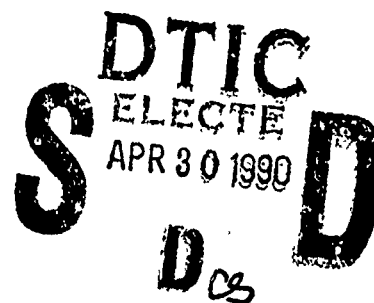


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TOMAHAWK WEAPON CONTROL SYSTEM RELEASE MANAGEMENT STUDY



**BY ROBERT B. CLARK, SR.
COMBAT SYSTEMS DEPARTMENT**

MARCH 1990

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NAVAL SURFACE WARFARE CENTER
Dahlgren, Virginia 22448-5000 • Silver Spring, Maryland 20903-5000

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NAVSWC MP 90-187

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FOREWORD

This document identifies and examines areas where efficiency could be improved in the Naval Surface Warfare Center (NAVSWC) Cruise Missile Weapon Systems Division release management function. It was written in response to an action item given by the Cruise Missile Project Office

This document was reviewed by Joanna H. Donegan, Senior Technical Advisor, and Charles J. Naples, Head of the Product Support Branch.

Approved by:



RAYMOND M. POLLOCK, Head
Cruise Missile Weapon Systems Division



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INTRODUCTION

→ The Naval Surface Warfare Center (NAVSWC) Cruise Missile Weapon Systems Division (N40), Product Support Branch (N44) performs software configuration and release management for the TOMAHAWK Weapons Control System (TWCS). The Cruise Missile Project (CMP) tasked N44 to identify areas where efficiency could be improved in its release management function. This report documents N44's findings and describes resultant actions.

Delivery requirements, Key words: networking, Standardization of configurations. (KR)

ITEMS TARGETED FOR IMPROVEMENT

The following were identified as items that would significantly improve the efficiency of N44's release management function:

1. Develop faster, more flexible Navy DTD (data transport device) Production System (NDPS) and multivolume tape dump utility (MDUMP) programs. NDPS is the system used to create tactical DTDs. MDUMP is used to create tapes for delivery to the Naval Ship Weapon Systems Engineering Station (NSWSES). MDUMP uses a nonstandard tape format approved by the nuclear certification community.
2. Develop a single, consistent method for producing both tactical and Program Performance Test (PPT) DTDs.
3. Develop a networking capability among the various computer systems used by the release management group (i.e., VAX, MV20000, ROLM, HP9020).
4. Standardize delivery items from software and documentation developers to the release management group.
5. Participate in the development of an agreement on the content and format of TOMAHAWK Engagement Planning Exercise and Evaluation (TEPEE) program deliveries received from McDonnell Douglas.
6. Update the division's configuration and release management documents to reflect current policies and procedures.

DEVELOPMENT OF FASTER, MORE FLEXIBLE NDPS AND MDUMP PROGRAMS

Because the current NDPS and MDUMP programs are slow and inflexible, long lead times are needed to produce DTDs and MDUMP tapes. This is especially frustrating when a simple change is necessary (e.g., changing one file on the DTD), yet the entire build process must be restarted by the release management group.

In response to this problem, N44 has developed faster, more flexible NDPS and MDUMP programs for BLOCK II deliveries. These new programs should significantly speed up the response time for DTD builds. These programs are currently undergoing testing. NDPS is scheduled for delivery to NSWSES on 1 April 1990.

DEVELOPMENT OF A SINGLE BUILD METHOD FOR TACTICAL AND PPT DTDs

The NDPS program creates the tactical DTDs used in system-level testing. PPT-level DTDs, however, are essentially done "by hand," which is time-consuming and error prone. To solve this problem, N44 has developed an in-house version of NDPS that not only builds tactical DTDs but also incorporates the features necessary to build PPT-level DTDs. The program automates special PPT DTD requirements and uses essentially the same DTD build procedures used in making tactical DTDs. Because the in-house version is based on the official, certified NDPS program, most of the code is identical for both systems. The program is undergoing testing and should be available by mid-February 1990.

NETWORKING

The release management process at NAVSWC requires the use of several different types of computer systems, both tactical and commercial. The official configuration management source code is maintained on a VAX system, regeneration of Track Control Group (TCG) and Launch Control Group (LCG) source code is performed on an MV20000, DTD builds are created on a ROLM 1666, and TEPEE regeneration is done on an HP9020.

Because the VAX and MV20000 are not networked, TCG and LCG source files must be kept on both the VAX and the MV20000; each time configuration management databases are updated on the VAX, they must also be updated by tape on the MV20000. To increase the efficiency of the release management file transfer process and reduce the duplication of source code masters, N44 will install a classified network in its computer laboratory. The network will be based on the same digital equipment technology used in N40's unclassified office space network. The network should be operational by mid to late February 1990. The network will initially

connect the VAX system used for configuration management with the MV20000 system used for compilation and generation of executable files.

In addition, N44 has undertaken a project to develop a networking capability for its ROLM computers. The computer protocol being developed for this effort will be compatible with the classified network mentioned above, thus making it possible to add ROLM systems to our classified network. If implemented, it would be possible to sit at the VAX system, transfer source code to the MV20000 for compiling, and then download the resultant executable to the ROLM system for execution or DTD building. This project is in its initial stages. It is estimated that completion will take one year.

Occasionally, a request is made to transfer a file from the MV20000 to the HP9020. Since the tape drives of the systems are incompatible, these requests cannot be satisfied. Therefore, N44 is currently investigating commercial products that will allow the HP9020 to be connected to our classified network.

STANDARDIZATION OF DELIVERY REQUIREMENTS

In the past, each software development group had its own method of delivering products to the release management group. Both the items delivered and the format of delivery were different for each group, requiring development of separate procedures for each system. N44 has worked with both the N40 TCG and LCG developers to standardize delivery requirements across the division. In addition, after May 1990, all Lockheed deliveries will be made through N40's TCG group and, therefore, will be subject to the standard delivery agreement. The following is a list of agreed-upon delivery standards.

1. The following items should accompany all documentation deliveries made to N44 from internal (N40) and external sources:

- modified documentation via the Change and Configuration Control (CCC) System
- hard copy list of fixed software trouble reports (STRs)

2. The following items should accompany all software deliveries made to N44 from internal (N40) and external sources:

- hard copy list of regeneration environmental requirements such as identification and version numbers for hardware, operating systems, compilers, and assemblers
- regeneration instructions

- completed module update form for each affected module
- modified source routines and applicable macros or command files delivered via CCC
- modified relocatable binary files (RBs) and executable files via electronic transfer to the MV20000
- hard copy list of fixed STR descriptions and associated operator impacts by source routine

Software deliveries for new block upgrades should contain all regeneration requirements, instructions, source routines, applicable macros, RBs, and executable files pertinent to the first delivery of that upgrade. The last item listed above is not applicable to block upgrade deliveries.

Delivery of TEPEE from McDonnell Douglas will not be covered under the standard agreement discussed above. TEPEE deliveries are discussed in the following section.

DEVELOPMENT OF TEPEE DELIVERY AGREEMENT

The TEPEE program is delivered to NAVSWC from McDonnell Douglas Missile Systems Corporation. CMP has directed NAVSWC to include TEPEE as one of its release management products. N44 performs regeneration and distribution of TEPEE and the associated UNIX operating system to the TOMAHAWK community, as requested by PMA-282. N44 is pursuing the establishment of an agreement with McDonnell Douglas and CMP that will define both the content and format of TEPEE deliveries to ensure compatibility with N44 requirements.

UPDATING CONFIGURATION AND RELEASE MANAGEMENT DOCUMENTATION

An updated version of the NAVSWC TWCS STR Management Process, T-SGN-0323-01, has been completed and will be referenced in the Software Configuration Management Plan that is currently being revised. This will address N40 software configuration and release management policies, procedures, emergency processes, standards, and changes made in the management of STRs. This plan is targeted for completion by the end of fiscal year 1990 (FY90). Some of the source materials that will be used in updating this plan are contained in Figures 1 through 3.

Figure 1 provides a brief overview of the release management procedures that will be used in N44 to process software deliveries. The figure shows a general process

flow for deliveries going out of NAVSWC. What is noted in the figure as an FCA/PCA is referred to within N40 as the product review.

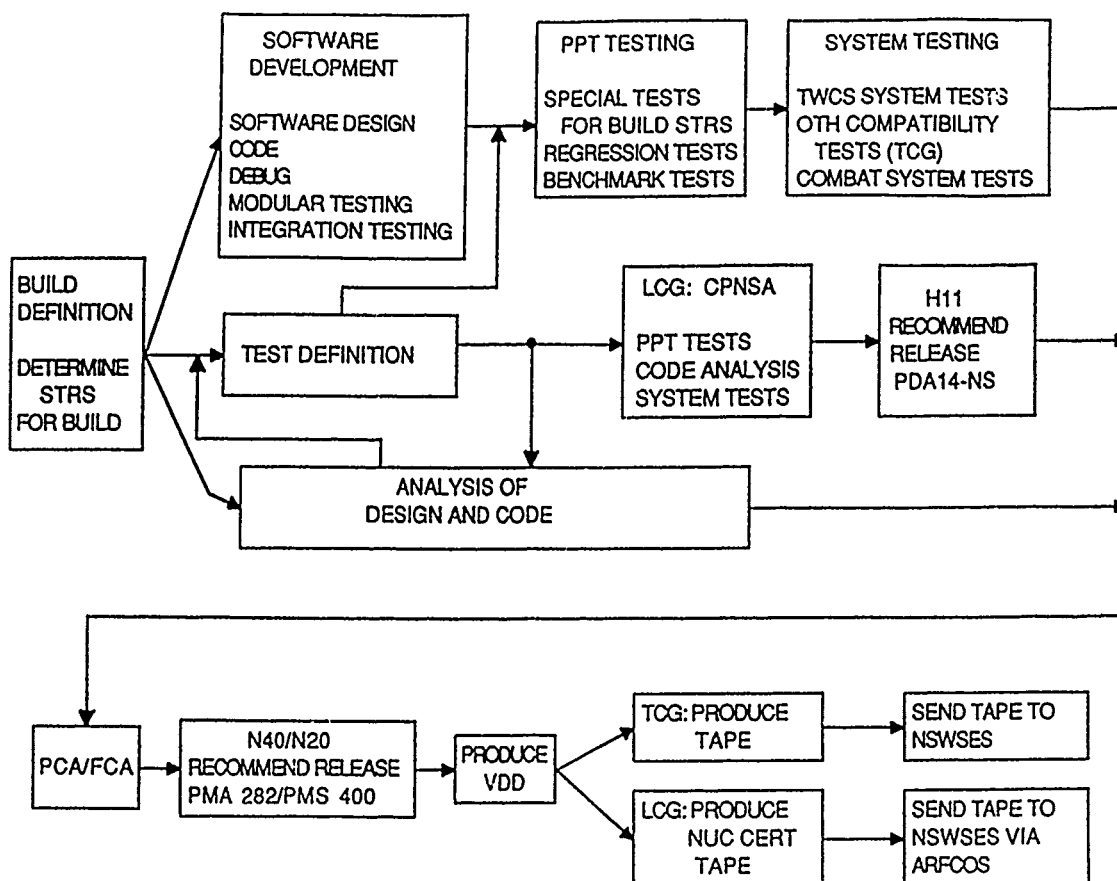


FIGURE 1. NAVSWC DELIVERY PROCESS

Figure 2 shows the procedures used for processing software changes/deliveries via the N40 automated configuration management system (CCC). The three columns in the figure represent general build procedures, procedures used within CCC, and status accounting changes for the affected STR. Horizontal blocks are occurring in parallel (or nearly so), and vertical blocks are occurring in sequence.

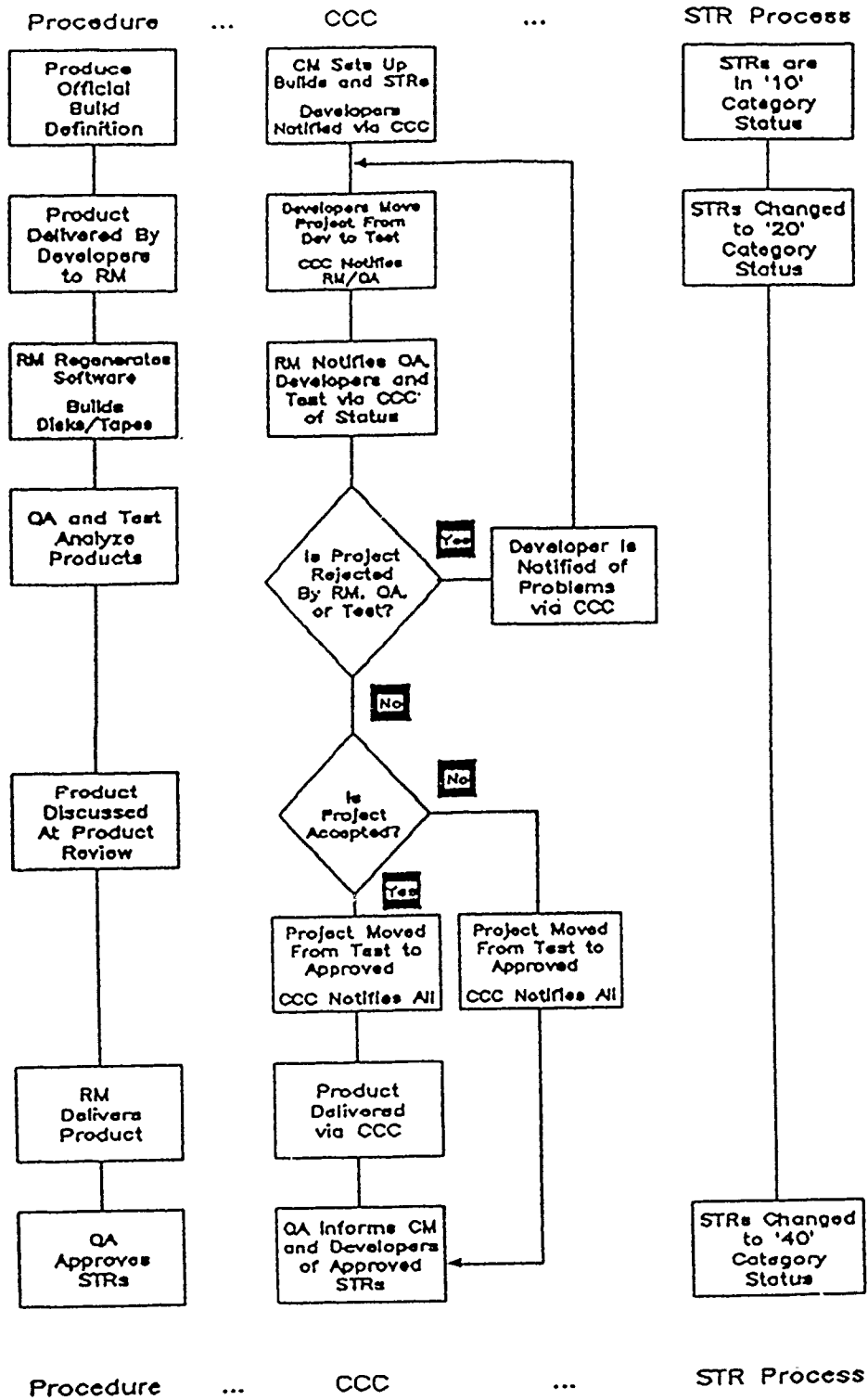


FIGURE 2. SOFTWARE BUILD PROCESS

Figure 3 shows the procedures used by N40 to process emergency builds. The two columns reflect the release management as opposed to the developer/test areas of responsibility. Horizontal blocks are performed in parallel, and vertical blocks are performed in sequence.

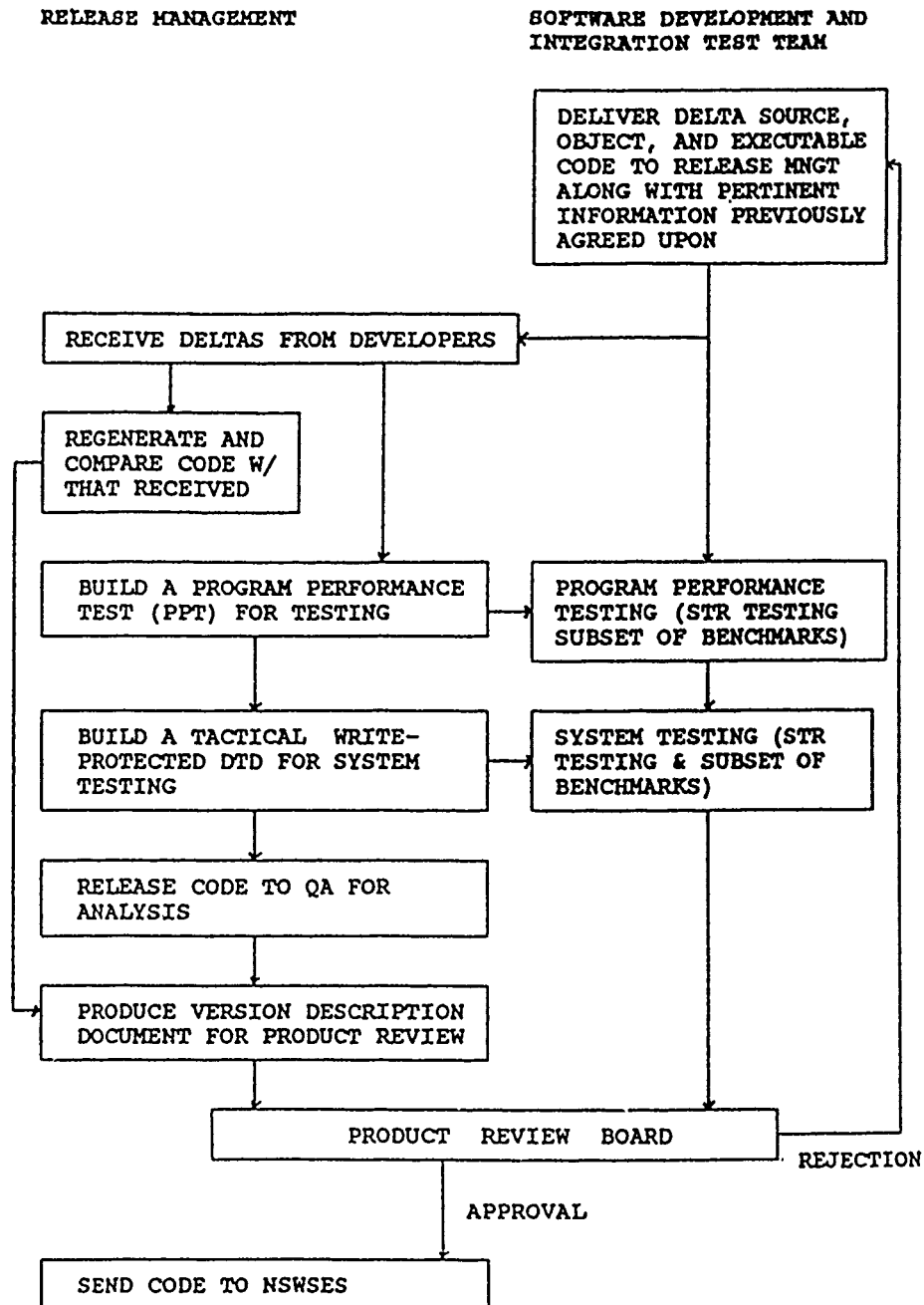


FIGURE 3. EMERGENCY BUILD PROCEDURE

SUMMARY

N44 will significantly improve its release management ability in the early 1990 timeframe through initiatives in the areas of software tool development and networking. Other initiatives in the areas of delivery requirement standardization and documentation updates will also contribute to improving release management.

GLOSSARY

ABL	Armored Box Launcher
CCC	Change and Configuration Control System
CM	configuration management
CMP	Cruise Missile Project
DTD	data transport device
FCA	Functional Configuration Audit
FY	fiscal year
LCG	Launch Control Group
MDUMP	multivolume tape dump utility program
NPDS	Navy DTD Production System
NAVSWC	Naval Surface Warfare Center
NSWSES	Naval Ship Weapon Systems Engineering Station
OTH	Over the Horizon
PCA	Physical Configuration Audit
PPT	Program Performance Test
QA	quality assurance
RBs	relocatable binary files
RM	release management
STR	software trouble report
TCG	Track Control Group
TEPEE	TOMAHAWK Engagement Planning and Exercise Evaluation
TWCS	TOMAHAWK Weapon Control System
VDD	version description document

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