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### **1.0 POLICY/PURPOSE**

The purpose of this Work Instruction (WI) is to ensure that software developed by Santa Barbara Applied Research (SBAR) meets the following criteria:

- Software Configuration Management (SCM) is planned.
- Software products are identified, controlled, and available.
- Changes to software are managed and controlled.
- All pertinent employees have access to status and content of software baselines.

### 2.0 SCOPE

The scope of this WI pertains to the Functional Area Manager (FAM), programmer/ analysts, software programming personnel, and program librarian. It applies only to programs with a life cycle longer than 1 year, or programs that require multiple programmers, or any program delivered to a customer. This WI applies to the SBAR office in Ventura, CA (VTA).

### **3.0 REFERENCES AND DEFINITIONS**

### 3.1 References

ISO 9001: Quality Management Systems-Requirements, Third Edition (2000-12-15)

• ISO 9001 Element 7.5.3, Identification and Traceability

"Capability Maturity Model<sup>SM</sup> for Software, Version 1.1"; Technical Report CMU/SEI-93-TR-024; ESC-TR-93-177; February 1993; <u>http://www.sei.cmu.edu/pub/documents/93.reports/pdf/tr24.93.pdf</u>

"NASA Software Configuration Management Guidebook"; <u>http://satc.gsfc.nasa.gov/</u> <u>GuideBooks/cmpub.hmtl</u>

### 3.2 Definitions

**Functional Area Manager (FAM):** A senior supervisory individual who is responsible for the leadership, direction, and overall success of an area of the company, such as finance, human resources, contracts administration, engineering, operations and maintenance, logistics, quality, special projects/contracts, etc.

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**Integration Test:** Testing the combination of all pieces of source code to verify that they interact properly and the program performs correctly.

**Program Librarian:** The employee responsible for maintaining the SCM library for a program.

**<u>Programmer</u>**: An employee who creates, implements, or modifies the source code of a program.

**Quality Assurance (QA):** (1) A planned and systematic pattern of all actions necessary to provide adequate confidence that a software work product conforms to established technical requirements. (2) A set of activities designed to evaluate the process by which software work products are developed and/or maintained.

**Software Configuration Control Board (SCCB):** A group responsible for evaluating and approving or disapproving proposed changes to configuration items, and for ensuring implementation of approved changes.

<u>Software Configuration Management (SCM)</u>: The process whose objective is the identification of configuration of software at discrete points in time and the systematic control of changes to the identified configuration for the purpose of maintaining software integrity and traceability throughout the software life cycle.

**Software Life Cycle:** The steps that a software development project goes through, starting with the requirements phase and ending with the software acceptance and delivery phase.

**Source Code:** A collection of statements within a computer language to accomplish a specific task.

**<u>Unit Testing</u>**: Testing performed by the programmer on a piece of source code to verify correct operation prior to integration into the program.

**Work Instruction (WI)**: Written details that, when appropriate, state what shall be done and by whom, when, where and how it shall be done; what materials, equipment and documents shall be used; and how it shall be controlled and recorded. WIs will normally be used to implement corporate procedures and/or specific contractual requirements.

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### 4.0 **RESPONSIBILITIES**

### 4.1 Functional Area Manager (FAM)

The FAM is responsible for the overall management of software projects and programming efforts for SBAR. The FAM:

- Provides guidance and direction on software development and design.
- Assigns programming tasks, as necessary.
- Acts as liaison between SBAR and client.
- Chairs any SCCB meeting

### 4.2 Programmer

Programmers are responsible for the creation and maintenance of software applications. Programmers:

- Provide software design documentation to the program librarian.
- Provide source code and source code modifications to the program librarian after unit testing.
- Unit test, integration test, and provide quality assurance (QA) fr applications.
- Meet with clients for reviewing purposes or demonstrations of the product.

### 4.3 Program Librarian

The program librarian will implement the SCM plan and maintain the program library. The program librarian:

- Maintains a copy of all code pieces during development (i.e. a copy of everything that has been unit tested) in the program library.
- Maintains a copy of every trouble report and current status in the program library.
- Maintains a copy of all final source code (i.e. what was shipped to the customer).
- Purges all beta source code (i.e. anything that was not accepted as final source code) from the program library after program acceptance by the customer (i.e. the customer is satisfied that the program accomplishes it's mission).
- Maintains information on the environment configuration used to develop/compile the program (i.e. the environment needed to recreate the program from the source code).
- Provides the final source code and compiled program for integration testing.

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# 5.0 **REQUIREMENTS/PROCEDURES:**



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### 5.1 General

This WI ensures that software developed by MCA is reproducible; all configuration items are stored in the program library; and that changes to software are tracked, verified, and tested.

## 5.2 Procedures

The procedures listed below describe the steps required for proper configuration management.

## 5.2.1 SCM Plan

An SCM plan is prepared at the beginning of each project. This plan details the SCM activities to be performed, the schedule of activities, assigned responsibilities, and resources required (i.e., staff, equipment, etc.). After approval, the SCM plan is used as the basis for performing the SCM activities.

### 5.2.2 Configuration Management Program Library

A configuration management program library, or program library, is established and used as a repository for the software baselines and controlling information. The library system:

- Provides for storage and retrieval of configuration items/units.
- Allows for the transfer and sharing of configuration items/units between affected programming personnel.
- Provides for storage and recovery of archive versions of configuration items/units.
- Ensures accuracy of products created from the software baseline library.
- Supports production of SCM reports.
- Provides for the maintenance of the library structure and contents.

### 5.2.3 Configuration Identification

Software products that are placed under configuration management are identified. Software products which may be identified as configuration items/units include:

- Process-related documentation (e.g., plans, standards, or procedures).
- Software requirements.
- Software design.
- Software code.
- Software test procedures.

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- Software system builds for the software test activity.
- Software systems build for delivery to the customer or end users.
- Support tools.

Information regarding the configuration items/units are recorded and maintained in a database, including:

- A unique identifier for each assigned configuration item/unit.
- Characteristics of each item/unit.
- The software baseline to which it belongs.
- The point in development that it is placed under configuration management
- The person responsible for each configuration item/unit.

### **5.2.4 Change Requests/Problem Reports**

Change requests and problem reports for all configuration items/units are initiated, recorded, reviewed, approved, and tracked following proper procedures. These procedures include:

- Performing reviews and/or regression tests to ensure that changes have not introduced unintended effects on the software baseline.
- Ensuring that only configuration items/units that have been approved by the Software Configuration Control Board (SCCB) are entered into the software baseline library.
- Checking configuration items/units in and out is performed in a manner that maintains the accuracy and integrity of the software baseline library. This process includes:
  - Verifying that the changes are authorized by the SCCB.
  - Creating a change log.
  - Maintaining a copy of the changes.
  - Updating the software baseline library.
  - Archiving the replaced software baseline.

### 5.2.5 Software Creation and Release

Software products from the software baseline library are created and their release is controlled through proper procedures. These procedures include SCCB authorization for creation of products from the software baseline library, as well as, maintaining software integrity by products being built only from configuration items/units contained in the software baseline library.

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### 5.2.6 Status Tracking

The status of all configuration items/units is recorded. Status information should include name of files, date of creation/modification, name of owner, and any identifiers associated with the configuration items/units. The current status and history of any changes or actions specific to a configuration item/unit is also maintained.

### 4.2.7 Reports

Reports documenting the SCM activities and the contents of the software baseline are created and made available to all affected software programming personnel. Reports can include, but are not limited to, SCCB meeting minutes, change request summary and status, trouble report summary and status (including fixes), summary of changes made to the software baselines, change history of configuration items/units, software baseline status, and results of software baseline audits.

### 5.2.8 Records

The program library's index and/or reports constitute all necessary records for software configuration management.

### 5.2.9 Training

Training for this WI is required for FAMs, program librarians, programmers, and anyone writing or maintaining software within the scope of this procedure. Training records shall be maintained in the Training Attendance Form Binder, and/or the individual's personnel file.



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