementation, 4) testing, 5) installation and checkout, 6) operations and maintenance, and 7) retirement. Software shall be developed according to the software life cycle model. This will ensure that software is developed in a traceable, planned, and orderly manner. The relative emphasis placed on each phase of the software development cycle will depend on the nature and complexity of the software.

Software verification and validation activities shall ensure that the software adequately and correctly performs all intended functions, and the software does not perform any unintended function that either by itself or in combination with other functions can degrade the entire system.

Software configuration control shall be maintained. A configuration baseline shall be defined at the completion of each major phase of the software development. Configuration change control and configuration status accounting dictate that changes to software be formally documented and that the information needed to manage a configuration be documented.

The following is the minimum acceptable documentation for software development: software quality assurance plan, software requirements documentation, software design and implementation documentation, software verification and validation documentation, and user documentation.

Software requirements review, software design review, and software verification and validation review shall be conducted and documented.

A formal procedure of software problem and corrective action shall be established for software errors, faults, and failures. To the extent appropriate, controls shall be established to permit authorized and prevent unauthorized access to a computer system.

Individuals or organizations developing and supplying software under contract shall be required to have policies and procedures that meet the applicable requirements of NQA-2 Part 2.7. Software that has not been developed using this standard shall be placed under configuration control as defined by NQA-2 Part 2.7 prior to its use.

Record copies of required documentation shall be retained with other project records as required by codes, standards, plans or procedures.

DOE 1330.1C
(Abstract)

"Computer Software Management"

1/12/90

DOE Office of IRM
Policy, Plans, and Oversight
(AD-24)

Weapons and Non-Weapons Related

Keywords: site manager, software management program, software management methodologies, software quality assurance, software quality control

Scope: DOE Order 1330.1C applies to all departmental elements and contractors. DOE 1330.1C covers software proposed for use, under development, or being maintained and used. It applies to software developed in-house, licensed from a commercial vendor, obtained from another organization, or otherwise acquired. The order includes 1) system, 2) scientific/engineering, 3) manufacturing, and 4) administrative/business software.

Abstract: **Policy:** A) DOE software represents a considerable investment and must be managed appropriately. B) A site specific software management plan, which directly involves upper management, should organize and control software expenses. C) Each site will establish its own software management program. Sites are assumed to be the best judge of the level of management effort required. D) Each software management program will implement a software management methodology (or methodologies), software quality assurance, and software quality control. E) The software management methodology should be software life cycle based, auditable, and consistently applied. F) Sites are encouraged to automate elements of software management methodologies. G) Each site will discourage the abuse or misuse of software. H) Each site will conduct reviews to determine if their software management methodologies should be updated. I) Sites should determine if software exists and can be purchased cost-effectively before developing custom software. J) Sites are encouraged to share information about software products. K) Sites will identify, document, and have reviewed their needs for software acquisitions and development. L) Sites are encouraged to use the same

software to perform the same functions. M) Sites are encouraged to adopt hardware and software standards to facilitate the transportability of software. N) DOE elements will work toward implementing an integrated financial management system, per OMB Circular A-127. O) Sites will abide by the terms of software contracts and licenses.

Requirements: Each site shall A) establish a software management program to cover all categories of software, B) conduct evaluations of the software management program, C) conduct periodic reviews of operational software, D) satisfy the reporting requirements of Departmental Call for Information Technology Resources Long-Range Plans, E) request approval from Department of Administration for large software developments and acquisitions*, F) promote the transfer of software technology and information, G) perform analysis of benefits and costs (ABC) for software projects, H) encourage joint procurement or development of software, I) perform all appropriate security requirements, J) abide by all software contracts and licenses, and K) when developing a shared application system, the developing site is responsible for obtaining licenses for all sites.

Exclusions: At the discretion of each site manager, certain software may be exempt from the local software management program. Exempted software may include: A) acquired software that is integrally embedded in the instrumentation associated with an experiment, B) software in a turnkey system when the software is not purchased separately from the system, C) software that is an integral part of power transmission systems, D) the National Energy Information System, E) software developed internally that supports scientific applications which are undergoing continuous change, F) System software supporting the previous software category.

DOE 1330.1C contains a list of the responsibilities and authorities of administration levels of DOE. DOE 1330.1C contains two attachments, "Elements of a Software Management Methodology" and "Software Categories".

- * "large software" is defined as administrative or manufacturing oriented software either having external impact or costing more than \$1,000,000 to implement, and being developed or substantially customized by the site.

DOE 1360.2A
(Abstract)

"Unclassified Computer Security Program"

5/20/88

DOE, Office of ADP Management

Weapons and Non-Weapons Related

Keywords: computer security, unclassified computers, mission-essential

Scope: This DOE order applies to all unclassified ADP systems. It provides for the protection of all sensitive unclassified automated information on an unclassified computer system. It also provides for the continuity of operations of unclassified computer systems and applications that support DOE mission-essential functions.

Where appropriate, this order should be used in conjunction with DOE orders related to telecommunications security and classified computer security. This order does not apply to classified computer systems used to process or store classified and unclassified information concurrently. In such situations, the provisions of DOE orders related to classified computer security apply.

Abstract: This DOE order covers unclassified computer systems including microcomputers and word processors; it provides for protecting such computer systems and sensitive unclassified automated information and it provides for the continuity of operations of unclassified computer systems and applications that support DOE mission-essential functions.

This order establishes requirements, policies, responsibilities, and procedures for developing, implementing, and sustaining a DOE unclassified computer security program. It includes requirements for risk assessments, software application development, access control, certification/recertification, disaster recovery plans, application contingency plans, and computer protection plans.

DOE 1360.3A
(Abstract)

"Automatic Data Processing Standards"

7/11/83

Office of ADP Management

Non-Weapons Related

Keywords: automatic data processing (ADP), data communications, Federal Information Processing Standards Publications (FIPS), hardware, software

Scope: This order establishes responsibilities and policies for the development and implementation of ADP standards, and applies to DOE and its contractors.

Abstract: The purpose of this order is to: 1) promote efficiency in the exchange of data, programs, and equipment within DOE and between DOE and other agencies; and 2) economically improve performance and quality in the development or acquisition of ADP products.

DOE 1360.4A
(Abstract)

"Scientific and Technical Computer Software"

10/7/87

Office of Scientific and Technical Information

Non-Weapons Related

- Keywords:** computer software programs, operational system software, scientific and technical computer software, specialized information analysis centers, national energy software center (NESc), supporting material
- Scope:** This order applies to all departmental elements, contractors, and financial assistance recipients performing work for the Department as provided by law and/or contractual agreement.
- Abstract:** This order establishes responsibilities, policies, and procedures for the purpose of maintaining a centralized software activity to promote the sharing of unclassified scientific and technical computer software among DOE and its contractors. The centralized activity also shall function as the department's focal point for dissemination of this software to private industry, the public, and foreign requestors.

DOE 1370.2
(Abstract)

"Computer-Aided Design, Engineering, and Manufacturing Resources"

5/20/85

DOE Office of IRM
Policy, Plans, and Oversight
(AD-24)

Non-Weapons Related

- Keywords:** computer-aided design/computer-aided engineering (CAD), computer-aided manufacturing (CAM), computer integrated manufacturing (CIM), automatic data processing equipment (ADPE)
- Scope:** This order applies to all departmental elements and contractors performing work for the Department as provided by law and/or contract.
- Abstract:** CAD/CAM resources should be acquired, utilized, and managed as economically and efficiently as possible. CIM resources shall be utilized to achieve maximum productivity gains and/or cost savings/avoidance consistent with programmatic requirements.

DOE 5637.1
(Abstract)

"Classified Computer Security Program"

1/29/88

DOE Office of Safeguards and Security

Weapons and Non-Weapons Related

Keywords: classified computer security, computer security, ADP security

Scope: This DOE order applies to all ADP systems which handle classified information at all DOE and DOE contractor sites.

Abstract: This order is applicable to all Automated Data Processing (ADP) systems, including word processors, microprocessors, personal computers, controllers, automated office support systems (AOSS), memory typewriters, and other stand-alone or special systems that process, store, transfer, or provide access to classified information. This order also applies to sensitive, mission-essential, and other unclassified information processed on classified ADP systems.

This order establishes the uniform requirements, policies, responsibilities, and procedures for the development and implementation of a DOE Classified Computer Security Program to ensure the security of classified information in ADP systems. It establishes the baseline security requirements for the protection of classified ADP systems. All reasonable measures to protect classified ADP systems should include (but are not limited to) the following: 1) physical security; 2) personnel security; 3) telecommunications security; 4) administrative security; and 5) hardware and software security measures. This order establishes this policy and defines responsibilities for the development, implementation, and periodic evaluation of the DOE Classified Computer Security Program.

EP401022, Issue G
(Abstract)

"Equipment Qualification System"

11/30/77

Weapons and Non-Weapons Related

Keywords: product testers, gages, equipment qualification

Scope: This interagency Engineering Procedure (EP) outlines the objectives of the Equipment Qualification (EQ) Evaluation System. This system is applicable to all Acceptance Equipment Systems, acceptance equipment and acceptance equipment procedures that are used for the acceptance of DOE Directive Schedule product. It includes all Sandia National Laboratories designed Product Testers (PT), Gages (G), associated equipment, and associated procedures. In addition, at the discretion of Sandia National Laboratories, it may include certain production agency-designed acceptance equipment, modified or complex commercial equipment and associated procedures.

Abstract: The objective of Equipment Qualification is to verify that acceptance equipment and procedures adequately test the product, a typical inspector can perform acceptance tests, and test equipment is operated in a safe manner. Acceptance equipment and procedures must be qualified before initial use. Additional equipment qualifications may be required for a variety of reasons.

This EP lists the responsibilities of Sandia Laboratories with respect to setting up and monitoring equipment qualifications. This EP list the responsibilities of the production agency with respect to implementing equipment qualification procedures.

EQ may include analysis of 1) equipment drawings, 2) operating, calibration and maintenance procedures, 3) equipment, 4) safety considerations, 5) design and fabrication requirements, 6) inspection and audit data, 7) product inspection and functional requirements, 8) accuracy study results, 9) verification of equipment calibration, 10) operation of equipment, and 11) review of test data output. Sandia National Laboratories determines whether EQ is acceptable, conditionally acceptable, or not acceptable.

EQ processing will involve 1) observation of manufacture, testing, and inspection, 2) availability calibration and inspection tools, and 3) availability of manufacturing, maintenance and inspection records. Results of an EQ will be furnished to the Production Agency by means of a QER published by Sandia National Laboratories.

The production agency or Sandia National Laboratories can initiate a RE-EQ. Sandia National Laboratories will decide whether a RE-EQ will be performed.

EP401040, Issue G
(Abstract)

"Drawing System"

9/12/85

J. W. Sims and Brint

Weapons Related

Keywords: Drawing prefix, drawing set, product drawing, support drawing, drawing suffix, AS, AT, NC, PD, AM, AP, SD, TP, DR, drawing issue, identification, control

Scope: This interagency Engineering Procedure (EP) outlines drawing systems concepts and defines the kinds of engineering drawings and specifications used for Sandia National Laboratories designed and controlled production and testing equipment. At the discretion of Lawrence Livermore National Laboratory (LLNL), portions of this EP may be implemented for LLNL designed and controlled items. It may also apply to nonweapon projects.

Abstract: The EP defines general configuration management procedures. It includes control of software (programs, code, data, specifications, and documentation). It consists of: 1) how to handle drawings, 2) part drawings' and support drawings' prefixes and purposes, 3) special purpose documents, 4) drawings no longer used, and 5) references and an appendix.

- 1) How to handle drawings includes: applicability, responsibility, preparation, approvals, identification, controls, drawing set structure, and selecting degree of product definition control.
- 2) The Part Drawings includes: Special Design Drawings, Performance Definition Drawings, Commercial Part Drawings, Kit Drawings, Acceptance Equipment System (AES) Drawings, and Procurement Drawings. Support drawings include Product- Related Support Drawings, Acceptance Equipment Related Support Drawings, Data System Support Drawings, Seven-Digit Material and Process Specifications, Development and Design Control Support Drawings, Reprocessing and Retirement, Indexes, and Lists.

- 3) Special Purpose Documents includes: drawing standards and design guide.
- 4) The drawings no longer used section identifies some of the drawings no longer prepared for new programs.
- 5) The reference section identifies the EP's referenced in this EP and Appendix A covers the use of public domain documents.

EP401043, Issue F
(Abstract)

"Acceptance Equipment Program Definition"

6/10/85

N. A. Bransom and Williams

Weapons Related

Keywords: Tester Control Program (AM), Tape Definition (TP), source program, object program, Acceptance Equipment, Acceptance Equipment System (AES), Software Documentation (SD)

Scope: This interagency Engineering Procedure states the Sandia National Laboratories policy regarding the definition, identification, transfer, control and retention of Acceptance Equipment Programs.

Acceptance Equipment Programs refer to the source and object programs used to control Acceptance Equipment. Acceptance Equipment is a test system required by Sandia and used by a DOE production agency (PA) or the Quality Assurance Inspection Agency (QAIA) for acceptance inspection of weapons material, including associated test and handling equipment and joint test assemblies.

Abstract: Acceptance Equipment programs are defined and controlled in accordance with the Tester Control Program (AM) or the Tape Definition (TP) option. The Sandia engineer responsible for acceptance equipment design in conjunction with the PA engineer determine which option to use.

In the Tester Control Program (AM) option, the drawing's original medium is the material on which the source program is encoded. The AM consists of the identification (a drawing number, a 3-digit control suffix, issue and title), source programs, routines to verify identification and test limits and the engineering change order number. The PA is required to mark the AM appropriately, maintain the AM original files, provide assembly listings, and provide program information.

In the Tape Definition (TP) option, the drawing's original medium is paper. The TP consists of the identification, and the necessary programs. The PA is required to mark the TP appropriately.

The PA is also responsible, under either option, for object program distribution, and release and change of programs.

EP401062, Issue B
(Abstract)

"Laboratory Test Program Validation"

6/5/86

N. Bransom, J. Williams

Weapons Related

Keywords: laboratory, test, test program validation (TPV), weapon, configuration, new materials laboratory test (NMLT), stockpile laboratory test (SLT), software, Sandia National Laboratories

Scope: This interagency Engineering Procedure (EP) outlines the objectives of Test Program Validation (TPV); the responsibilities of Sandia National Laboratories and production agencies (PAs); and requirements to meet TPV system objectives. This EP applies to the following DOE sites: KC, SA, SL, and PX.

The TPV system is applicable to all weapon evaluation activities related to weapon disassembly and test configuration assembly, and test and reconfiguration as required for New Materials Laboratory Test (NMLT) and Stockpile Laboratory Test (SLT).

Abstract: The TPV is done to assure that hardware configuration and test equipment meet requirements, a qualified operator can properly perform the tasks given appropriate equipment and procedures, the equipment has been fabricated professionally, and data derived are reliable. One of the reasons a TPV may be required is when a major change occurs in test equipment software or procedures.

Sandia has responsibilities before and after the TPV including providing complete test equipment drawings, software documentation, and procedures to the Weapon and Test Qualification Section a minimum of two weeks prior to the start of TPV by the Systems Test Equipment Design Division.

The TPV team will review the test configuration or component test requirements and related equipment drawings, equipment procedures, software documentation, and test results; evaluate software to assess the degree to which it supports TPV objectives;

and analyze inspection and audit results and equipment and software development records.

An acceptable evaluation resulting from a TPV means that the equipment, test configuration, and associated procedures and software will adequately perform the required weapon or component test and functions.

EP401301, Issue A
(Abstract)

"Numerical Index of Active Computer Integrated
Manufacturing (CIM) and Engineering Procedures"

8/28/89

J. W. Sims

Weapons Related

Keywords: index, engineering procedures (EP), computer integrated
manufacturing (CIM)

Scope: The listed interagency Engineering Procedures apply to all DOE
design and production agencies.

Abstract: This interagency Engineering Procedure lists the five Engineering
Procedures related to computer integrated manufacturing:

EP401302 "Management of Computer Integrated
Manufacturing Projects"

EP401303 "Management Plan for Development of CIM
Software Shared Within the NWC"

EP401304 "CIM Configuration Management Plans"

EP401305 "CIM Effectivity Plans"

EP401314 "DOE NWC File Header"

EP401302, Issue A
(Abstract)

"Management of Computer Integrated Manufacturing Projects"

8/28/89

J. W. Sims and Priebat

Weapons Related

Keywords: computer integrated manufacturing (CIM), Nuclear Weapons Complex (NWC), DOE-AL CIM Office (DOE/CIM), CIM Advisory Board, CIM Working Group (CIMWG), Lead Laboratory, Project Lead Agency (PLA), Task Group, Task Sponsor

Scope: This interagency Engineering Procedure (EP) explains policies and procedures for initiating, coordinating, and implementing Nuclear Weapons Complex (NWC) interagency computer integrated manufacturing (CIM) projects. This interagency Engineering Procedure applies to all DOE design and production agencies.

Abstract: CIM projects are initiated in response to requirements or needs relating to the exchange of electronic definition for product and/or programmatic information within the NWC. CIM projects are categorized as Initiative (large), Venture (medium), or Task (small), depending on the number of people needed, the project duration, and number of interagency meetings.

To initiate a CIM project, a participating agency must first submit a CIM project request, then a CIM Project Requirements Document, and then submit these documents to DOE/CIM for approval.

The life cycle of CIM projects is described by project category.

CIM project documentation will include 1) agreements among NWC agencies, 2) shared software documentation per EP401303, and 3) a configuration management plan. If there are implementation delays, an effectivity plan will be required.

EP401303, Issue A
(Abstract)

**"Management Plan for Development of CIM Software
Shared within The NWC"**

8/28/89

J. W. Sims and Hall

Weapons Related

Keywords: computer integrated manufacturing (CIM), software quality assurance (SQA), configuration management, software project initiation document (SPID), software system definition document (SSDD), CIM Office (DOE/CIM), verification, validation

Scope: This interagency Engineering Procedure (EP) provides a management plan for the development and control of software used to achieve automated product definition exchange within the DOE Nuclear Weapons Complex (NWC). This interagency Engineering Procedure applies to all DOE design and production agencies. This plan provides a mechanism for documenting the requirements and deliverables of a NWC CIM software project and ensuring functionality of software.

Abstract: The approval process for a CIM shared software project is described in EP401302. The software project initiation document (SPID) will contain: 1) a statement of requirements and objectives, 2) constraints, 3) system block diagram, 4) project schedule, and 5) resource requirements. The software system definition document (SSDD) will contain the SPID as well as 1) functional definition of the system block diagram units, 2) inputs/outputs, and 3) system interface.

Documentation for a CIM project will include software unit documentation for each software unit of the system and software system documentation. Software unit documentation will include: 1) design specification, 2) user's guide, 3) installation guide, 4) verification test results summary, 5) design consideration limitations, and 6) configuration management methodology. The software system documentation will contain: 1) the software system definition document, 2) user's guide, 3) installation guide, 4) integration and acceptance tests results summary, and 5) change request/problem reporting forms.

Verification of CIM project software will be performed using local SQA procedures of the software development group. Validation will be performed using integration and acceptance tests. The project lead agency will develop a configuration management plan to assure that correct versions of the CIM project software are used and compatible at all facilities. Records will be kept of the effective date for a new version of software, functional changes to the software, any operational changes, and reported errors.

A detailed list of responsibilities of different administrative groups involved with a CIM project is given.

EP401304, Issue A
(Abstract)

"CIM Configuration Management Plans"

8/29/89

J. W. Sims and Priebat

Weapons Related

Keywords: configuration management, nuclear weapons complex (NWC), computer integrated manufacturing (CIM), shared software, common hardware, common operating system, common database management system

Scope: This interagency Engineering Procedure (EP) defines the conditions that require a CIM project to include a configuration management plan, and, if required, how the configuration management plan must be approved and managed. Configuration management across the NWC requires the agreement of the individual agencies before any changes are implemented. A plan for the implementation of changes is covered in EP401305 and the implementation plan must be coordinated with the configuration management plan.

This CIM EP applies to interagency CIM projects in which operations depend upon shared software and/or common hardware configurations. This interagency engineering procedures applies to all DOE design and production agencies.

Abstract: A configuration management plan is required for an interagency CIM project if the success of the project depends upon identical 1) shared software, 2) common hardware, 3) common operating system, or 4) common database management system existing at each participating agency. The configuration management plan will document the version of shared software, the baseline hardware configuration, vendor system updates, and the version of database management systems that should be used.

The content of the configuration management plan depends upon the type of project and the reasons for requiring the plan. For each of the four categories listed above, the configuration management plan will list exactly what is managed, what procedures are to be

followed to implement changes, and who is responsible for managing the configuration management plan.

The configuration plan must be approved by each participating agency and DOE/CIM before the plan can be implemented.

EP401305, Issue A
(Abstract)

"CIM Effectivity Plans"

8/28/89

J. W. Sims and Priebat

Weapons Related

Keywords: computer integrated manufacturing (CIM), effectivity plan

Scope: This interagency Engineering Procedure (EP) defines when a CIM project requires an effectivity plan, what the plan must include, and how the plan will be approved and managed. This CIM effectivity plan needs to be coordinated with any CIM configuration management plan. This CIM EP applies to interagency CIM projects when it is impractical for all portions of the common approach to be implemented by all agencies at the same time. This interagency engineering procedures applies to all DOE design and production agencies.

Abstract: If all portions of an interagency plan can not be implemented at the same time, an effectivity plan is required. DOE/CIM or the project lead agency decide whether a plan is required. The effectivity plan will be made part of the project documentation.

The content of the effectivity plan will depend upon the type of project and the reason(s) for requiring the plan. The effectivity plan will list, by agency, the portions of the CIM project which can not be implemented immediately and list a time table for the complete implementation.

A CIM effectivity plan must be approved by DOE/CIM and each participating agency before the initial implementation of the CIM project.