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SUBJECT: Forwards description of enhancement to util configuration mgt program.

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James D. Shiffer
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April 19, 1989

PG&E Letter No. DCL-89-099

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Enhancements to PG&E's Configuration Management Program

Gentlemen:

On March 3, 1989, NRC Region V requested submittal of a plan outlining the scope and schedule of enhancements to PG&E's Configuration Management Program (CMP). Enclosed is a description of these enhancements. PG&E is committed to continue this program to a successful conclusion and has devoted necessary resources to ensure timely completion. PG&E will keep the NRC informed of progress of the CMP.

Kindly acknowledge receipt of this material on the enclosed copy of this letter and return it in the enclosed addressed envelope.

Sincerely,

J. D. Shiffer

cc: J. B. Martin
M. M. Mendonca
P. P. Narbut
H. Rood
B. H. Vogler
CPUC
Diablo Distribution

Enclosure

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ENCLOSURE

CONFIGURATION MANAGEMENT PROGRAM

An enhancement of the Diablo Canyon Configuration Management Program has been implemented to provide programmatic improvements to an existing configuration control system. These enhancements will further assure the maintenance of plant configuration and design bases. The enhancement represents a substantial effort by PG&E to facilitate the understanding and effective use of design bases and provides continued oversight and review of configuration management activities related to Diablo Canyon, Units 1 and 2. This program was described in Enclosure 4 to PG&E Letter DCL 88-236, October 5, 1988, and discussed with the NRC in meetings on October 26, 1988, December 9, 1988, and March 3, 1989.

PG&E's actions regarding configuration management have paralleled the industry's trends of increased attention and sensitivity to programs that ensure nuclear plants are configured, maintained, and operated in a manner consistent with the design bases. PG&E has been an active participant in industry forums addressing configuration management and design bases documentation.

I. INTRODUCTION

It is PG&E's policy that configuration management of Diablo Canyon be carried out as an integrated process that:

- Identifies existing plant design bases and requirements.
- Ensures that design changes and plant activities including operation, maintenance, and testing result in continuing conformance with design bases and requirements.

The results of internal technical audits and surveillances conducted by the PG&E Quality Assurance organization, coupled with deficiencies in configuration management identified at other nuclear plants, motivated PG&E to form a Configuration Management Task Force. The Task Force, chaired by Nuclear Engineering and Construction Services (NECS) with participation by Plant and General Office departments, was formed in the fall of 1987 to assess the overall adequacy of PG&E's program and to make recommendations for improvement as appropriate. The Task Force identified and defined the components of configuration management and established acceptance standards based upon INPO and industry guidelines for each of the components. PG&E's engineering and plant programs and procedures were reviewed to determine if the standards were met. A report of this effort, including recommendations for strengthening configuration management at Diablo Canyon, was issued June 16, 1988. PG&E management reviewed the Task Force recommendations and industry experience and, in the fall of 1988, established a configuration management enhancement program (CMP).

PG&E's program is derived from a firm base established in the period of 1981 to 1984, during which extensive reviews, evaluations, and upgrades were made as part of the Diablo Canyon Independent Design Verification Program (IDVP). Extensive upgrades were made to (1) plant as-built information, (2) design and design change procedures, (3) design criteria and methodology, and (4) design and analysis documentation. In addition, construction and maintenance procedures were improved to assure the integrity of plant configuration and design bases at Diablo Canyon.

Furthermore, since PG&E performed the architect/engineer (A/E) role during design and construction of Diablo Canyon, design information, control procedures, and construction knowledge reside in-house, thereby precluding an A/E-utility technology transfer. PG&E continues to provide engineering for design changes and maintains an engineering organization capable of responding to plant issues without outside support, with the exception of design or analysis within the scope of the Nuclear Steam Supply System (NSSS) vendor.

PG&E has taken the following actions to improve configuration management since completion of the IDVP.

- 1985: Continuing review of industry's configuration management programs and active participation in industry forums.
- 1985-1987: General improvements - Developed replacement/spare parts evaluation program; Engineering, Construction and Plant procedures reviewed during the Quality Assurance Program update; Engineering formed a dedicated group to perform safety evaluations.
- 1987: Internal technical self-assessments/surveillances similar to NRC's SSFI and SSOMI efforts.
- Fall 1987: Configuration Management Task Force formed.
- Fall 1988: Formal Configuration Management Program

II. OBJECTIVE

It is PG&E's objective to use effective configuration management practices to ensure that Diablo Canyon is configured, maintained, and operated in a manner that is consistent with design bases and licensing commitments. Consistent with this goal, changes and additions have been identified that will:

- Improve plant knowledge of design bases
- Improve design engineering and plant interfaces
- Improve design change review process and commissioning of new designs

III. PROGRAM SCOPE

The Configuration Management Program consists of three major efforts: program enhancements to maintain plant configuration and continued compliance with design bases; design bases documentation enhancement; and oversight and continued review. These three efforts are discussed in further detail below.

A. Program Enhancements

Program enhancements encompass activities exclusive of design bases documentation, and includes the following actions:

- Issue configuration management policy document to ensure proper and consistent implementation of the program by appropriate personnel.
- Consolidate design delegations to eliminate redundancy and ensure clear, concise delegations are in effect at the proper organizational level.
- Enhance Design Change Packages (DCPs) as follows:
  - Identify design bases information and make appropriate changes in plant programs and procedures concurrent with hardware changes.
  - Include test and acceptance criteria in DCNs to assure that critical design bases functions are demonstrated by test prior to release for operation.
  - Provide advanced review of DCPs by all appropriate plant personnel to assure compatibility with plant operation, training, maintenance, and surveillance.
- Improve instrument setpoint control by modifying plant and engineering procedures to provide a clear definition of responsibilities and interfaces and by expanding control and setpoint documentation. Specifically, the following setpoint control actions are being taken.
  - Plant and Engineering procedures that contain requirements for establishing and maintaining setpoints are being reviewed and modified, were required, to clarify responsibilities and interfaces.
  - Setpoint classification criteria (i.e., Design Class 1 or Design Class 2) are being reviewed and clarified.
  - I&C and electrical Class 1 setpoints are being reviewed to ensure that process variable ranges are provided to ensure compatibility with the design basis and to minimize challenges to safety systems. Should additional range specification be required, it will be provided in the engineering setpoint document.
  - Nonsafety-related device setpoints will be controlled for situations in which the device action will challenge safety systems and where the device action may substantially affect plant availability.

- The Engineering Design Class 1 setpoint documents will be modified to include a reference to the regulatory commitment, analysis, or other design basis document that is the setpoint source.

- Review of generic maintenance procedures by Engineering to ensure appropriate consideration of design bases.

- Review of existing-construction installation specifications and engineering procurement specifications by Engineering to verify compatibility with present and future work requirements.

- Review vendor manuals to assure that manuals significant to operations and maintenance activities are upgraded to include current and correct information. This effort includes formal vendor contact to ensure currency.

- Improve design change status tracking by utilizing the Plant Information Management System (PIMS) to provide improved definition of plant activities and a readily available data source to ensure consistent status reporting.

B. Design Bases Documentation (DBD) Enhancement Program

The second major effort of the CMP is to improve documentation of the plant design bases. The Configuration Management Task Force compared PG&E's configuration management components with current industry recommendations. The conclusions specific to design bases were that although the design bases are retrievable and can be effectively used in the design process, the bases are not in the format currently recommended by the industry. Also, the documentation was not as easily accessed and interpreted by plant personnel as desired, however, the design bases were found to be available and adequate for use by NECS personnel. An extensive design bases reconstitution effort is not necessary for Diablo Canyon. This finding is attributed to the following considerations:

- An extensive design engineering organization has been maintained within PG&E to internally perform the majority of design. Design performed by others is rigidly controlled by specification and reviewed and accepted by PG&E prior to implementation. The high level of PG&E engineering involvement provides consistent application of design criteria, methodology, and controls and provides a "corporate memory" that might not exist if substantial work had been performed under consulting contracts.

- Extensive design basis documentation in DCMs, calculations, and other controlled documents, coupled with significant improvements in the design change process, occurred during the period of 1981 through 1984.

- Design activities necessary to support an operating plant, such as specification of replacement parts, have been controlled to assure maintenance of plant configuration and compliance with design basis.

To address the Task Force's conclusions, a short-term (Task I) and long-term (Task II) approach was taken. The first task will provide an immediate

improvement in understanding of and access to design bases information by the plant staff, and the second task will provide design bases information in a single set of documents to further improve accessibility. The following discussion provides further details of each task.

1. Task I

The approach of Task I is to improve plant access to design bases information, provide design bases training to the plant, and improve communications to the plant. The scope of task involves three major areas as discussed below:

a. Establishment of a Design Basis Document Source Reference Guide (DBDSRG) as a controlled document. The DBDSRG provides instructions for personnel to access design basis information for Diablo Canyon structures, systems, and components, and contains a discussion of the several subjects or categories of documents that contain design basis information. These subjects and categories of documents are listed below.

- Purpose and scope
- Q-List
- Design Criteria Memoranda
- Calculations/analyses
- NECS engineering correspondence files
- Westinghouse design requirements
- Miscellaneous controlled documents
- Drawings
- Manufacturer's documents
- Design considerations matrix
- Accessing design basis information

b. Establishment of a Plant System Engineer/System Design Engineer matrix to improve design interface and identify system responsibilities. To facilitate interface coordination between Plant System Engineers and System Design Engineers, a matrix has been developed that provides system identification, personnel assignments and telephone contact information.

C. Establish detailed design basis training in major topical design areas and training in the use of DBDSRG. The training program will instruct the following technical personnel:

- System engineers
- Startup engineers
- Mechanical maintenance engineers
- Electrical maintenance engineers
- I&C maintenance engineers
- Others as appropriate

The training includes the following subjects:

- Piping
- High Energy Line Break
- Auxiliary Feedwater
- ALARA
- Instrument Classification
- Instrument Setpoints
- 4KV Electrical
- Equipment Qualification
- Civil Structural
- Heavy Loads
- Flooding
- Missiles
- Seismic Induced System
- Interaction Program
- Equipment Seismic Qual.
- Fire Protection

2. Task II

Task II is a longer term program established to provide improved design basis detail in a central location by enhancement of existing DCMs and development of new DCMs. DCMs contain system descriptions, requirements, design bases, and references to support design bases documentation. Included in the program is a requirement that each plant surveillance procedure be reviewed to provide confidence that the testing is adequate to show that the system will perform as required by the plant design bases. Task II also includes three major elements as described below.

a. Development of Writer's Guide. This guide provides a consistent scope and level of detail to the program by establishing a consistent methodology and format for DCMs as follows:

- Scope of DCM's. DCMs will include consideration of the following:
  - Safety related systems/important to environmental quality
  - Systems which can challenge safety systems/impact availability
  - Safety related topical design considerations
- Methodology for Preparation. The DCMs will be prepared with the following approach:
  - Performed by NECS Engineering
  - Document retrieval and review
  - Document DCM preparation
  - Coupling design basis to source
  - Ensure documentation compatibility
  - Identify missing information/open items and resolve using existing discrepancy process
  - Review surveillance procedures
  - Establish all functions or features for surveillance and develop associated acceptance criteria
  - Plant participation/review
  - NSSS Review/Approval
  - Coordination/review

The format established for the enhanced DCMs is shown in Table 1. Figure 1 is a flow diagram illustrating a typical DCM Enhancement Process.

b. Preparation of Pilot DCM Program. Three plant systems, one mechanical, one I&C, and one electrical, were chosen for a pilot program that began in 1988. Two of the systems are within PG&E direct design responsibility and the other by the NSSS vendor. These systems are:

- Auxiliary Feedwater System
- 4KV Electrical System (Includes Emergency Diesel Generator)
- Nuclear Instrumentation System

The pilot program is nearing completion and has provided the following information and lessons-learned:

- With the exception of a few items, design bases information is retrievable from the PG&E engineering files
- DCM format is appropriate for system DBD presentation
- Enhanced DCMs are viewed as beneficial
- A few design and operation open items were found requiring corrective actions

c. Completion of DCM enhancement. It is currently estimated that about 86 DCMs are required to be developed or enhanced. This effort is scheduled over the next three years.

C. Oversight Program Review

The Configuration Management Task Force has demonstrated its usefulness in reviewing, evaluating, and recommending enhancements to Diablo Canyon's configuration program. The Task Force will remain active in an oversight role to monitor the effectiveness of the program and recommend further improvements. Specific tasks include:

- Study feasibility and benefit of adding functional design basis information at the component level in Project Information Management Systems (PIMS).
- Lead a technical review of a sample of operating procedures to verify compatibility with design bases.

IV. PROGRAM SCHEDULE AND ACTIVITIES COMPLETED

The discussion below provides a list of the major program activities completed to date and a schedule for completion of remaining efforts.

A. Activities Completed

Significant Configuration Management Program activities completed to date include the following:

- Issued NPG Configuration Management Policy Statement

- Revised Administrative Procedure, Plant Modification Program, and Nuclear Engineering Manual Procedures (NEMP) to ensure proper interface and compatiblity with Nuclear Power Generation Department.

- Revised the NEMPs to require new or revised design bases to be included in DCNs

- Revised the NEMPs to include test and acceptance criteria in DCNs

- Issued DCM Writer's Guide

- Issued DBDSRG

- Provided training to Plant System Engineers

- Drafted three Pilot DCMs

  - Auxiliary Feedwater System
  - 4 KV Electrical System
  - Nuclear Instrumentation System

- Reviewed Surveillance Procedures associated with Pilot Program

- Issued System/Design Engineer Matrix

- Revised the DCN, Rev. A, process (advance design review) to include all Plant disciplines, as appropriate

B. Schedule

The schedule for completion of CMP elements through 1989 is shown in Figure 2. A subject listing of DCMs to be completed in 1989, 1990, and 1991 is shown on Tables 2, 3, and 4. In summary, the schedule for DCM enhancements is:

- 1989 DCM Scope - 24 DCMs to be completed
- 1990 - 1991 DCM Scope - 62 DCMs to be completed

PG&E considers the schedule to be ambitious and the CMP enhancement to be a dynamic process, such that lessons learned in the pilot phase and throughout the program may substantially affect present goals and schedules. From that viewpoint, the schedules presented are subject to further revision. Furthermore, negotiations for firm schedule commitments from the NSSS vendor, who has review and concurrence responsibilities in the support of this program, is in progress.

TABLE 1

ENHANCED DESIGN CRITERIA
MEMORANDA FORMAT

1.0 INTRODUCTION

- 1.1 PURPOSE
- 1.2 FUNCTION

2.0 DESCRIPTION

- 2.1 BOUNDARIES
- 2.2 MODE REQUIREMENTS
- 2.3 INTERFACES
- 2.4 SCHEMATICS AND DRAWINGS

3.0 LICENSE REQUIREMENTS, CODES AND STANDARDS

4.0 DESIGN BASIS

- 4.1 CLASSIFICATION
- 4.2 CHEMISTRY AND MATERIALS
- 4.3 SYSTEM AND MAJOR EQUIPMENT
- 4.4 NATURAL PHENOMENA REQUIREMENTS
- 4.5 RELATED DESIGN BASIS DOCUMENTS

5.0 SURVEILLANCE/MAINTENANCE REQUIREMENTS

6.0 REFERENCES

- 6.1 TECHNICAL SPECIFICATIONS
- 6.2 FSAR
- 6.3 SERs
- 6.4 SURVEILLANCE PROCEDURES
- 6.5 PLANT SYSTEM DESCRIPTIONS

7.0 DEFINITIONS

8.0 OPEN ITEMS

TABLE 2

DESIGN CRITERIA MEMORANDA SCHEDULED FOR 1989

I. MECHANICAL ENGINEERING

1. AUXILIARY FEEDWATER SYSTEM
2. COMPONENT COOLING WATER
3. EMERGENCY DIESELS
4. EQUIPMENT SEISMIC QUALIFICATIONS
5. SAFETY INJECTION SYSTEM
6. RESIDUAL HEAT REMOVAL SYSTEM

II. ELECTRICAL ENGINEERING

1. 4 KV SYSTEM
2. 12 KV SYSTEM
3. 480 V SYSTEM
4. 125 AND 250 VDC SYSTEM

III. CIVIL ENGINEERING

1. CONTAINMENT EXTERIOR
2. CONTAINMENT INTERIOR
3. CONTAINMENT ANNULUS
4. CONTAINMENT LINER PLATE
5. PIPEWAY STRUCTURE
6. PLANT VENT
7. AUXILIARY BUILDING
8. RACEWAY STRUCTURAL

IV. I&C ENGINEERING

1. NUCLEAR INSTRUMENTATION SYSTEM
2. INSTRUMENT CLASSIFICATION
3. DIGITAL FEEDWATER CONTROL SYSTEM
4. BACK-UP AIR SYSTEM
5. P-250 PLANT COMPUTER

V. PIPING ENGINEERING

1. PIPE STRESS ANALYSIS

TABLE 3

DESIGN CRITERIA MEMORANDA SCHEDULED FOR 1990

I. MECHANICAL ENGINEERING

1. CHEMICAL AND VOLUME CONTROL SYSTEM
2. CONTAINMENT SPRAY
3. REACTOR COOLANT SYSTEM
4. SPENT FUEL COOLING SYSTEM
5. HEAVY LOADS
6. FLOODING/MISSILES/HELB/MELB
7. COMPRESSED AIR SYSTEM
8. FIRE PROTECTION SYSTEM
9. FEEDWATER SYSTEM
10. TURBINE STEAM SUPPLY SYSTEM (DOWNSTREAM OF MSIVs)
11. APPENDIX R FIRE PROTECTION PROGRAM
12. GASEOUS RADWASTE SYSTEM
13. LIQUID RADWASTE SYSTEM
14. HVAC
15. MAKE-UP WATER SYSTEM
16. AUXILIARY SALTWATER SYSTEM

II. ELECTRICAL ENGINEERING

1. ANNUNCIATOR, TEMPERATURE MONITOR AND SITE EMERGENCY ALARM SYSTEMS
2. MAIN GENERATOR 25 KV, 250 KV AND 500 KV SYSTEMS
3. ELECTRICAL SEPARATION AND ISOLATION
4. ENVIRONMENTAL QUALIFICATION
5. GROUNDING SYSTEM
6. 120 V INSTRUMENT AC

III. I&C ENGINEERING

1. SOLID STATE PROTECTION SYSTEM
2. RADIATION MONITORING SYSTEM
3. DIGITAL ROD POSITION INDICATING SYSTEM

IV. CIVIL ENGINEERING

1. FIRE PENETRATIONS
2. FUEL HANDLING BUILDING
3. HVAC STRUCTURAL DUCT AND SUPPORTS
4. CRANES AND FUEL HANDLING SYSTEM

V. PIPING ENGINEERING

1. PIPING SUPPORT ANALYSIS
2. ACTIVE VALVES

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TABLE 4

DESIGN CRITERIA MEMORANDA SCHEDULED FOR 1991

I. MECHANICAL ENGINEERING

1. SISIP
2. ALARA
3. NSSS SYSTEM
4. TURBINE STEAM SUPPLY SYSTEM (UPSTREAM OF MSIVs)
5. CONTAINMENT H2 PURGE SYSTEM
6. FUEL HANDLING SYSTEM
7. NUCLEAR FUEL SYSTEM
8. CONDENSATE SYSTEM (EXCEPT CPS)
9. EXTRACTION AND HEATER DRIP SYSTEM
10. AUXILIARY SYSTEM
11. N2 AND H2 SYSTEM
12. SERVICE COOLING WATER SYSTEM
13. LUBE OIL AND PURIFICATION SYSTEM
14. MAIN TURBINE SYSTEM
15. OIL WATER SEPARATOR SYSTEM
16. CONDENSATE POLISHING SYSTEM
17. SOLID RADWASTE HANDLING AND STORAGE SYSTEM
18. HAZARDOUS WASTE SYSTEM

II. ELECTRICAL ENGINEERING

1. ELECTRICAL CABLE TERMINATION AND RACEWAY
2. MISC. ELECTRICAL DEVICES (MOTORS, ETC.)
3. LIGHTING, 120VAC GENERAL USE, BORIC ACID HEAT TRACE AND CATHODIC PROTECTION SYSTEMS
4. COMMUNICATIONS, CCTV MONITORING, AND 125V SECURITY SYSTEM
5. SEISMIC MONITORING SYSTEM

III. I&C ENGINEERING

1. SAFETY PARAMETER DISPLAY SYSTEM
2. NUCLEAR MONITORING SYSTEM
3. DCPP SIMULATOR
4. MULTI-SYSTEM INTERFACE (PANELS)

IV. CIVIL ENGINEERING

1. SEISMIC DESIGN
2. INTAKE STRUCTURE
3. TORNADO
- TSUNAMI

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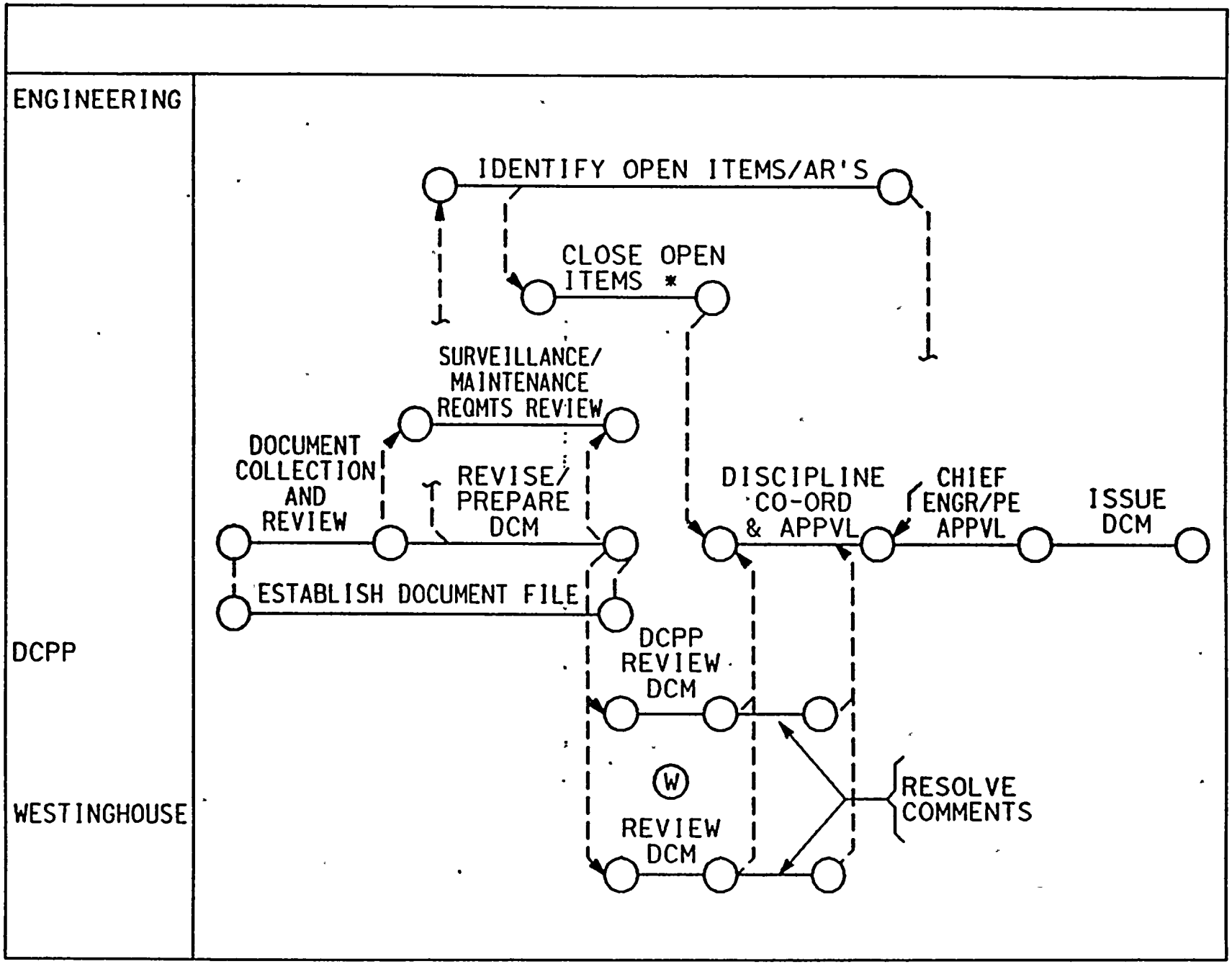
Figure 1

TYPICAL DCM ENHANCEMENT PROCESS



* CLOSURE OF ALL OPEN ITEMS MAY NOT BE POSSIBLE PRIOR TO ISSUE

Figure 2

CONFIGURATION MANAGEMENT PROGRAM ENHANCEMENTS