PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON POWER PLANT
UNITS 1 AND 2
NUCLEAR POWER GENERATION DEPARTMENT

PROGRAM MANUAL:

SYSTEMS INTERACTION PROGRAM (SIP)
FOR
SEISMICALLY-INDUCED EVENTS

REVISION 4
MARCH 15, 1984

SYSTEMS INTERACTION PROGRAM
PROJECT COORDINATOR

3/29/84
DATE

APPROVALS

DCPP PROJECT MANAGER

4/3/84
DATE

Controlled Copy No. _____

Notes on Revision 4 to the Program Manual

This Revision 4 to the SIP Program Manual reflects major changes to the manual's organization and the incorporation of all pertinent instructions and documents relevant to the implementation of the Seismically-Induced Systems Interaction Program.

Program changes reflected in this revision have been in effect since October 1983 and were implemented by direct Project correspondence to the disciplines involved. This revision systematically organizes those adjustments to the Program. Numerous appendices have been added to include and describe detailed procedures relating to specific areas of the Program.

Because of the bulk of this document and the fact that not all users require the appendices to this manual, a single sheet has been provided in place of the actual appendix. The user is urged to contact the SIP Project Coordinator for those deleted appendices, if he or she feels they will assist in the user's work on this Program.

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT

NUCLEAR POWER GENERATION DEPARTMENT

SEISMICALLY-INDUCED SYSTEMS INTERACTION PROGRAM

TABLE OF CONTENTS

SYSTEMS INTERACTION PROGRAM

CHAPTER 1 - PROGRAM DEFINITION

TABLE OF CONTENTS

SYSTEMS INTERACTION PROGRAM

CHAPTER 1 - PROGRAM DEFINITION

1.1 PROGRAM OBJECTIVE

The objective of the Systems Interaction Program (SIP) is to verify that the equipment required for safe shutdown, along with certain accident-mitigating systems, will not be prevented by physical interactions with nonsafety-related equipment from performing their intended functions when subjected to seismic forces, including the maximum postulated 7.5M Hosgri earthquake.

A computerized data base is established which contains or references all SIP-generated data. Included in the data base will be all postulated interactions, site evaluation documentation, engineering resolutions (or their reference), and references to documents generated as a result of the Program. Not included in the data base are memoranda or other written communication incidental to but not necessary for the resolution of postulated interactions.

Upon completion of the SIP, a Final Report will be submitted to the NRC outlining the program and discussing its results. The report will summarize the postulated interactions, site evaluation data, resolution to interactions, and the engineering analysis required to substantiate those resolutions.

1.1.1 Targets

Targets are defined as all safety-related structures, systems, and components required to: (a) safely shutdown the plant, (b) maintain the plant in a safe shutdown condition, (c) maintain the function of certain accident-mitigating systems, and (d) assure operation of manual equipment relied upon for the suppression of fires. In addition to Items (a) through (d) above, targets shall include related process tubing, instrumentation, and electrical cables which are necessary to ensure that operating requirements and failure modes will be maintained during the postulated Hosgri event. (See Appendix A for a complete description of the target scope.)

A list of these SIP targets is prepared which includes information on corresponding locations in designated zones of the plant. The zones provide convenient spatial subdivisions for a Site Elevation Team to document postulated interactions. The basis for these zones is the original fire zones established at the time of the inception of the Program.

1.1.2 Sources

Sources are defined as nonsafety-related structures, systems, and components postulated to create interactions with targets during a seismic event. Sources are inspected for their effect due to postulated failures

or behavior resulting from an earthquake. Source failure might result in potential physical contact with targets. (See Appendices B and C for a full description of the source scope used by the Site Evaluation Team.)

1.2 PROGRAM SCOPE

1.2.1 Fundamental Criterion

The following paragraph embodies the scope of the Systems Interaction Program:

> "When subjected to seismic events of severity up to and including the postulated 7.5M Hosgri event, the Program will demonstrate that the capability of all Diablo Canyon Nuclear Power Plant structures, systems, and components important to safety shall not be prevented from carrying out their required safety function by physical interaction with nonsafety-related structures, systems, or components. Nor shall they lose the required redundancy to compensate for single failures because of such physical interaction." (Section 4.1 of Reference 1)

1.2.1.1 Interaction Criterion

Seismic events are considered to include Hosgri magnitude ground motion, a tsunami, and the potential for full or partial loss of offsite power.

Seismically induced physical interactions include any credible failures or adverse behavior of nonsafety-related structures, systems, or components. Their credibility will be based on conservative technical judgment of experienced engineers. In the identification stage of the Program, any doubtful cases will be identified for detailed evaluation.

Class I to Class I

Interactions between two safety-related items which are qualified to withstand the postulated 7.5M Hosgri earthquake are not explicitly part of the program. If, however, during the course of the program, design or construction oversight is observed, it will be documented, evaluated, and corrected.

Nonseismically-Induced Interactions

Interactions which may be caused by other than seismic effects on nonsafety-related structures, systems, and components (such as human errors) are not explicitly included in this Systems Interaction Program. However, other potential source-target interactions identified during the course of site inspection will also be documented.

Other Interacting Phenomena

Sources of interactions by rupture of high energy and medium energy piping systems need not be considered in this Program. Previous safety programs consistent with the requirements of NRC Regulatory Guide 1.46 and the studies referenced in Subsection 3.6 of the Diablo Canyon Final Safety Analysis Report (FSAR) have resulted in provisions being made to accommodate postulated pipe rupture.

1.2.2 Program Abstract

The SIP consists of the following tasks:

a. Initial Office Activities

1) Identification and listing of targets to be evaluated for postulated interactions.

2) Development of criteria and guidelines used to postulate seismic interactions.

b. Target Site Evaluation

1) Identifying and postulating interactions from sources to targets by onsite inspection utilizing experienced engineers or those specifically trained to perform such tasks.

2) Identifying and postulating indirect and intercompartmental interactions resulting from seismically induced source failure which may potentially affect the SIP targets.

c. Resolution of Postulated Interactions

1) Resolution of these postulated interactions identified in (b) above, by: (a) judgment of the Site Evaluation Team (no action necessary), (b) engineering resolution to determine whether the interaction would occur or would compromise a target, or (c) implementation of design or procedural modifications to eliminate the interaction.

d. Final Site Evaluation

1) For those postulated interactions whose resolution results in design modifications, a final site evaluation is conducted after construction is complete to ensure that the SIP modifications are in accordance with the work requests and that they will not have the potential for creating further interactions.

e. Independent Review

1) Independent Audit

See Section 2.2.7 for a complete description of Program Audits.

2) Independent Review Board

See Section 2.2.8 for a description of the Independent Review Board and its function.

1.2.3 Clarifications

This Program includes the identification of interactions, evaluated as though the Diablo Canyon Power Plant were in a normal operating condition or in a state of shutdown, including refueling. Intercompartmental, direct, and indirect (or chain-type) interactions are explicitly considered.

The Program includes the inspection of electrical, mechanical, fluid, pneumatic, and other equipment or appurtenances associated with targets for possible interactions from sources in the vicinity.

1.3 DEFINITIONS

Analysis - An engineering resolution of a postulated interaction by a discipline engineer or consultant because it was beyond the practical capability of the Site Evaluation Team to perform such a resolution by inspection. When there is any doubt regarding an interaction by the Site Evaluation Team, it is forwarded for resolution to a discipline engineer.

Component - A single device which is classified as a target and is required to be inspected for a seismically-induced interaction with a source. Examples are valves, tubing, wiring, switches, pumps, etc.

Discipline Engineer - A technically experienced engineer assigned to perform one or more tasks of the SIP. These include: a) participation on the Site Evaluation Team, b) resolution of postulated interactions, (c) initiation of Action Request Transmittals (ARTs) or Design Change Notices (DCNs), and (d) technical review of consultant-originated analyses.

Engineering Resolution - A category of resolution to a postulated interaction. An engineering discipline or consultant has determined that no detrimental effect has resulted from the postulated interaction, or that the interaction will not occur.

Interaction Documentation Sheet (IDS) - The primary document of the SIP used to track and record a postulated interaction from initial identification to its final resolution.

Intercompartmental Analysis - The review by the Site Evaluation Team of interactions which one physically isolated area of the plant may have on another, resulting from seismically-induced source failures.

Matrix or Target List - A numerical listing of SIP targets indicating the system, subsystem, and component of target items. A three-set numbering system of the form abc-def-ghi is used. When a matrix item is identified as the target of a postulated interaction, a fourth set of sequentially assigned numbers is added, resulting in the form: abc-def-ghi-jkl.

NOTE: See Chapter 5 of this manual for specific examples of the Interaction Documentation Sheet (IDS) and target (matrix) documents.

No Action Necessary (NAN) - A category of resolution to a postulated interaction. The Site Evaluation Team has made a determination that the interaction either has no detrimental effect or is not credible.

Nondesign Changes - Modifications to the plant that do not require documentation in the form of DCNs. Examples of these nondesign changes are rerouting of instrument tubing, placing of minor protective devices around targets, securing of field run sources, etc.

Postulated Interaction - The resulting interaction of a source with a target, postulated by the Site Evaluation Team as being caused by seismically-induced behavior of nonqualified structures, systems, or components. Included in this definition are indirect (or chain-type) and intercompartmental interactions.

Qualified - Qualified to the Hosgri seismic criteria, or shown by analysis not to fail or adversely behave.

Resolved By Field Modification – A category of resolution to a postulated interaction. An engineering discipline, after analysis, has concluded that the interaction may have credibility; a field or procedural modification would then result.

Site Evaluation Team – A group of technically experienced engineers or designers familiar with the design of Diablo Canyon. They are trained for identifying systems interactions or have prior experience and are qualified to:

1) Postulate source-target seismically-induced interactions
2) Resolve interactions when practical (optional)
3) Recommend resolutions when practical (optional)
4) Evaluate field modifications made under the SIP
5) Evaluate the plant for intercompartmental and indirect interactions by onsite inspections

Source – Any item in the plant which is not a target. Also see Sources, Section 1.1.2 and Appendices B and C of this manual.

Target – A structure, system, or component identified by the four target criteria of Section 1.1.1, which must be inspected under the SIP for potential seismically-induced interaction by nonqualified structures, systems, or components. In most instances, targets themselves are not assumed to fail; therefore, target-target interactions are not considered credible. See Appendix A for a complete description of target scope.

Technical Review - A review of the resolution to a postulated interaction by a technically experienced reviewer who was not involved with the original resolution. See Section 2.2.4.

Site Evaluation (Walkdown) - Field inspection of sources and targets by a Site Evaluation Team. See Section 2.2.2.

Site Evaluation Team Leader - The person designated by the SIP Project Coordinator to lead the interdisciplinary Site Evaluation Team.

SYSTEMS INTERACTION PROGRAM

CHAPTER 2 - METHODOLOGY

TABLE OF CONTENTS

SYSTEMS INTERACTION PROGRAM

CHAPTER 2 - METHODOLOGY

2.1 PURPOSE

This chapter describes the method to be used in implementing a Systems Interaction Program at Diablo Canyon Power Plant.

2.2 GENERAL DESCRIPTION

The Task Flow Diagram of Chapter 4, Figure 4.1.1, presents the methodology and documentation flow of the Systems Interaction Program as a sequential set of tasks. The tasks are described more specifically in the following paragraphs.

2.2.1 Initial Office Activities

The initial task of the Program is to identify all target systems and components. This is accomplished by systems engineers or consultants familiar with plant operating requirements and safety functions. Criteria defining systems, system boundaries, and appurtenances are first established by the target scope definition. Safety functions and component boundaries are identified using piping schematics. A list of those components and systems performing those functions is then generated. A separate listing is compiled for the associated electrical

circuits of the target systems. These two lists (target component and target electrical) form the basis for the field identification and interaction documentation of target systems, subsystems, and components.

2.2.2 Site Evaluation of Targets

Site inspections are performed by a Site Evaluation Team, which is led by a highly experienced Team leader. The Team leader is selected by the SIP Project Coordinator.

This Site Evaluation Team uses specially prepared piping schematics as maps in the inspection of the target safety systems requiring an SIP review. Each component in these safety systems is evaluated for potential sources of interactions. The target list (matrix) and schematics are used as tools for documenting and locating target systems which are inspected by the team. Additions or corrections may be made to the target list and schematics as errors are discovered during site inspection or discipline analysis.

The results of each walkdown are documented on Interaction Documentation Sheets (IDSs). See Section 5.2 for a complete description of the IDS.

At the conclusion of each walkdown, a report is compiled which describes the activity and results of the Site Evaluation Team's inspection of target systems.

In addition to the component-by-component evaluation, the Team considers interactions that may occur among compartments. In many cases, these types of interactions have been covered by other studies (for example, those on flooding and fire). The Team also considers potential effects of indirect interactions (source to source to target).

2.2.3 Analysis of Postulated Interactions

When an interaction requiring additional analysis is identified, the Site Evaluation Team's findings and recommendations are transmitted and analyzed during an office-based evaluation phase of the program. Analysis, testing, and/or historical experience may be used to assess the validity of the Site Evaluation Team's findings and recommendations or to provide an independent resolution to the postulated interaction.

2.2.4 Technical Review of Resolutions

A technical review of the resolution to a postulated interaction is required. The technical review certifies that an interaction has been properly addressed.

Not included in the technical review described above is a detailed review of calculations made by the engineering disciplines. Each analysis conforms to the established procedures of its engineering group. Refer to Appendix E regarding guidelines used by the technical reviewer.

2.2.5 Modifications

2.2.5.1 Design Changes

Recommended design modifications or procedural changes are initiated based on site or office evaluations. The independent technical review of the recommended modification ensures that the postulated interaction has been properly addressed. The implementation of these modifications ensures that the postulated interaction cannot compromise a target's function.

Design modifications issued as a result of the SIP are prepared under the direction of the engineering department. The SIP Project Coordinator is notified by either the construction or operations department when the modification by DCN is completed. The design, analyses, and construction work are required to comply with project quality assurance or quality control requirements, whichever is applicable to the DCN.

2.2.5.2 Nondesign Changes

Nondesign changes issued as a result of the SIP are implemented by application of an Action Request Transmittal (ART), more fully described in Chapter 5 and Appendix D of this manual.

2.2.6 Site Evaluation of Modifications

The Site Evaluation Team finally inspects each field modification to determine whether the interaction has been resolved and that the modification(s) itself does not result in a potential interaction condition. If the latter does occur, the procedures described in Sections 2.2.3 through 2.2.5 are repeated. Should the modification not be in accordance with the work package, the team is to either evaluate it for acceptability "as is" or reject it, stating the reasons for such rejection.

2.2.7 Program Audits

The SIP is reviewed by Project Quality Assurance under two separate audits, described below.

2.2.7.1 Quality Assurance (QA) Special Audit of SIP

The Quality Assurance Department shall be directly involved in the Systems Interaction Program by providing a team of engineers to perform independent audits to verify the correctness and completeness of program implementation. The composition of the audit team is described on page 6-3 of the 1980 Program Description (Reference 1) and Safety Evaluation Report, Section 4.1.5 (Reference 3). Upon successful audit of the Unit 1 Program, no additional audit will be required for Unit 2.

2.2.7.2 QA Normal Auditing Function

The Program is also subject to PGandE's Quality Assurance Program as described in Section 17 of the Final Safety Analysis Report. The normal functions and responsibilities of PGandE's Quality Assurance Department as required by Appendix B to 10 CFR Part 50 are not affected by the Quality Assurance Department's involvement with the program, as described in References (1) and (3) of Paragraph, 2.2.7.1.

2.2.8 Independent Review Board (IRB)

The IRB is responsible for reviewing any aspect of the SIP without restriction, to ensure confidence in the program. The Board is composed of well-established, experienced individuals* from the professional and academic nuclear community. Program methodology, documentation methods, and analysis and design modifications may be reviewed for technical adequacy and conformance to licensing commitments. Results of the review will be submitted to the managing consultant**, who will in turn report them to the Project Manager.

---

* Dr. Spencer Bush, Mr. Edward Keith, Dr. Robert E. Nickell, and Dr. Victor Weingarten

** Keith, Feibusch Associates, Engineers

2.2.9 Documentation

Figure 4.4.1 outlines a Task Flow of work under the SIP. Documentation is established to track the tasks shown. Chapter 4 provides a detailed description of documentation required to implement and close out each interaction file.

SYSTEMS INTERACTION PROGRAM

CHAPTER 3 - ORGANIZATION OF PERSONNEL

TABLE OF CONTENTS

FIGURES

SYSTEMS INTERACTION PROGRAM

CHAPTER 3 - ORGANIZATION OF PERSONNEL

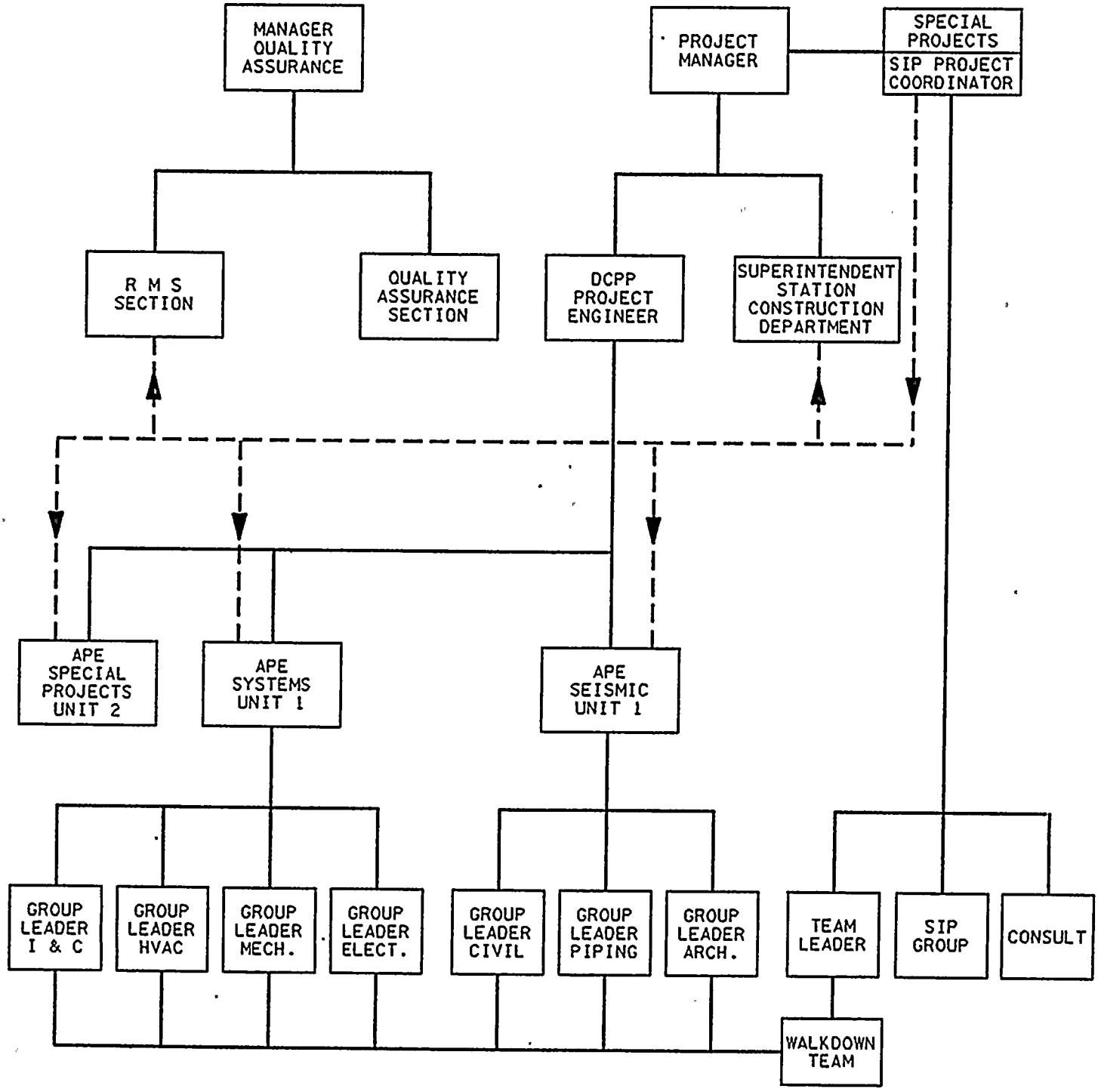
3.1 PURPOSE

This chapter describes the function of key personnel involved in the performance of the Systems Interaction Program. It establishes the reponsibilities which those persons have relative to the Program and designates the interfaces which exist between the organizations engaged in Program activities. These responsibilities include the administration, implementation, review, and approval of all aspects of the SIP.

3.2 GENERAL DESCRIPTION

The SIP is administered by the Diablo Canyon Project under the direction of the SIP Project Coordinator. Personnel from various PGandE departments are assigned to the Program and take direction from the SIP Project Coordinator. Figure 3.2.1 indicates the reporting relationships among PGandE personnel and consultants who fulfill key roles in the SIP. Titles may vary within each department; however, the assigned responsibilities to individuals will be carried out as described in the following sections.

FIGURE 3.2.1
SYSTEMS INTERACTION PROGRAM ORGANIZATIONAL CHART



LEGEND:

- - - - - PROJECT DIRECTION

——— FUNCTIONAL DIRECTION

3.3 RESPONSIBILITIES OF PERSONNEL

3.3.1 Project Manager

The Project Manager is responsible for the overall coordination of the program between PGandE and the consultant managing the Independent Review Board. He also coordinates with the Manager, Nuclear Plant Operations; Superintendent, Station Construction Department; and the Project Engineer. He shall establish the project controls, procedures, and guidelines for the work performed within the SIP.

3.3.2 Manager, Nuclear Plant Operations

The Manager, Nuclear Plant Operations is responsible for ensuring the implementation of all resolutions/modifications which involve equipment and systems under the control of the Plant Operations Department.

3.3.3 Manager, Quality Assurance

The Manager, Quality Assurance is responsible for maintaining an adequate quality assurance program and reviewing and reporting the Program's effectiveness. He is independent of the departments directly involved in the SIP and has the authority and organizational freedom to investigate any problems pertaining to code or safety-related items or activities and

to initiate any corrective action resulting from these investigations in accordance with PGandE's Quality Assurance manual. He reports to the Vice President, Nuclear Power Generation.

The Manager, Quality Assurance also supervises the Records Management System (RMS) Section. The RMS Section is responsible for maintaining records of Diablo Canyon Power Plant in accordance with the Corporate Quality Assurance Program. The section microfilms essential data, records, documents, and drawings as transmitted by the SIP Project Coordinator and maintains a computerized index of the microfilmed documents.

Additional quality assurance functions are performed by the Project QA group which is primarily responsible for conducting audits of the programs as procedurally defined by this document.

3.3.4 Superintendent, Station Construction Department

The Superintendent, Station Construction Department is responsible for implementing all resolutions/modifications which involve equipment and systems under the control of his department. He ensures that all appropriate inspections are performed, that documentation regarding each resolution is completed and then properly transmitted to verify the completion of each resolution. He interfaces with the Diablo Canyon Project, Engineering, and Plant Operations Departments.

3.3.5 Project Coordination Section (PCS)

The PCS is responsible for distributing and maintaining a log to track the status and location of documentation pertaining to those SIP resolutions requiring a field modification. PCS distributes the documents to each group in the DCPP project involved in SIP field modifications.

3.3.6 Systems Interaction Program (SIP) Project Coordinator

The SIP Project Coordinator, reporting to the DCPP Project Manager, has the direct responsibility for the conduct of the program, including the following functions:

a. Preparing the Systems Interaction Program Manual

b. Coordinating the efforts of those personnel involved in the Program, implementing its requirements and establishing Program evaluation criteria utilizing the Engineering disciplines' specific expertise

c. Providing functional and technical direction to the Site Evaluation Team

d. Reviewing and approving the IDS at the completion of resolution

e. Coordinating and collating data for the SIP Final Report

f. Reporting the activities of the Site Evaluation Team and the results of the Program to the Project Manager

g. Providing overall administrative direction for the Program

h. Tracking the transmittals related to plant modifications resulting from analysis of SIP resolutions

i. Selecting appropriate disciplines to be represented on the Site Evaluation Team for each walkdown

j. Assigning postulated interactions for resolution to the appropriate disciplines or consultants

k. Closing out the interaction files and coordinating data to be input into the RMS or other suitable computer bases.

3.3.7 Engineering Group Supervisor

The supervising engineers of each engineering discipline involved in the SIP are responsible for providing the necessary qualified personnel for the Site Evaluation Team, for performing the office-based resolutions and design, and for providing technical review of consultant analyses.

3.3.8 Engineering Group Leaders

The Engineering Group Leaders are responsible for ensuring implementation of procedures for the SIP in their respective disciplines. They shall supervise Discipline Engineers in the implementation of the procedures and appoint members to the Site Evaluation Team.

3.3.9 Site Evaluation Team Leader

The Site Evaluation Team Leader is the most highly experienced member of the Team. He is thoroughly familiar with the criteria, guidelines, and procedures of the SIP and is selected by the SIP Project Coordinator. He reports directly to the SIP Project Coordinator during walkdown activities.

3.3.10 Site Evaluation Team

The SIP Project Coordinator selects the disciplines to be represented on the Site Evaluation Team based on the complexity or density of targets and sources or areas of the plant to be inspected. Each Team member shall be knowledgeable of the Diablo Canyon Power Plant in his area of assignment and preferably have been involved with one or more of the following DCP activities: design, construction, startup, or operations.

A full interdisciplinary Site Evaluation Team is composed of the following personnel:

- o Team leader
- o Civil engineer
- o Piping engineer
- o Mechanical engineer*
- o Electrical engineer*
- o Instrumentation and control engineer*

* Two of the three indicated disciplines. A substitute for any discipline may be made using an experienced operating person or an engineer from the construction startup group.

These Team members shall utilize their knowledge and background in considering equipment arrangements, geometry, the possible results of postulated interactions, and recommend resolutions to interactions. Alternatively, personnel with equivalent background, experience, or specific training in SIP techniques and criteria may be assigned to the Team.

From time to time, the discipline composition of the Site Evaluation Team may be adjusted (i.e., concerning discipline representation), based on the nature of the targets and sources to be evaluated during a given inspection day.

3.3.11 Independent Review Board

See Section 2.2.8 for a complete description of the Independent Review Board. The IRB is dissolved once it issues its final report on the Program. The report has been completed as of Revision 4 of this manual; therefore, the IRB has not been included in the SIP organizational chart, Figure 3.2.1.

SYSTEMS INTERACTION PROGRAM

CHAPTER 4 - INSTRUCTIONS

TABLE OF CONTENTS

FIGURES

SYSTEMS INTERACTION PROGRAM

CHAPTER 4 - INSTRUCTIONS

4.0 PURPOSE

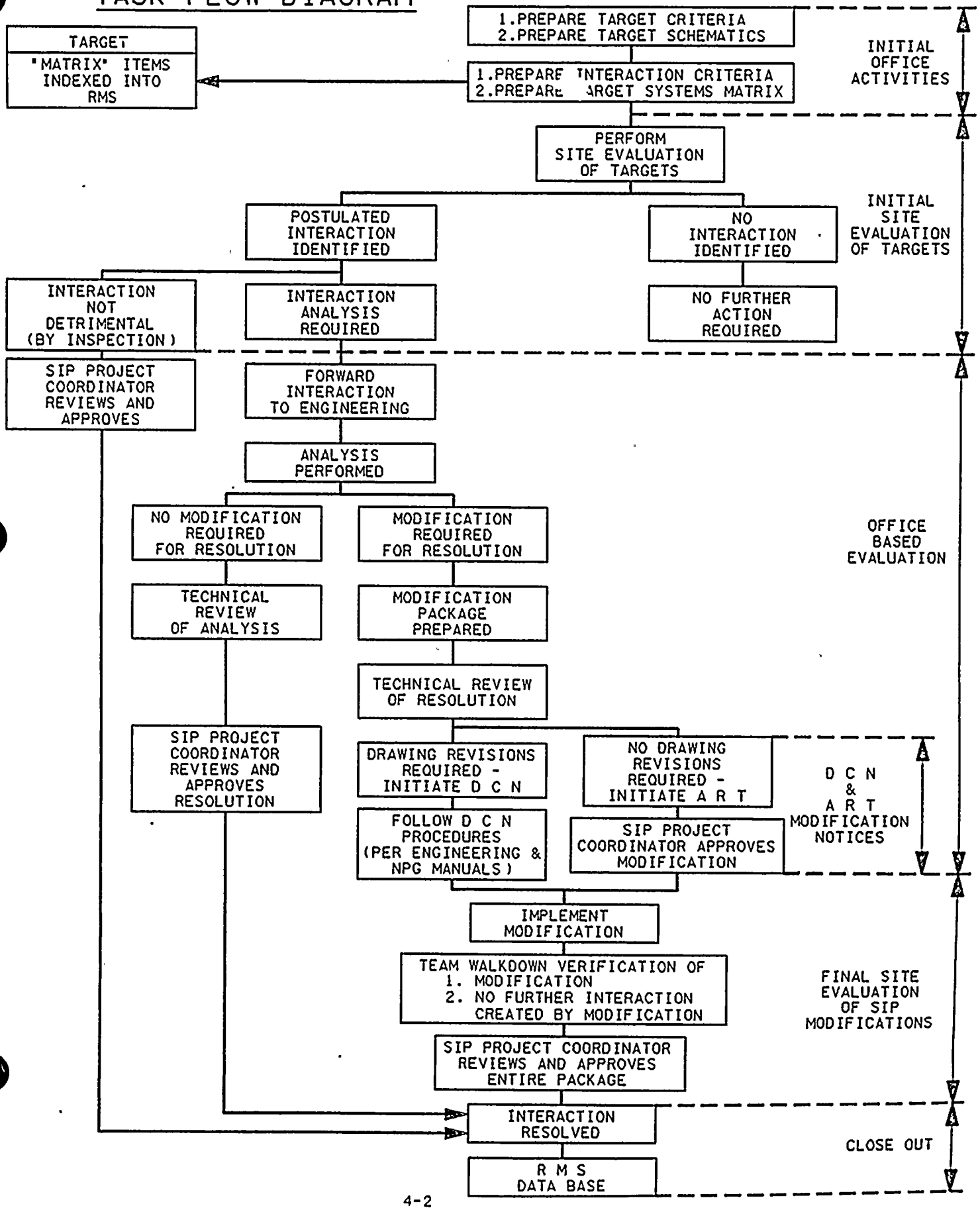
This chapter describes the detailed instructions necessary to assist those involved in the Systems Interaction Program. Each set of instructions delineates the sequence of activities of a particular segment of the Program.

4.1 PROGRAM OUTLINE

The following Systems Interaction Program Task Flow Diagram, Figure 4.1.1, outlines the major steps in implementing the SIP. This procedure satisfies the full power license requirements described in the Safety Evaluation Report NUREG-0675 Supplement 11, Reference (3).

REV. 4
DATE 3-15-84

FIGURE 4.1.1
SYSTEMS INTERACTION PROGRAM
TASK FLOW DIAGRAM



4.2 DETAILED INSTRUCTIONS

The following paragraphs describe in detail the steps shown on the SIP Task Flow Diagram, Figure 4.1.1.

4.2.1 Initial Office Activities

4.2.1.1 Identification of Targets

The initial task is the identification of targets, their corresponding locations in existing plant fire zones, and operational requirements. Target systems, subsystems, and components are first identified on piping and electrical schematics.

A replica of the DCPP piping system schematics is highlighted to indicate the target systems necessary to perform each safety function. Updating of these SIP schematics is necessary only when system boundary changes are made to piping schematics.

The technical disciplines are responsible for delivering to the SIP Project Coordinator an approved document which specifically identifies the targets to be considered under the SIP. This document requires preparation of target criteria and the highlighted SIP schematics. The results of this task are contained in Appendix A.

4.2.1.2 Interaction Criteria

Preparation of detailed evaluation criteria provides a basis for (1) postulating source failures, (2) postulating interactions, (3) technically evaluating the credibility of postulated interactions, and (4) the resolving of postulated interactions. These criteria are presented in Appendix B of this manual.

4.2.1.3 Listing of Targets

Targets, together with related information such as location and operability requirements, are compiled into a numbering system for use by the Site Evaluation Team to record inspection results.

A three-set numerical "matrix" number is assigned to each component identified as a target. The matrix or target number references a structure or system, subsystem, and component. (See Section 5.5 for a complete definition of the target matrix number.)

The matrix is prepared in a specially created format. Each entry describes the system, subsystem, and component in addition to information relating to fire zone location, appurtenances, operability requirements, and a section for comments and applicability to a specific unit (i.e., Unit 1, or Unit 2, or both).

4.2.2 Site Evaluation of Targets

A site evaluation for possible interactions is made of all target equipment listed on the target matrix. See the documentation procedure described in Section 5.2.

The following is a detailed description of the field inspection of targets and the postulating of interactions. The site evaluation is performed by an interdisciplinary Site Evaluation Team.

4.2.2.1 Selection of Site Evaluation Team

See Section 3.3.10 for a complete description of the Site Evaluation Team.

4.2.2.2 Inspection of Targets

The Site Evaluation Team shall perform an in-depth onsite evaluation to identify potential sources which may be postulated to cause an interaction with targets. Refer to Appendix C for a more detailed description of the instructions to the Site Evaluation Team.

4.2.2.3 Postulating Interactions

A site evaluation or walkdown of each system, fire zone, or compartment is performed. The Team members postulate interactions from potential source failures, deflections, or other behavior modes that could be induced by a seismic event. Each target listed on the matrix is evaluated for these potential interactions with sources located in the surrounding area of the same compartment. The postulated interactions are then documented. The criteria specified in Appendix B are used as a guide for evaluating source failure or deflection, and the instructions in Appendix C provide clarification for the Site Evualutation Team based on those Appendix B criteria.

Source equipment in the vicinity of the target is considered to fail or behave by the appropriate mechanisms listed in the source acceptance criteria (Appendix B). These mechanisms are considered to act both singly and in combination. After the failure modes are determined, interactions with target equipment are postulated.

Additionally, the Team evaluates each area for interactions with targets in other areas or compartments. Secondary or chain effects, where sources may interact with other sources which in turn may interact with a target, are explicitly a part of the site evaluation of targets.

The intent of the Site Evaluation Team approach is to render as much freedom as possible to each Team member to postulate interactions.

4.2.2.4 Resolving Postulated Interactions

The Site Evaluation Team may recommend resolutions to postulated interactions when practical. Additions and/or corrections to the target list may be made when the Site Evaluation Team or engineering disciplines so determines that such a change is necessary.

All changes to the Target List are subject to confirmation by the office-based engineers. When a listed target has been determined not to be an SIP target, the interaction is treated as an NAN (see item (a), below) or otherwise identified in the SIP data base.

The Site Evaluation Team must find one or more of the following determinations regarding each documented postulated interaction:

a. Determination that the interaction, initially postulated, is not credible. No Action Necessary (NAN).

b. Determination that, if an interaction is credible, no safety function is impaired. No Action Necessary (NAN).

c. Recommendation for further evaluation. Engineering resolution or Field Modification is the final result.

d. Recommendation that a physical modification be designed and installed. Field Modification may be made if discipline engineers so concur.

4.2.2.5 Site Evaluation Team Documentation

Documentation utilized by the Site Evaluation Team includes but is not necessarily limited to:

Documentation Used for Site Evaluation (Walkdowns)

a. Area drawings used by the Team to inspect targets, including the SIP target schematics

- or -

b. The SIP target matrix

Documentation Prepared by Site Evaluation Team or Team Leader

a. Interaction Documentation Sheets for each postulated interaction (see Section 5.2 for a complete discussion of IDSs)

- and -

b. A report describing the activities and findings of the Team during each week's walkdown

Categorizing Non-SIP Interactions

The Site Evaluation team has been instructed not to ignore other plant conditions should they be identified. These "other" conditions are considered to be outside the scope of the objective

of the SIP and, therefore may be procedurally resolved in a different manner. Refer to Appendix H for disposition of these "other" conditions which have been documented on the IDS.

4.2.3 Resolution of Postulated Interactions

Based on the information contained in the interaction documentation, a further review is conducted by the Team or office-based engineering disciplines as follows.

4.2.3.1 By the Site Evaluation Team

As much as is practical, after postulating an interaction, the Team shall review the interaction and determine:

a. If the interaction is credible

b. If the interaction is detrimental

c. If a minor field modification will resolve the interaction

A Team review of the initial postulated interaction may determine that it is not credible or will not cause a detrimental effect on targets. For example, a telephone receiver (source) may be postulated to fall on a valve, and this would be documented. Later,

during the evaluation, the Team may determine that the receiver could not possibly damage the valve it was assumed to contact; hence, the interaction becomes resolved by inspection i.e., No Action Necessary (NAN). NANs do not require additional formal discipline or independent technical review.

Refer to Appendix C for guidelines issued to the Site Evaluation Team.

The more complex interactions, or those where the interacting variables are not readily ascertainable or analyzable by the field, require further analysis by engineering or operations. The specific Team guideline is: "When in doubt, recommend Engineering Resolution."

4.2.3.2 By Engineering Resolution

The activities during this phase of the SIP involve the review of postulated interactions and documentation originated by the Site Evaluation Team.

The primary purpose of this step is to review the interaction documentation and determine what the corrective action, if any, should be.

Resolved by Analysis

This category of interaction results from the formal transmittal of the IDS by the SIP Project Coordinator to a technical group for analysis. After concurrence by a technical review (see Section 4.2.4), if the engineering resolution should conclude that no detrimental effect will result from the postulated interaction, it will be considered "Resolved by Analysis," and no further action will be required.

4.2.3.3 Summary of Steps

The steps involved in the resolution of an interaction are summarized as follows:

a. The SIP Project Coordinator shall review and approve those interactions resolved by the Site Evaluation Team as NAN.
Note: Those IDSs whose targets have been determined to be outside the SIP scope are treated separately. Refer to Appendix H for these guidelines.

b. When the Site Evaluation Team supplies recommended resolutions, the technical adequacy is verified by an engineer. Additional analysis is performed where necessary.

c. Some interaction analysis may result in design or procedural modifications to mitigate the interaction. In those cases, preparation of work packages and concurring technical review are required.

d. The result of an Engineering Resolution will be a recommendation that:

1) No further action is required (other than a technical review) because the interaction is not credible or will not be detrimental to the target's function.

- or -

2) A final modification is necessary to ensure the target's integrity from the postulated interaction.

4.2.4 Technical Review

A technical review of each engineering resolution is conducted by an independent technical reviewer. This requirement is contained in Reference (1), "Description of the Systems Interaction Program for Seismically-Induced Events, Diablo Canyon Units 1 and 2," August 29, 1980.

The technical reviewer signifies on the IDS that this step has been performed or provides a written statement describing the results of the review. The statement shall be a part of the permanent SIP data base. The technical review shall be transmitted to the SIP Project Coordinator for his permanent filing in the SIP data base.

Refer to Appendix H, Categorization of Non-SISIP Interactions, and Appendix E, Guidelines for Technical Review, for further information.

4.2.5 Resolved by Field Modifications

Two categories of field modifications may result from the SIP: (a) Nondesign plant or operational changes, and (b) Design changes that require engineering procedures to be implemented by use of the Design Change Notice.

4.2.5.1 Action Request Transmittal (ART)/Design Change Notice (DCN)

When a modification is the final resolution of an interaction, the PGandE discipline engineer assigned to perform that technical analysis or design prepares a work package that describes the modifications to be made.

This is accomplished by:

a. Initiating an Action Request Transmittal (ART) with appropriate backup documentation (refer to Appendix D for ART procedures)

— or —

b. Initiating a Design Change Notice (DCN)

Note: The SIP Project Coordinator or his delegate reviews and approves all ART packages.

4.2.5.2 Implementation of Modification

Upon receipt of the ART or DCN work package, the construction department implements the requested change. The following procedures take place:

a. The Superintendent, Station Construction Department or the Manager of Nuclear Plant Operations assigns the modification work to the appropriate personnel and coordinates the work efforts in accordance with the applicable procedures.

b. Upon completion of each DCN work package, notification of completion is forwarded to the Project Coordination Section (PCS). The SIP files and data base are then updated when notice is received from PCS or the Construction Department that the modification has been performed.

c. Upon completion of each ART package, the General Construction or Operations Department documents the completion of the modification by signing in the space provided on the ART. The package shall then be forwarded to Project Coordination with copies to the SIP Project Coordinator. Refer to Appendix D for detailed ART procedures.

Note: For a licensed unit, other applicable procedures may be required. Refer to the FSAR and engineering procedures as appropriate.

4.2.5.3 Final Verification Walkdown

Upon completion of the modification and assembling of the completed documentation in the SIP files, the Site Evaluation Team or a Team leader plus one Team member inspects the modification to ensure that no additional interaction has been created. If the modification is different than documented by the work package, the Site Evaluation Team can accept it "as is" or reject the changes. Those modifications which have been rejected by the team are documented on a Field Verification Report.

The Field Verification Report form (see Figure 5-5) is used by the Site Evaluation Team during walkdowns. The purpose of the form is to document those SIP modifications determined by the Team to be unacceptable.

The Team shall note both the postulated interaction and discrepancies with the modification. If further action is required, a recommended resolution shall be indicated on the form.

If the interaction was not resolved in accordance with the design drawings or work request but is determined as acceptable, the Field Verification Report shall so indicate.

4.2.6 Documentation Requirements

Each of the steps in Chapter 4 requires auditable documentation tracking methods. See Section 5 for samples of the actual documents used to record the SIP activities described in this chapter. Section 5.7.2, Field Evaluation Documents, lists the documentation necessary for target identification and evaluation, both at the site and for office-based activities.

4.2.6.1 Analysis of Postulated Interaction

Documenting the analysis of a postulated interaction is the most flexible part of the SIP. It allows each engineering discipline or consultant to format their own reviews and analysis in the form most suitable to their purpose, individual departmental procedures, and the nature of the postulated interaction.

4.2.6.2 Technical Review

No additional documentation is required for the technical review of engineering analysis. The signature of the reviewer appears on the IDS or on a separate Technical Review Sheet (preferred).

4.3 COMPLETING THE PROGRAM

This section describes the close-out of each postulated interaction and input of data into the RMS computer base.

The RMS Section of the Quality Assurance Department maintains records of the interaction files in accordance with the Corporate Quality Assurance Program. The interaction files shall include or reference essential data, documents, calculation sheets, Action Request Transmittals (ARTs), Design Change Notices (DCNs), and drawings associated with each interaction.

4.3.1 Closing Out SIP Files

a. The interaction file will be reviewed for completeness and signed by the SIP Project Coordinator.

b. Each interaction file shall include: completed IDSs, technical reports, notes, etc. used in the resolution; and for field modified interactions, the completed ART or DCN packages. References to trackable documentation may be made on the IDS in place of its inclusion in the interaction file.

c. The SIP Project Coordinator shall forward the completed interaction file to the Records Management System for final entry into the computerized data base.

4.3.2 Records Management System

The Records Management System (RMS) Section of the Quality Assurance Department retains the interaction file on the RMS, therefore providing the RMS with capability of long term retention and retrievability of SIP records. Documentation that has been assembled to resolve the interaction is entered into the RMS data base.

The initial entry to the RMS is the listing of all target items and their description as listed in the SIP matrix. Target adjustments may be made to the RMS throughout the course of the Program.

With the close-out of an SIP interaction file, the RMS computer base will be updated accordingly, including the completed interaction information.

No attempt has been made in this procedure to duplicate the capabilities or data input methods of RMS. Please refer to the RMS Handbook for this information.

4.3.2.1 Computer Data Base

The data entered in the RMS computer base will include the following:

a. All targets identified by matrix number and information contained in the SIP matrix

b. All postulated interactions and the pertinent information contained in the IDS. This includes:

1) Description of the postulated interaction
2) Description of the recommended resolution
3) Description of the final resolution
4) Criteria applied to interaction
5) Discipline assigned to the interaction

c. All interactions resulting in plant modifications shall contain additional pertinent information that has been included in the work package. This includes:

1) ARTs and/or DCNs, and/or reference to drawings
2) Description of the modification

Refer to Appendices F1 and F2 for the data entry procedures used to store the results of each interaction and target component.

4.4 FINAL REPORT

A Final Report will be prepared under the direction of the SIP Project Coordinator which will include:

a. Program description and historical information

b. A summary of the interactions postulated

c. The IDSs or interaction summaries

d. Reference to resolutions of postulated interactions

Items (a) through (d) will be in accordance with the requirements of References (1) and (3).

4.5 QUALITY ASSURANCE DEPARTMENT'S INDEPENDENT AUDIT

PGandE's Quality Assurance Department will conduct an independent audit of the Program. The audit will be conducted by an interdisciplinary team of engineers not involved with the Program. They will:

a. Perform, on a sampling basis, evaluations of representative compartments and any related intercompartmental interactions

b. Perform audits of previous intercompartmental evaluations

c. Perform, on a sampling basis, independent analyses to verify that the previous analyses were performed correctly

d. Review Program documents

e. Review completed modifications

The results of this independent audit will be contained in the Final Report.

4.6 THE TSO LOG

To assist the administration of the SIP, an IDS tracking mechanism for status and categorization in a computerized data base format has been developed. The data base includes the following information:

a. Logging each IDS and which discipline has been assigned its resolution

b. Status of the IDS until closure

c. Resolution stage - Analysis (A), Modification (M), or No Action Necessary (NAN)

d. Specialized codings for source and target

e. Categorizing non-SISIP IDSs

Other lettered categories may be necessary to segregate those IDSs not within the specific objective of the SIP. Also see Appendix H.

The computerized data base assists the Project Coordinator in:

a. Preparation of the SIP Final Report

- and -

b. Notifying disciplines with regard to those IDSs which remain unresolved

No formal procedures are necessary for this computerized method. The Engineering Computer Applications Department provides the computer, training and, at times, personnel to assist in the operation of the TSO Log utilized by the SIP.

Appendix J, TSO Log (Sample Sheets), provides samples of the TSO Log sheets used in the Unit 1 Program.

SYSTEMS INTERACTION PROGRAM

CHAPTER 5 - DOCUMENTATION AND REFERENCES

TABLE OF CONTENTS

SYSTEMS INTERACTION PROGRAM

CHAPTER 5 - DOCUMENTATION AND REFERENCES

TABLE OF CONTENTS (Continued)

SYSTEMS INTERACTION PROGRAM

CHAPTER 5 - DOCUMENTATION AND REFERENCES

5.1 SCOPE

A documentation system suitable for providing quality control for the Systems Interaction Program ensures that all targets, postulated interactions, and resolutions are documented in a manner that is identifiable and retrievable.

The DCPP Project Commitment Control System (CCS), the Project Coordination Section (PCS), DCN and ART tracking logs, the SIP log, the IDS, and the SIP hardcopy files provide a means to trace the progress made toward the resolution of each interaction.

The Records Management System contains the computer base upon which documentation relating to each postulated interaction will be ultimately referenced, i.e., Interaction Data Sheets, associated analysis, and, if modifications are required, Action Request Transmittals and Design Change Notices (or their reference).

This section will not duplicate procedures applying to the Systems Interaction Program which may also be contained in other programs. Please see the references at the end of this chapter for those other procedures.

5.2 INTERACTION DOCUMENTATION SHEET (IDS)

The IDS is the primary document used to reference the actions resulting from review of postulated interactions. It is the document initiated by the Site Evaluation Team, analyzed by a discipline engineer or consultant, and technically reviewed. It serves as a record of the final resolution for the postulated interaction. See Figure 5-1 for an IDS sample reflecting a hypothetical field change.

The IDS is used by the Site Evaluation Team to document the location of each interaction and to assign a postulated interaction number. The IDS describes the interaction and when feasible, a recommended resolution. The IDS is also used to document the actual resolution implemented to resolve the specific interaction.

The IDS is coded by four sets of numbers corresponding to the matrix or target identification number plus a trailing set of two or more numbers to indicate that an interaction has been postulated. For example:

IDS No. 05-05-03-01 contains the matrix or target component number (see Section 5.5) and signifies that a postulated interaction has been written by the Site Evaluation Team for this target component.

5.2.1 Signing of the IDS

Each IDS is signed by the Site Evaluation Team leader and/or any other Team member who identifies an interaction. The form is finally signed in a designated space by the SIP Project Coordinator after he completes a satisfactory review of the interaction file.

Listed below are three separate categories of interaction resolutions with the signatures they require.

5.2.1.1 No Action Necessary (NAN)

Two signatures are required to close out this category of IDS:

a. ORIGINATOR/DATE: The Site Evaluation Team member and/or Team leader who postulates an interaction.

b. REVIEWER/DATE: The SIP Project Coordinator signifying agreement that the resolution requires no further action.

5.2.1.2 Resolved by Analysis

Three signatures are required to close out this category of IDS:

a. ORIGINATOR/DATE: Same as Section 5.2.1.1.

b. SISIP DISCIPLINE SUPERVISOR/DATE: The PGandE discipline engineer or group leader who either originates or reviews the resolution, which by analysis results in no further action required for the interaction; i.e., the interaction has been "Resolved by Analysis."

c. REVIEWER/DATE: The SIP Project Coordinator reviews the SIP file for this interaction. His signature indicates that all program steps have been completed and the file may now be closed.

5.2.1.3 Resolved by Plant Modification

Four signatures are required to close out this category of IDS:

a. ORIGINATOR/DATE: Same as Section 5.2.1.2.

b. SISIP DISCIPLINE SUPERVISOR/DATE: Same as Section 5.2.1.2.

c. FIELD VERIFICATION/DATE: The designated Site Evaluation Team leader or his designee signs the IDS, thereby concurring that the work package is in order, the SIP modification has been inspected, is acceptable, and will not result in the creation of another interaction.

d. REVIEWER/DATE: Same as Section 5.2.1.2.

5.3 ACTION REQUEST TRANSMITTAL (ART)

Because many field changes that are made under the SIP do not reflect actual design changes, a special form is implemented to authorize and track such plant modifications. This form is generally initiated by an engineering discipline.

Figure 5-2 shows a sample of the SIP "ART" form. Refer to Appendix D for instructions on the use of the ART.

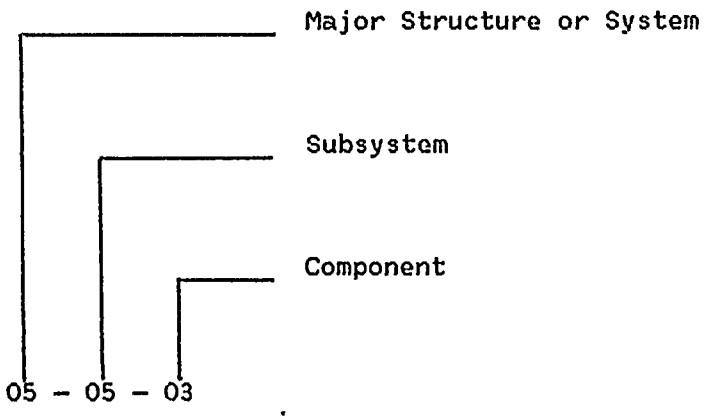
5.4 SIP TRANSMITTAL

This is a general form for the transmittal of information not covered by the ART or DCN process. See Figure 5-3 for a sample of this form.

5.5 SIP TARGET LIST (MATRIX)

The SIP Matrix is prepared in conjunction with Appendix A of this manual. The Matrix encompasses a listing of all systems, subsystems, and components requiring an SIP evaluation. Figure 5-4 shows a typical page of the Matrix.

The numeric breakdown of a Matrix item is as follows:



In this example, the first pair of digits, 05, identifies the Steam Generator Blowdown System.

The second pair of digits is assigned to the subsystem. In this case, -05-, represents subsystem FCV-760.

The third pair of digits represents the individual component(s) within the FCV-760 subsystem. As shown, -03 identifies a solenoid valve, SV-249 and a panel, Panel 48 for Valve FCV-760.

IMPORTANT: The IDS numbers assigned in Unit 1 do not reflect a direct correlation to a target Matrix number. This resulted from a complete revision to the SIP Target List. Appendix G is a computer listing, cross-referencing the Unit 1 IDSs and the revised Matrix numbers.

5.6 SIP TARGET SCHEMATICS

Replicated from DCPP's piping schematic, this series of drawings represents the highlighting of SIP targets. Refer to Appendix A regarding the SIP target schematics.

5.7 OTHER DOCUMENTATION

5.7.1 Technical Reports, Memos, Notes, etc.

Technical reports, memos, notes, etc. may be used to document engineering resolution and technical reviews of postulated interactions and are included in the completed SIP file.

a. Technical reports are initiated by engineering disciplines or consultants. Acknowledgment of the performance of a technical review may be indicated by signature on the report, the IDS, or by a separate sheet initiated by the reviewer.

b. Memos, notes, telecons, etc., when signed by the appropriate discipline, carry the same weight as technical reports, acting as resolutions to interactions.

5.7.2 Field Evaluation Documents

The following documents may be used during the "Site Evaluation of Targets" phase of the Program as described in Section 4.2.2:

a. Highlighted "SIP Target Schematic"

b. SIP target list

c. Drawings as required to determine physical location of target structures, systems, and components, including electrical conduits

d. Interaction Documentation Sheets

e. Walkdown reports

f. Initial office activity documentation, utilized for target identification, which includes:

1) Structure and system, subsystem, and component matrix listing

2) SIP highlighted target schematics

3) Electrical schematics, area drawings, and/or raceway schedules

4) Electrical matrix listing

5.7.3 Documenting Analysis of Postulated Interactions

This may include the following:

a. Technical reports

b. Interaction Documentation Sheets

c. Memos, notes, telecons, etc.

d. Engineering analysis packages

5.7.4 Technical Review

a. Interaction Documentation Sheets

b. Items listed in Section 5.7.3, above

c. Technical Review Sheet (optional)

5.7.5 Field Modifications

a. Design Change Notices

b. Action Request Transmittals or other work package documentation

c. Interaction Documentation Sheets

5.7.6 Final Verification of Modification

a. Documents listed in Section 5.7.5, above.

b. Field Verification Report (Figure 5-5) for rejected field modifications

5.8 MISCELLANEOUS DOCUMENTATION

5.8.1 Design Change Notices

DCNs are used to initiate plant design changes. Refer to Engineering Manual Procedure No. 3.6, Attachment A, "Design Changes" and Procedure No. 3.6 ON.

5.8.2 Computer Data Entry

A specially prepared data file and computer program using the RMS basic system has been developed to implement the data entry of the SIP and to reference the microfilm of the SIP hardcopy files. See Appendix F, Data Entry Procedure: Functional Specifications, for the procedures and format of this system.

5.9 CLOSING OUT AN SIP FILE

During the course of the SIP, all correspondence and documentation are stored in an interaction file. The file is referenced by its assigned interaction number, as described in Section 5.2.

In closing out an SIP file, some of the documentation may not be required for the permanent computerized data base. The SIP Project Coordinator reviews each interaction file, screens the documentation no longer related to the

analysis or final resolution of an interaction, and formally closes the file by his signature. He then transmits the file to the RMS section responsible for microfilming the data base.

A closed-out interaction file will contain some or all of the following:

a. IDS complete with signatures in accordance with Section 5.2.1

b. ART complete with signatures

c. Consultant or engineering discipline's analysis of postulated interaction or its reference

d. A separate sheet containing the technical reviewer's signature and comments (optional)

e. DCN work package or its reference

f. Drawings, sketches, etc., or reference to same when used to resolve an interaction by modification

5.10 REFERENCES

The following documents describe the licensing requirements for DCPP's Systems Interaction Program:

1) "Description of the Systems Interaction Program for Seismically-Induced Events, Diablo Canyon Units 1 and 2," August 29, 1980.

2) "NRC Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, Volume 1, Task II.C, May 1980.

3) "Safety Evaluation Report to the operation of Diablo Canyon Nuclear Power Station Units 1 and 2;" NUREG-0675 Supplement No. 11, October 1980.

The following documents describe other applicable procedures:

4) Engineering Department Manual Procedures 3.6 and 3.6, ON.

5) Quality Assurance Department Manual.

6) Records Management Handbook.

69-005 (1/81)

FIGURE 5-1
(Referenced in Section 5.2)
PACIFIC GAS & ELECTRIC CO.

DIABLO CANYON PLANT

SEISMICALLY INDUCED SYSTEMS INTERACTION PROGRAM

INTERACTION DOCUMENTATION SHEET

(Use additional sheets if required)

Interaction criteria IF2

Fire Zone: 1C
Location within Fire Zone: Top of Pressurizer, approx. el. 168'
Postulated Interaction No.: 07-16-05-01
Identification of interacting components, including operating mode/position, etc.:

T) Acoustic monitor POT 118

Description of Postulated Interaction:

Pipe mounted POT damaged by electrical conduit. Thermal or seismic motion resulting in impact.

Recommended Resolution of Postulated Interaction:

Provide flexible conduit connection to POT 118

Final Resolution of Postulated Interaction:

Modification criteria R3

POT 118 relocated per attached sketch

PG&E Group Leader/3.3.81
SISIP Discipline Supervisor (Applies only if resolution is required)

Site Evaluation Team Leader/3-18-81 SIP-Project Engineer/3-20-81
Originator/Date Reviewer/Date

SAMPLE

FIELD VERIFICATION/DATE Team Leader 3-1-82

69-005
(1/83)

Figure 5-1A
(Referenced in Section 5.2)

SHEET ____ OF _____

PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON PLANT, UNIT NO. 2
SEISMICALLY INDUCED SYSTEMS INTERACTION PROGRAM
INTERACTION DOCUMENTATION SHEET (IDS)

POSTULATED INTERACTION NO.: _____

FIRE ZONE _____ FLOOR ELEVATION _____ SOURCE ELEVATION _____

LOCATION WITHIN FIRE ZONE (SPECIFY RELATION TO COLUMN LINES, AZIMUTH, MAJOR EQUIPMENT NEARBY ETC.):

IDENTIFICATION OF INTERACTION COMPONENTS (INCLUDE ORIENTATION, SIZE, ETC.):

SOURCE: SOURCE CODE: _____

TARGET (INCLUDE OPERABILITY REQUIREMENTS IF APPLICABLE):

POSTULATED INTERACTION (INCLUDE DESCRIPTION, INTERACTION CRITERIA, REF. DRAWINGS IF APPLICABLE)

IC_____

RECOMMENDED RESOLUTION BY WALKDOWN TEAM (SEE SHEET TWO IF FINAL RESOLUTION REQUIRED):

RRC_____

DISCIPLINE RESPONSIBLE FOR RESOLUTION: CE EE EMS HVAC I+C PSE NPO NAN

_____
WALKDOWN TEAM ORIGINATOR/DATE

_____ _____
WALKDOWN TEAM LEADER APPROVAL/DATE SIP PROJECT ENGINEER APPROVAL/DATE

69-005
(1/83)

Figure 5-1B

(Referenced in Section 5.2)

SHEET _____ OF _____

PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON PLANT, UNIT NO. 2
SEISMICALLY INDUCED SYSTEMS INTERACTION PROGRAM
INTERACTION DOCUMENTATION SHEET (IDS)

POSTULATED INTERACTION NO. _____

FINAL RESOLUTION BY RESPONSIBLE DISCIPLINE (REFERENCE ATTACHED DCN's, ART's, SUPPORTING CALCULATIONS OR DOCUMENTS, ETC.):

FRC _____

_____
DISCIPLINE ENGINEER/DATE

_____
ENGINEER GROUP SUPERVISOR/DATE

_____
TECHNICAL REVIEW NUMBER

_____
FIELD VERIFICATION BY WALKDOWN TEAM
(FOR MODIFICATIONS ONLY)

[KLMOFORM]

69-005
(1/83)

Figure 5-1C
(Referenced in Section 5-2)
PACIFIC GAS & ELECTRIC CO.
DIABLO CANYON PLANT, UNIT NO. 2
SEISMICALLY INDUCED SYSTEMS INTERACTION PROGRAM
INTERACTION DOCUMENTATION SHEET (IDS)

SHEET ____ OF _____

POSTULATED INTERACTION NO.: _____

CONTINUED FROM PAGE ONE:

Form 69-003, Rev. 1

PACIFIC GAS AND ELECTRIC CO.
NUCLEAR PROJECTS DEPARTMENT

Date 6-1-81

ART No. 155

SAN No. 81

Sheet 1 of 3

SAMPLE 1

Figure 5-2
(Referenced in Section 5.3)

SYSTEM INTERACTION PROGRAM
ACTION REQUEST TRANSMITTAL

Diablo Canyon Unit 1

To: GENERAL CONSTRUCTION
ATT: Construction Supt.

From: SIP - PROJECT ENGINEER

Description of Action:

Relocate acoustic monitor in accordance with the attached sketch.

Postulated Interaction No. 07-16-05-01

Completion of Work ☐ is ☒ is not required prior to receipt of Operating License. If not, when? Prior to power ascension

Estimated Field Costs: $1500.00

Work Status: ☒ Not Started ☐ Partially Complete ☐ Complete

Work Package Documentation Required ☐

Non-Design Documents Affected or Referenced:

Requested By:	Reviewed By:	Approved By:
Iniating Person, (optional)	Electrical Engineer, 6-8-81	SI Project Engineer 6-17-81
Date	Discipline Engr. Date	SI Project Engineer Date

Project Design Coordinator Review Required. Signature Signed when cost > $10,000

Work Completed General Construction Date

RETURN TO NUCLEAR PROJECTS ADMINISTRATIVE SECTION

jma 1/82

(5-17)

PACIFIC GAS AND ELECTRIC CO.
NUCLEAR PROJECTS DEPARTMENT

Figure 5-2A
(Referenced in Section 5.3)

Date _____

ART No. _____

SAN No. _____

Sheet 1 of _____

2

SAMPLE

SYSTEM INTERACTION PROGRAM
ACTION REQUEST TRANSMITTAL

Diablo Canyon Unit ___

To: _____ From: _____

_____ _____

Description of Action: _____

_____

_____

_____

_____

_____

_____

_____

Postulated Interaction No. _____

Completion of Work ☐ is ☐ is not required prior to receipt of Operating License. If not, when? _____

Estimated Field Costs: _____

Work Status: ☐ Not Started ☐ Partially Complete ☐ Complete

Work Package Documentation Required ☐

Non-Design Documents Affected or Referenced: _____

_____

_____

Requested By:	Reviewed By:	Approved By:
_____, _____ Date	_____, _____ Date	_____, _____ SI Project Engineer Date

☐ Diablo Canyon Project Engineer Signature _____

Work Completed _____ Date _____

RETURN TO PROJECT COORDINATION SECTION

jma 4/30/83
Page 1 of 1

69-026 (11/81)

Figure 5-3
(Referenced in Section 5.4)

SAMPLE

SYSTEM INTERACTION PROGRAM TRANSMITTAL

Date 9-15-81

TO: A.G. Barta
ELECTRICAL ENGINEERING

FROM: SIP PROJECT ENGINEER EXT. 4831

Note: Always list applicable IDS matrix numbers in all transmittals.

- ☐ ART (SIP) Form No. _____
- ☐ Drawing(s) No. _____
- ☒ IDS Sheet No. 03-06-02-01, 07-05-01-02, 17-03-02-01
- ☒ Resolution Report No. 35
- ☐ DCN No. _____
- ☐ Other _____

MEMO Please technically review the attached consultant resolution report. If you agree with the analysis and recommendation, return to SIP Project Engineer with a completed ART.

DCPP UNITS 1 & 2
SYSTEMS INTERACTION PROGRAM - TARGET LIST

05 STEAM GENERATOR SAMPLE AND BLOWDOWN

SYS	SUB SYS	CMP	DESCRIPTION	COMPONENT IDENTIFICATION	ELEV	FIRE ZONE	OPER REQ	COMMENTS	UNIT APPL
05	05		SUBSYSTEM: Actuator FCV-760					061-C	
05	05	01	Valve Actuator (Pneumatic)	FCV-760	116	1-B	F	FC	
05	05	02	Tubing From FCV-760 to SV-249		116 117	1-B			
05	05	03	Solenoid Valve	SV-249, Panel 48	117	1-B	F	FTV	
05	05	04	Electrical Circuit for SV-249					See Electrical Target List	
05	06		SUBSYSTEM: Actuator FCV-761					061-C	
05	06	01	Valve Actuator (Pneumatic)	FCV-761	115	1-B	F	FC	
05	06	02	Tubing From FCV-761 to SV-247		115	1-B			
05	06	03	Solenoid Valve	SV-247, Panel 125	117	1-B	F	FTV	
05	06	04	Electrical Circuit for SV-247					See Electrical Target List	
05	07		SUBSYSTEM: Actuator FCV-762					061-D	
05	07	01	Valve Actuator (Pneumatic)	FCV-762	115	1-B	F	FC	
05	07	02	Tubing From FCV-762 to SV-245		115	1-B			
05	07	03	Solenoid Valve	SV-245, Panel 46	117	1-B	F	FTV	
05	07	04	Electrical Circuit for SV-245					See Electrical Target List	

Figure 5-4
(Referenced in Section 5.5)

Figure 5-5
(Referenced in Section 4.2)

PACIFIC GAS & ELECTRIC CO.

DIABLO CANYON PLANT

SEISMICALLY INDUCED SYSTEMS INTERACTION PROGRAM

FIELD VERIFICATION REPORT

Postulated Interaction No.: _____

Condition:

Recommended Action:

_____

Walkdown Team Leader/Date

SYSTEMS INTERACTION PROGRAM

APPENDIX A - CRITERIA FOR IDENTIFICATION OF

TARGET COMPONENTS

ENGINEERING SIGNATURE SHEET

(The signatures below document Project Engineering approval of the target scope of the SIP.)

	Unit 1 (Name/Date)	Unit 2 (Name/Date)
Discipline Supervisors: Mechanical	H.O. Tedrick for E.C. Connell / 3-29-83	H.M. Lai / 3/25/83
Civil	J.K. McCall / 4/1/83	N.O. Shah 3/25/83
Architectural	F.M. Germano / 3-25-83	F.M. Germano / 3-25-83
Electrical	S. Auer 3-25-83	G.M. Hazari 3/25/83
Instrument/Controls	T.N. Crawford / 3-29-83	F. Mori 3/25/83
Piping/Supports	M.R. Tresler 3/25/83	V.P. Mercado 3/25/83
HVAC	E.J. Brady / 3-31-83	E.J. Brady 3-31-83
Project Engineers: (Approved for Project Use)	G.H. Moore / 4/5/83	G.V. Cranston 4/1/83

[GP03J/1]

SYSTEMS INTERACTION PROGRAM

APPENDIX A- CRITERIA FOR IDENTIFICATION OF TARGET COMPONENTS

TABLE OF CONTENTS

[GP03J/2]

A.I INTRODUCTION AND PROGRAM SCOPE

This document contains the detailed criteria and methodologies for identifying the target structures, systems and components which require inspection under the Systems Interaction Program (SIP). The criteria contained herein identify the functional requirements that the SIP target group must satisfy and the resulting required systems within the program.

The documents referenced during the development of these criteria are listed in Section A.IV, References. Review and interpretation of the requirements of these reference documents form the basis for the criteria described in this and the following sections.

Reference 3 (NRC Safety Evaluation Report) addresses four categories of structures, systems and components which are to be included in the scope of the SIP as targets.

The first category of targets is the "safe shutdown" equipment which formed the target basis for the SIP during the early formulation and development of the program. This category includes the equipment, the basic flowpaths, process monitoring instrumentation and cooling water inventories that are required to achieve and maintain cold shutdown from normal operating conditions following a postulated Hosgri earthquake. Since the Phase I effort of the "Seismic Evaluation for Postulated 7.5M Hosgri Earthquake", Amendment 50 to the Diablo Canyon Operating License Application (hereinafter referred to as the "Hosgri Report", Reference 4) describes and lists the minimum equipment required to accomplish cold shutdown, this Phase I portion is used to explicitly define the systems and components designated as targets for this category.

The second category of targets is the "refueling operations" group of equipment which was added to the SIP target scope to address the safety-related structures, systems and components necessary for maintenance of cold shutdown during all phases of the initial fueling and subsequent refueling operations. A list of equipment required to accomplish this function was generated for this mode of plant operation.

The third category of targets is the seismically-qualified portion of the firewater system supplying water to the fire protection hose reels. This group of targets was added at the direction of the NRC to assure that the ability to suppress fires within the areas of the plant which contain safety-related equipment is maintained following a postulated Hosgri seismic event. Reference was made in Reference 3 to the PG&E letter dated November 13, 1978 regarding the fire protection system. This letter was used to define the fire protection equipment designated as targets.

The fourth category of targets is the "accident mitigating systems" group of targets, which was added to the SIP scope at the direction of the NRC. The description of the scope of target systems for this category (contained in Section 2.1 of Reference 3) is as follows:

> "We believe that the scope of equipment designated as targets should also include...certain accident mitigating systems not already included, such as the containment isolation, main steam isolation and containment spray systems..."

Following discussions with the NRC staff, it was decided that it was reasonable to include accident mitigation within a program which protected safety-related equipment from damage during and following the Hosgri earthquake. It should be noted that specific accident scenarios are not addressed in the SER description pertaining to accident mitigation. It was concluded that protection of certain accident mitigating systems from postulated seismically-induced failures of non-safety-related components was appropriate and provided added assurance of the integrity and operability of certain systems which would be desirable to have available following abnormal operating transients. As a result of these discussions, the equipment required to perform the following three accident mitigating functions was included within the scope of SIP targets:

1) Containment Isolation
2) Main Steam System Isolation
3) Containment Spray

In summary, the inclusion of the above-described four categories of structures, systems and components into the SIP target scope meets the intent of the requirements of References 1 and 3. Section A.II of this document defines the specific structures, systems and components which meet the above target scope definition.

In Section A.II, which follows, the first, third and fourth categories have been combined in an overall term of "safe shutdown" in Subsection A.II.A; the second category is included in "initial fueling and refueling operations" in Subsection A.II.B.

[GP03J/5]

A.II. TARGET SYSTEMS' IDENTIFICATION

A. Functional Requirements and Identification of SIP Target Systems-Safe Shutdown

Structures, systems and components required to achieve and maintain a safe shutdown condition shall be within the target scope of the Systems Interaction Program. The general functional safe shutdown requirements are:

- Fission product boundary integrity shall not be compromised; i.e., integrity of fuel cladding, reactor coolant pressure boundary and containment pressure boundary shall be maintained.
- The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.
- The reactor coolant makeup function shall be capable of controlling reactor coolant system pressure and maintaining and controlling reactor coolant inventory.
- The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.
- The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the functions above.
- The supporting functions such as process cooling, lubrication, HVAC, etc., shall be capable of providing the necessary services to permit the operation of the equipment used for safe shutdown.

-Onsite emergency power shall be available and capable of powering the equipment and systems required to achieve and maintain the above safe shutdown functions.

1) Mechanical Systems and Equipment

a) Systems-Safe Shutdown

The mechanical systems required to satisfy the functional safe shutdown requirements specified above consist of the:

- Reactor Coolant System
- Residual Heat Removal System
- Auxiliary Feedwater System
- Chemical and Volume Control System (Boration & Charging)
- Component Cooling Water System
- Auxiliary Saltwater System
- Main Steam (thru Containment Penetrations) and Feedwater Systems (to Support Auxiliary Feedwater System and Steam Generator pressure control)
- Emergency Diesel Generator System
- HVAC Systems required to provide cooling air necessary to permit operations of the equipment used for safe shutdown and maintain control room habitability in the normal operating mode

b) Systems-Accident Mitigation

In addition to the systems listed in 1a) above, the following accident mitigating systems shall be within the target scope of the program:

- Containment Spray System including interconnected flowpaths associated with other functions such as safety injection, boron injection and RHR recirculation which make the Containment Spray System a viable system under all modes of operation

- Containment Isolation
- Main Steam System Isolation

c) Systems-Fire Protection
- Seismically-qualified portions of the Firewater System supplying water to the fire protection hose reels

d) Equipment-Safe Shutdown
The mechanical equipment required as part of the systems listed in 1a) above consist of:

- Reactor Coolant System equipment specified in Chapter 6 of the Hosgri Report, including Reactor Pressure Vessel (RPV) and appurtenances, Reactor Coolant System (RCS) piping, steam generators, Reactor Coolant Pump (RCP) casings, pressurizer, Control Rod Drive Mechanism (CRDM), etc.
- Mechanical equipment as specified in Section 7.3 of the Hosgri Report, including the valves listed in Tables 7-3A and 7-3B
- Piping, valves and other appurtenances to the piping and valves required for functional operability and pressure boundary integrity of the above-identified systems.
- HVAC equipment as listed in Section 9.2 of the Hosgri Report

[GP03J/8]

e) Equipment-Accident Mitigation

The mechanical equipment required as part of the systems listed in 1b) above consist of:

- Containment spray pumps, Reactor Water Storage Tank (RWST), the spray additive tank and associated containment spray system piping and valves
- Residual Heat Removal (RHR) recirculation flowpath (piping and valves) discharging into the containment spray header
- Safety injection flowpath (consisting of Safety Injection (SI) pumps taking suction from the Reactor Water Storage Tank (RWST) and associated piping and valves) discharging into the Reactor Coolant System (RCS)
- Charging flowpath through the Boron Injection Tank
- Piping and valves including Main Steam Isolation Valves (MSIVs), Steam Generator (SG) blowdown isolation valves, SG 10% Power Operated Relief Valves (PORVs), and SG safety relief valves required to maintain the containment isolation and main steam system isolation functions

f) Equipment-Fire Protection

The mechanical equipment required as part of the systems listed in 1c) above consist of:

- Firewater Storage Tank
- Fire Pumps

- Piping and valves out to but not including the firewater hose reels
- Sprinkler system isolation valves (to maintain pressure boundary integrity of the hose reel water supply if manually isolated)

2) INSTRUMENTATION

The instrumentation within the target scope of the program consists of:

a) The instrumentation required to fulfill the safe shutdown process monitoring function as specified in Section 7.3.1.5 of the Hosgri Report; i.e., steam generator level and pressure, pressurizer level, reactor coolant system pressure and temperature and boric acid tank level.

b) Instrument Class 1A instrumentation providing Solid State Protection System (SSPS) input signals that originate from systems and components within the target scope of the program.

c) Instrument Class 1A instrumentation required to operate safety-related devices within the target scope

d) Instrumentation required for pre-planned manual action for operation of systems within the target scope.

e) Pressure boundary integrity only shall be maintained for all other instruments and tubing associated with systems within the target scope of the program.

Instrumentation within the target scope of the program required to be operable (items 2a, 2b, 2c and 2d) is listed in Appendix A2.

The Systems Interaction Program piping schematics (Appendix A1) illustrate the boundaries of the target systems and the operability requirements of the components of those systems. These schematics are included only for the purpose of illustrating the scope of the program as of the date of the issuance of this Appendix A. Unless major changes to the SIP scope or major changes to target systems occur, these drawings are not to be revised. These schematics represent an envelope of target functions and should not be construed as overriding any plant design documents.

3) ELECTRICAL

The electrical equipment and circuitry within the target scope of the program consist of:

a) Power and control circuitry and associated electrical devices required for all SIP target mechanical equipment and/or instrumentation that is required to attain or maintain its fail-safe position or is required to be operable.
b) Equipment and circuitry associated with the emergency power system as listed in Appendix A3.

4) STRUCTURES

All buildings, structures or architectural features which support, contain, brace or protect target equipment shall be included within the target scope of the program. The structures within the target scope of the program are listed in Appendix A4.

B. Functional Requirements and Identification of SIP Target Systems - Initial Fueling and Refueling Operations

Structures, systems and components required to maintain a safe shutdown condition during initial fuel load and subsequent refueling operations shall be within the target scope of the Systems Interaction Program. The general functional safe shutdown requirement is the maintenance of reactor cavity/refueling canal and spent fuel pool water inventories and recirculation for decay heat removal.

The structures, systems and components required during (re)fueling operations that are within the target scope of the program are listed in Appendix A5. Many of the structures, systems and components required during (re)fueling operations are within the SIP target scope for safe shutdown as specified in Section A.II.A of this document.

A.III. PIPING SCHEMATIC TARGET REPRESENTATION

Once the required systems are identified, the Diablo Canyon piping schematics (Appendix A) are marked-up to indicate the equipment which receive SIP inspection. A review by mechanical systems and instrumentation engineers resulted in controlled devices such as pumps, power-actuated valves, transmitters, etc. being designated as follows:

"O" Device shall be capable of complete operation on command; i.e., stopping or starting of pumps, opening or closing of valves, etc.

"F" Device shall, as a minimum, attain and maintain its fail-safe position without operator action. (Pertains to valves only.)

"I" Device shall, as a minimum, maintain its pressure boundary integrity.

[GP03J/12]

Target piping system boundaries are defined by vessels, "F" and "O" valves, normally closed manual valves and instruments (as defined below), to ensure that the pressure boundary integrity of all required systems is maintained.

Instruments not required for the safety-related functional requirements noted in Section A.II do not require SIP inspection and are not included as part of the piping schematic mark-up unless such instruments are part of the system pressure boundary. In this case, these instruments are designated as "I".

All other instruments (see Appendix A2) included as part of the system and/or sub-system being considered are required to function normally, including trip signals. Instruments between the source of the trip signal and the controlled devices are designated as "O" devices; i.e., the instrument must be operable to produce the appropriate signal to the "F" or "O" devices.

The target scope for equipment and devices designated as "O" and "F" must also be extended to include the power and control electrical circuitry, control air, electro-pneumatic controls, hydraulic systems, etc. which are associated with each piece of equipment or device. This extension must be sufficient to include all items which will assure as well as not prevent the required operability of "O" devices and the required failure ("fail-safe") position/status of "F" devices.

A.IV. REFERENCES

1. "Description of the System Interaction Program For Seismically-Induced Events", Revision 4, Pacific Gas and Electric Company, August 29, 1980.

2. "Program Manual: System Interaction Program (SIP) For Seismically-Induced Events", Revision 2, Pacific Gas and Electric Company, May 15, 1982.

3. "Safety Evaluation Report, NUREG 0675, Supplement No. 11", U.S. Nuclear Regulatory Commission, October, 1980.

4. "Seismic Evaluation for Postulated 7.5M Hosgri Earthquake", Amendment 50 to the Diablo Canyon Operating License Application.

Date: 03-15-84
FINAL

SYSTEMS INTERACTION PROGRAM

APPENDIX A1

CRITERIA FOR IDENTIFICATION OF TARGET COMPONENTS:

PIPING SCHEMATICS

DIABLO CANYON POWER PLANT

SYSTEMS INTERACTION PROGRAM FOR

SEISMICALLY-INDUCED EVENTS

CRITERIA FOR IDENTIFICATION OF TARGET COMPONENTS:

PIPING SCHEMATICS

APPENDIX A1

SYSTEMS INTERACTION PROGRAM

PIPING SCHEMATICS

[GP03J/15]

107195

SYSTEM INTERACTION PROGRAM SCHEMATIC 107195

SHEET NO.	DRAWING DESCRIPTION	ZONE (SEE NOTE 1)	SIP SYSTEM NO. DESIGNATION	REFERENCE PIPING SCHEMATIC (SEE NOTE 2) DESCRIPTION	DRAWING NO.	SHEET NO.
1	TITLE, CONTENTS, REF. DWG.					
2	LEGEND			LEGEND	102001	3
3	AUX. FEEDWATER SYS & F.W. TIE	1-A,1-C,3-88,3-C-1 3-C-2,26,31	81, 82	FEEDWATER SYSTEM	102003	4
4	STEAM GEN 3 & 4, MAIN STEAM LEADS, STM. GEN. BLOWDOWN REACTOR COOLANT	1-A,1-B,1-C,3-88	02, 03, 04			3
5	STEAM GEN 1 & 2, MAIN STEAM LEADS, STM. GEN. BLOWDOWN REACTOR COOLANT	1-A,1-B,1-C,3BB 3-C-1,1-B-2,28	02, 03, 04	TURBINE STEAM SUPPLY SYSTEM	102004	6
6	STEAM GEN BLOWDOWN & SAMPLING SYS	1-A,1-B,3-88	85	(PB & CI INTEGRITY ONLY)		7
7	AUX STM PIPE CONT. ISOLATION	1-A,1-88	26	AUXILIARY STEAM SYSTEM (CONT. ISOLATION ONLY)	102006	4
8	REACTOR COOLANT LOOPS	1-A,1-B	04,08,12,15,17,18,19			3
9	PRESSURIZER	1-A,1-B,1-C,3-88	07,05,09,12,19	REACTOR COOLANT SYSTEM	102007	4
10	REACTOR COOLANT LOOPS STD MANIFOLD	1-A,1-B	06			6
11	REACTOR VESSEL LEVEL INSTR. & VENT SYS	1-A,1-B,1-C,3-88	06	(RCS PB INTEGRITY ONLY)		7
12	REACTOR COOLANT PUMPS SEAL WATER	1-A,1-B,3-88,3-X	10, 12			3
13	REGENERATION HEAT EXCHANGER & 27S VCT & CONTROL VALVES	1-A,1-B,3-88	22			4
14	VOLUME CONTROL TANK & CHARGING PUMPS SYS	1-A88,3-B-1,2&3, 3-M-112,3-C,1-X 3-88	03,10,11,12,13, 14,15,16,17	CHEMICAL & VOLUME CONTROL SYSTEM	102008	48
15	BORIC ACID TANKS AND PUMPS	3-M,3-X	13, 17			50
16	CENTRIFUGAL CHARGING PUMP AUXILIARIES	3-M-1,	11			8
17	ACCUMULATOR DISCHARGE PIPING & TEST LINES	1-A,1-B,3-88	15	(RCS PB & CI INTEGRITY ONLY)		3
18	BORON INJECTION & REFUELING WATER TANK OUTLETS	1-A88,3-B-2&3,3-F 3-M-1,1-B-1,3-C 3-C-112,3-X,1-B-2	15,16,17,18	SAFETY INJECTION SYSTEM	102009	4
19	SAFETY INJECTION PUMP DISCHARGE & RHR TIE	1-A88,3-B-112,3-M, 3-88	09,15,16,18			5
20	RESIDUAL HEAT REMOVAL PUMPS & HEAT EXCHANGERS PIPING	1-A88,3-B-1,2&3 3-F,1-B8	15,16,18,19	RESIDUAL HEAT REMOVAL SYSTEM	102030	3
21	NUCLEAR STEAM SUPPLY SYSTEM SAMPLING	1-A,1-B,1-C,3-B-1, 3-B-2,3-M-1,3-X 3-88	29	NUCLEAR STEAM SUPPLY SAMPLING SYSTEM (RCS PB & CI INTEGRITY ONLY)	102011	2
22	CONTAINMENT SPRAY	1-A,1-C,3-F,3-L 3-88	09, 23	CONTAINMENT SPRAY SYSTEM	102012	3
23	SPENT FUEL PIT MAKE UP WATER & BORIC RECOVERY TIE	3-B,3-8	16, 27	SPENT FUEL PIT COOLING SYSTEM	102013	2
24	COMPONENT COOLING WATER PUMPS, HEAT EXCHANGER, SURGE TANK	3-J-1,3-J-2,3-J-3, 3-B-1,3-L,3-M-1,M-2, 3-88	20	COMPONENT COOLING WATER SYSTEM	102014	5
25	COMPONENT COOLING WATER PUMPS' LUBE OIL SYSTEM		20	LUBE OIL DISTRIBUTION & PURIFICATION SYSTEM	102020	8
26	CCW SUPPLY & RETURN FOR CCW PUMPS SEAL WATER & OIL COOLERS	3-J-1, 3-J-2, 3-J-3, 3-88	20			5A
27	CCW SUPPLY & RETURN FOR RHR, CCP, SIS, RCPC COOLERS	1-A,1-C,3-B-1,3-B-2, 3-M-1,3-X, 3-88	20			6
28	CCW SUPPLY & RETURN FOR GWS COMP, CENTRAL SAMPLE PANEL, RCP COOLERS	3-C, 3-M-1, 3-J-3, 3-L, 3-X, 3-88	20			6A
29	CCW FOR RCP & REACT. VESSEL SUPPORT COOLERS	1-A,1-B, 3-88	20	COMPONENT COOLING WATER	102014	7
30	CCW FOR S.G. EVAP. AUX. STM RCVR VENT, WASTE CONC., NSSS SAMPLE COOLERS	3-C, 3-L, 3-X, 3-88	20			8
31	CCW COOLERS FOR SEAL WATER, LETDOWN, S.G. BLDWN, SAMP, SPENT FUEL PIT, EXCESS LETDOWN	1-A, 3-L, 3-0, 3-88	20			9
32	CCW SUP & RET FOR CCP-1, RHX-1, RHR PP SEAL COOLER, SIS PP, RCPC-1,2	1-A, 1-C, 3-B-1, 3-M, 3-B-2, 3-X, 3-88	20			10
33	CCW TO WASTE GAS COMPRESSORS	3-C	20	GASEOUS RADWASTE SYSTEM	102024	3
34	CONDENSATE TANK	3-R, 31	01, 21	MAKE-UP WATER	102016	7

SYSTEM INTERACTION PROGRAM SCHEMATIC 107195

SHEET NO.	DRAWING DESCRIPTION	ZONE (SEE NOTE 1)	SIP SYSTEM NO. DESIGNATION	REFERENCE PIPING SCHEMATIC (SEE NOTE 2) DESCRIPTION	DRAWING NO.	SHEET NO.
35	PRIMARY WATER SUPPLY TO CCW SURGE TANK	3-B-1,3-88	21	MAKE UP WATER SYSTEM	102018	8
36	AUX SALTWATER PUMPS & HEAT EXCHANGER	14-A&E,30-A-1,2&3	22	SALTWATER SYSTEM	102019	3
37	FIREWATER YARD SUPPLY TO PLANT	3-B-1,3-F-1,14-A, SOLID RADWASTE FACILITY & SECURITY BUILDING	28			2
38	FIREWATER PUMPS & HOSEREELS IN FUEL HANDLING BLDG.	3-P-2,3-B-1,3-B & OUTSIDE 3-B-31	28	FIRE PROTECTION SYSTEM	102018	3
39	FIREWATER HOSEREELS IN TURBINE BLDG.	11-B,13-C,13-E, 14A, D&E 16-A, OUTSIDE 14-B & 16-A	28			4
40	FIREWATER HOSEREELS IN AUXILIARY BLDG.	3-C,3-L,3-S,3-T-1, 3-V-1&2,3-B,3-X,3-Z, 3-AA,3-BB,3-CC,3-2	28			5
41	FIREWATER SUPPLY, HOSEREELS, RCP RING IN CONTAINMENT BLDG.	1-A,1-B,1-C,3-88	28			7
42	CONTAINMENT ISOLATION OF LIQUID DRAINS PIPING PENETRATION	1-A,3-88	27,29	LIQUID RADWASTE SYSTEM (CI ONLY)	102019	3
43	DIESEL FUEL OIL SUPPLY SYSTEM	11-A-112,11-B-112 11-C-112,22-A-112 22-B-112 OUTSIDE OF 11-A,B&C-1	24			2
44	DIESEL STARTING AIR SYSTEM	11-A,B&C-1	24			3
45	DIESEL TURBO CHARGER AIR ASSIST SYSTEM	11-A,B1C-1	24			4
46	DIESEL COMBUSTION AIR & EXHAUST SYSTEM	11-A,B&C-1,11-C 11-A,B&C-2	24			5
47	DIESEL ENGINE FUEL OIL DAY TANK, PUMPS & FILTERS	11-A,B&C-1	24	DIESEL ENGINE-GEN. SYSTEM	102021	6
48	DIESEL LUBE OIL SYSTEM	11-A,B&C-1	24			7
49	DIESEL ENGINE JACKET WATER COOLING SYSTEM	11-A,B1C-1	24			8
50	DIESEL ENGINE MISC. INSTRUMENTS	11-A,B1C-1	24			9
51	CONTAINMENT, FUEL HANDLING, AUXILIARY BLDG. FANS	1-A,3-C,3-P-1 3-C-112,3-B,3-S	25			3
52	AUXILIARY BLDG VENTILATION DUCTS & SUPPLY FAN	3-B-1,2&3,3-C,3-F 3-M-1,2&3,3-S, 3-L,3-M,3-R,3-X 3-B-1,3-AA,3-P-1	25			4
53	CONTAINMENT HYDROGEN PURGE PIPING THRU CONT. ISOLATION	1-A,3-88	25	(CI ONLY)		44
54	CONTROL ROOM VENTILATION	3-A,3-B-2,3-C,3-E	25	VENTILATION AND AIR CONDITIONING SYS.	102025	5
55	POST LOCA SAMPLE TUBING THRU CONTAINMENT ISOLATION	1-A,3-88	25	(CI ONLY)		11
56	HYDROGEN MONITOR TUBING THROUGH CONTAINMENT ISOLATION	1-A,3-88	25	(CI ONLY)		13
57	VENTILATION OF INVERTER & 480-V SS-6R ROOMS (AUX BLDG)	3-A-1-3,3-A-2-3, 3-A-5	25			14
58	VENTILATION OF 4-KV VITAL BUS SS, GEAR & CABLE SPREADING ROOM	12-A,B&C,13-A-E	25			15
59	VENTILATION OF AUX SALTWATER PUMP ROOM	30-A-1,30-A-2	25			16
60	VENTILATION OF DIESEL ENG ROOM & FAN COOLED RADIATOR	11-A-112,11-B-112 11-C-112 ABOVE 11-A-2,11-B-2,11-C-2	25			17
61	COMPRESSED AIR THRU CONTAINMENT ISOLATION	1-A,3-88	31	COMPRESSED AIR SYSTEM (CI ONLY)	102028	4
62	FIRE ZONE KEYED LOCATION SUMMARY	ALL	—	(NOT APPLICABLE)	—	—

PROJECT SCOPE:

1. THE SYSTEMS INTERACTION PROGRAM SCHEMATICS ILLUSTRATE THE BOUNDARIES OF THE TARGET SYSTEMS AND THE OPERABILITY REQUIREMENTS OF THE COMPONENTS OF THOSE SYSTEMS. THESE SCHEMATICS ARE INCLUDED FOR THE PURPOSE OF ILLUSTRATING THE SCOPE OF THE PROGRAM AS OF THE DATE OF ISSUANCE, AND AS A GUIDE FOR PLANT WALKDOWNS.
2. UNLESS MAJOR CHANGES TO THE SIP SCOPE OR MAJOR CHANGES TO TARGET SYSTEMS OCCUR, THESE DRAWINGS DO NOT REQUIRE REVISION.
3. THESE SCHEMATICS REPRESENT AN ENVELOPE OF TARGET FUNCTIONS AND SHOULD NOT BE CONSTRUED AS OVERRIDING ANY PLANT DESIGN DOCUMENTS.

NOTES:

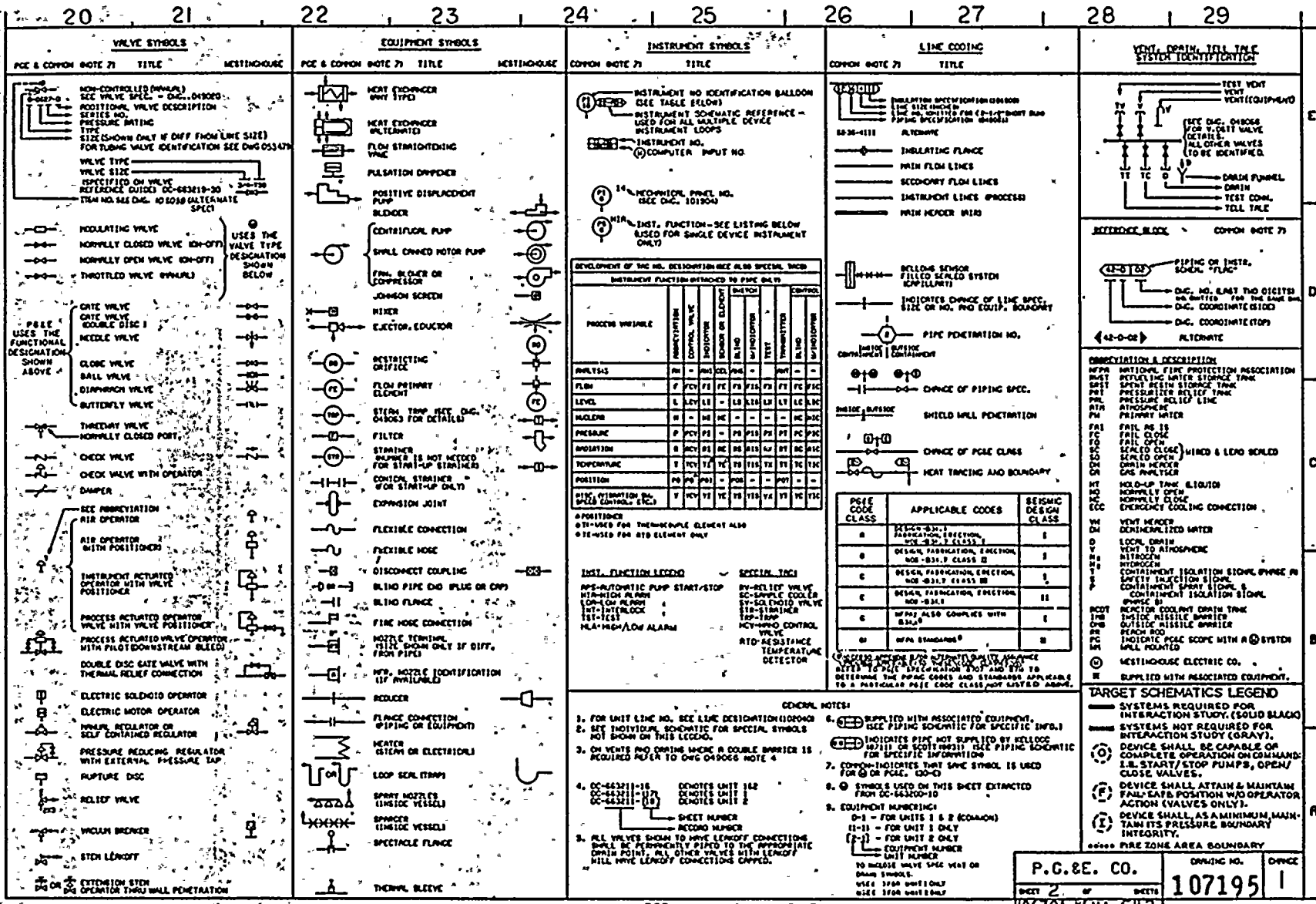
1. ONLY UNIT 1 ZONES ARE DESIGNATED ON SHEETS 1 & 3 THROUGH 61. THE EQUIVALENT UNIT 2 ZONES MAY BE DETERMINED BY USING SHEET 62.
2. THE COMPARABLE UNIT 2 PIPING SCHEMATICS ARE DRAWING NUMBERS 108001 THROUGH 108025.

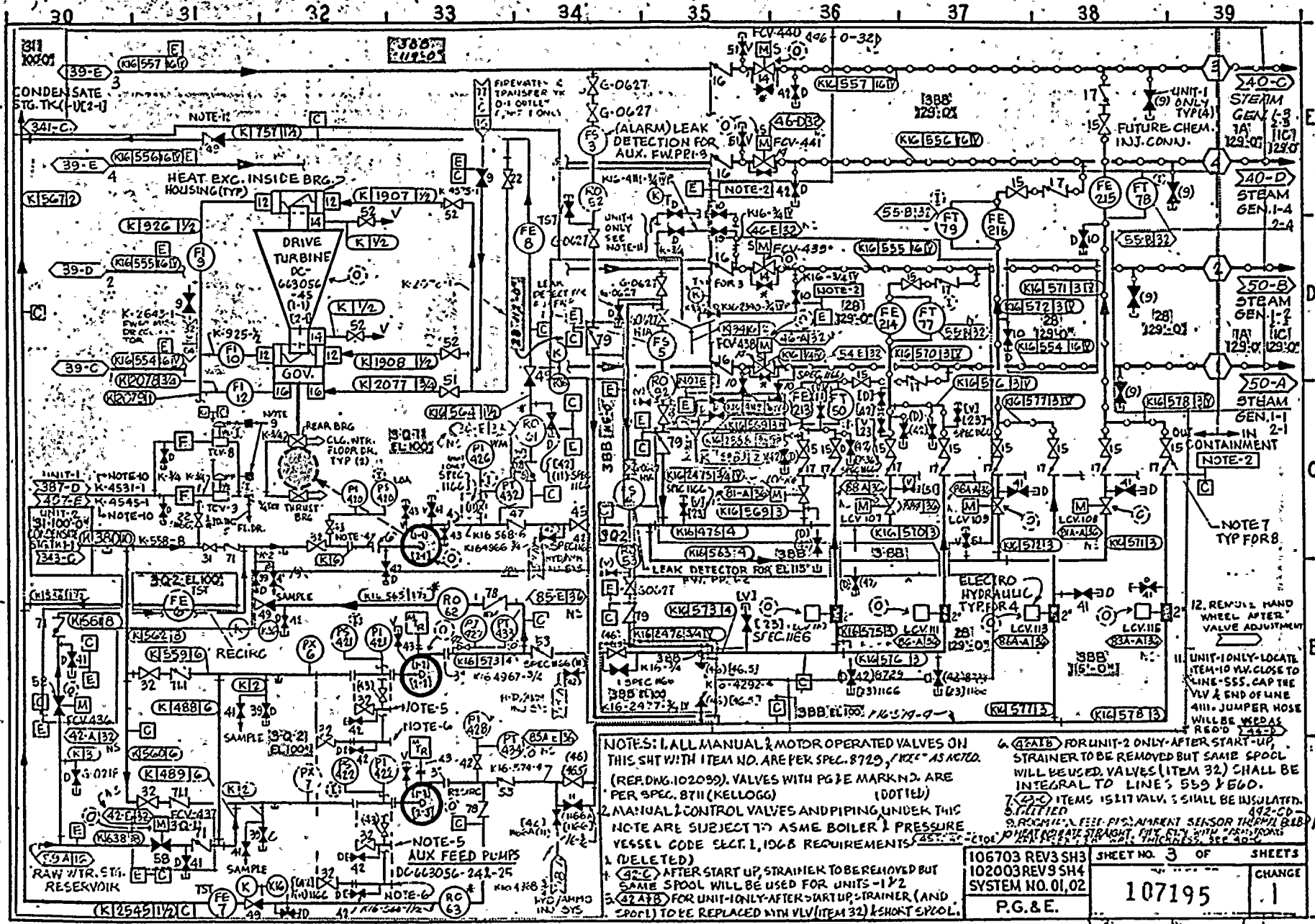
ABBREVIATIONS: RCS = REACTOR COOLANT SYSTEM; PB = PRESSURE BOUNDARY; CI = CONTAINMENT ISOLATION

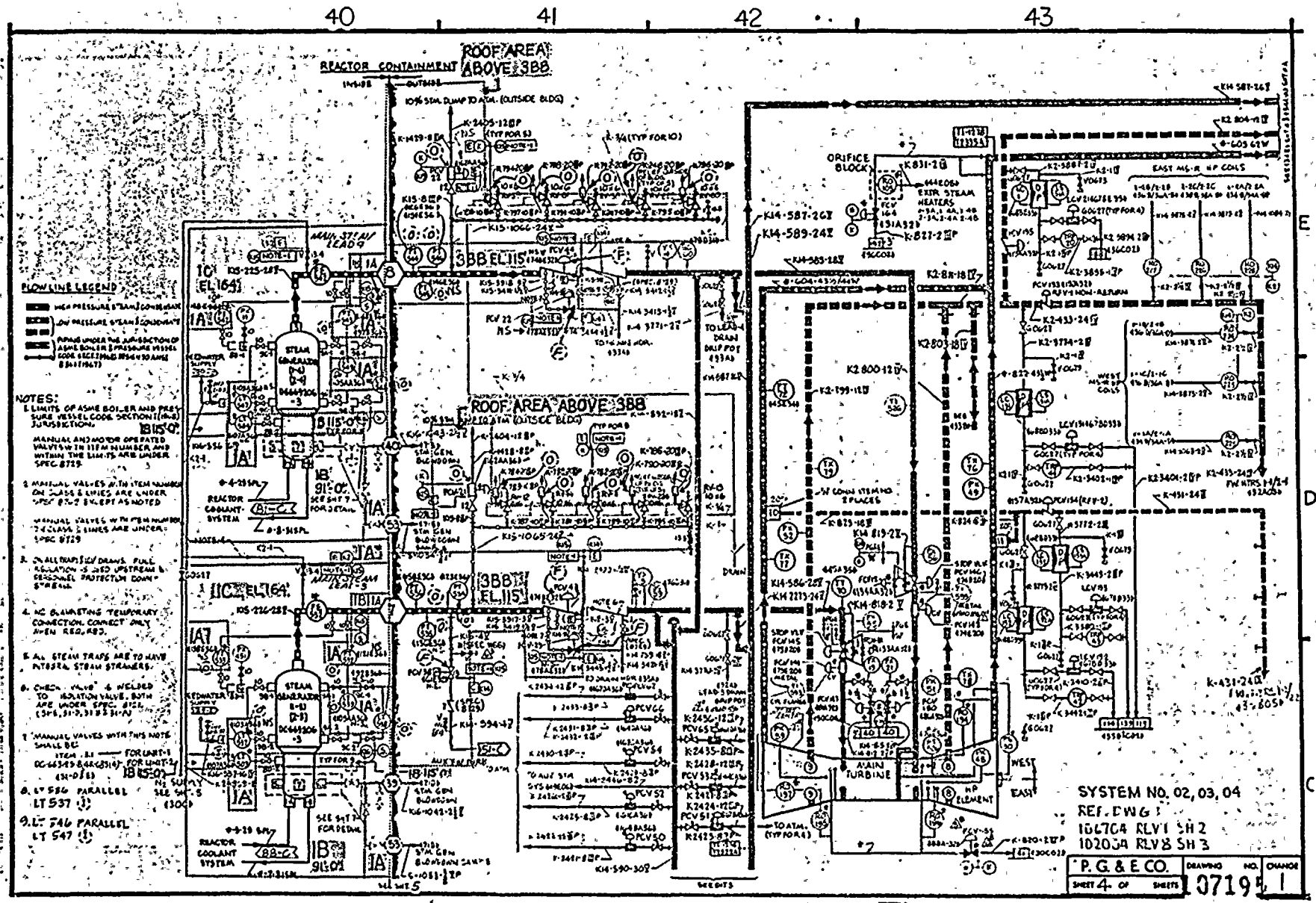
UNIT 1 & 2

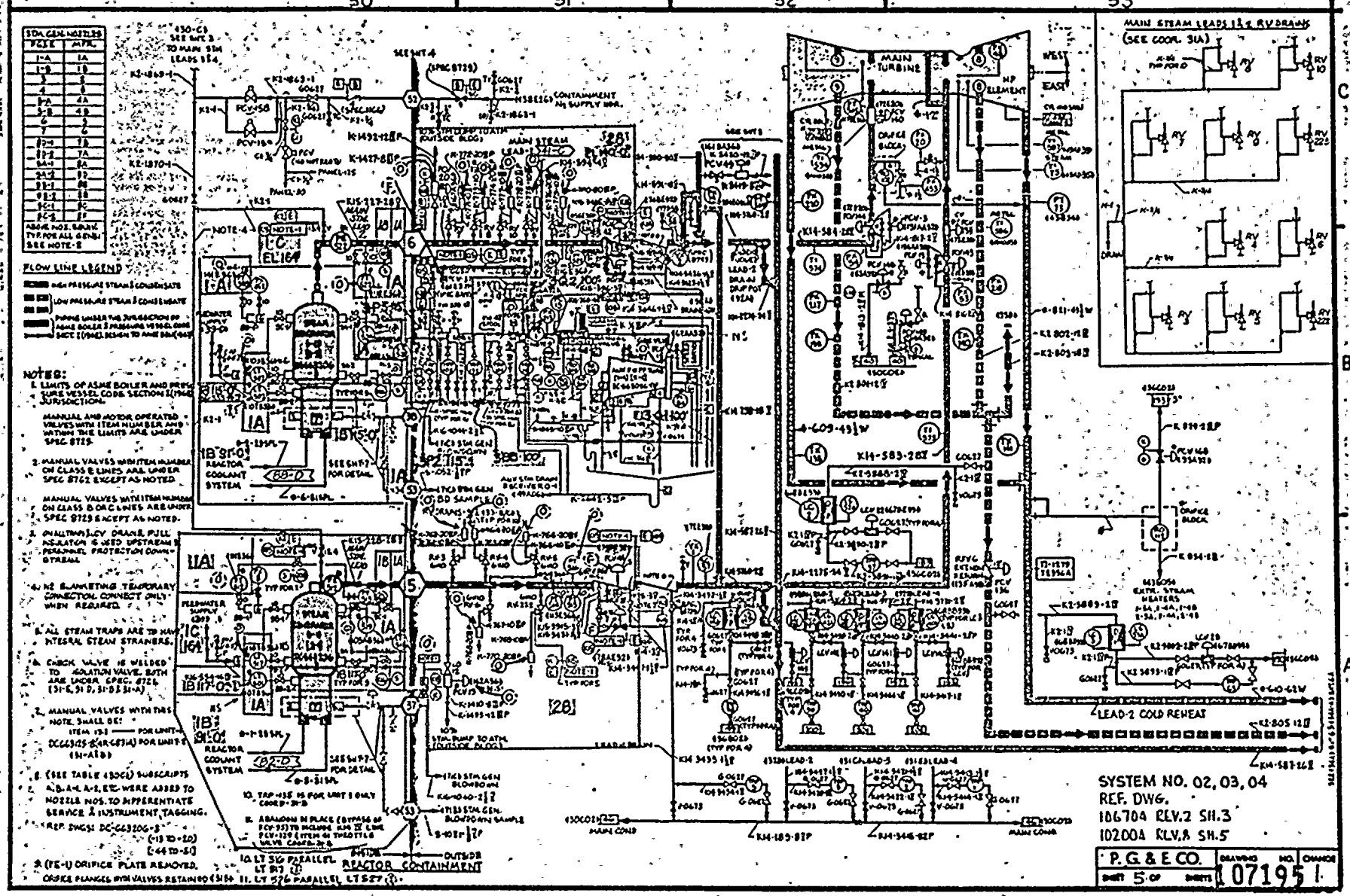
SYSTEM INTERACTION PROGRAM
TARGET SCHEMATICS
DIABLO CANYON
DEPARTMENT OF ENGINEERING
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

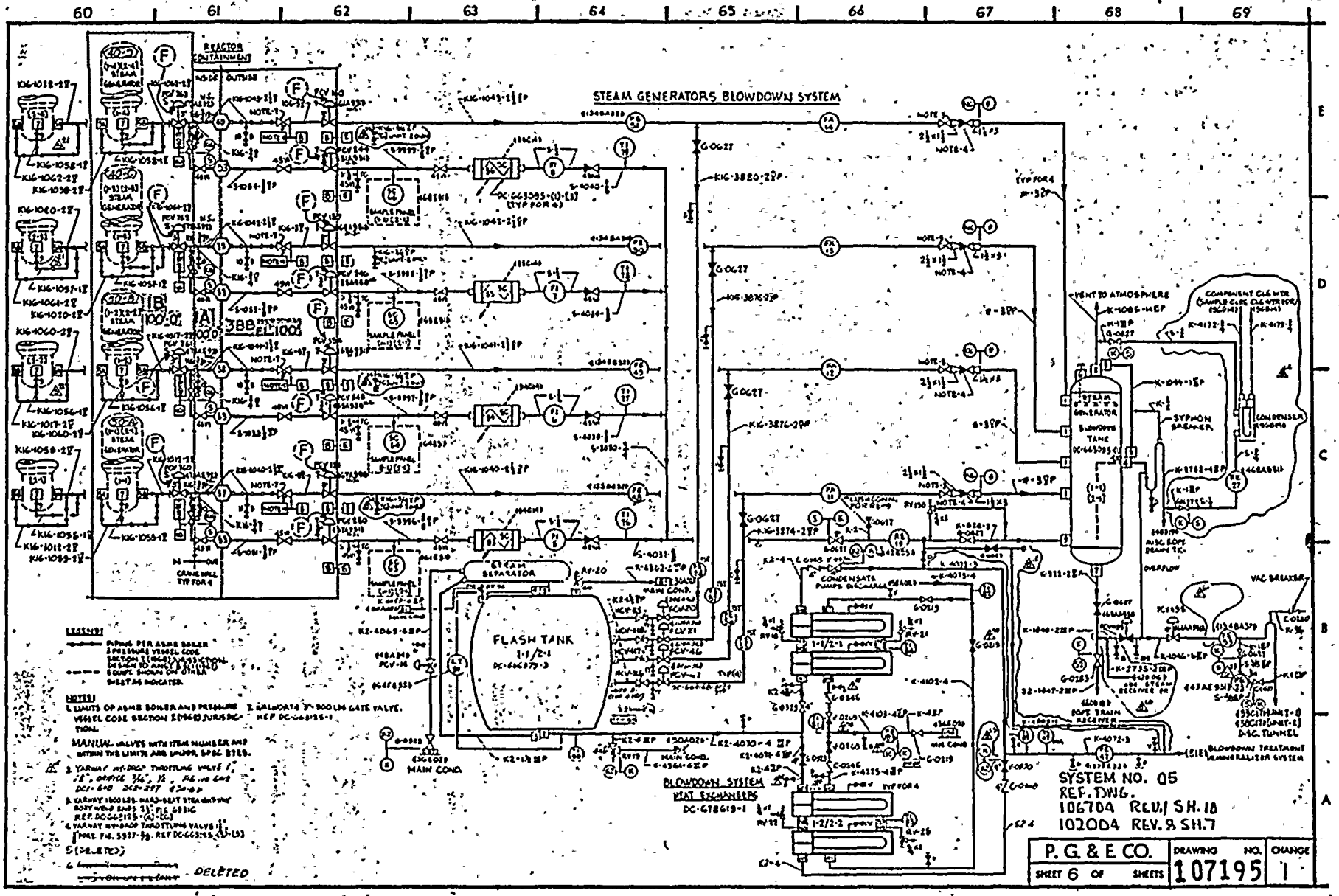
107195 1

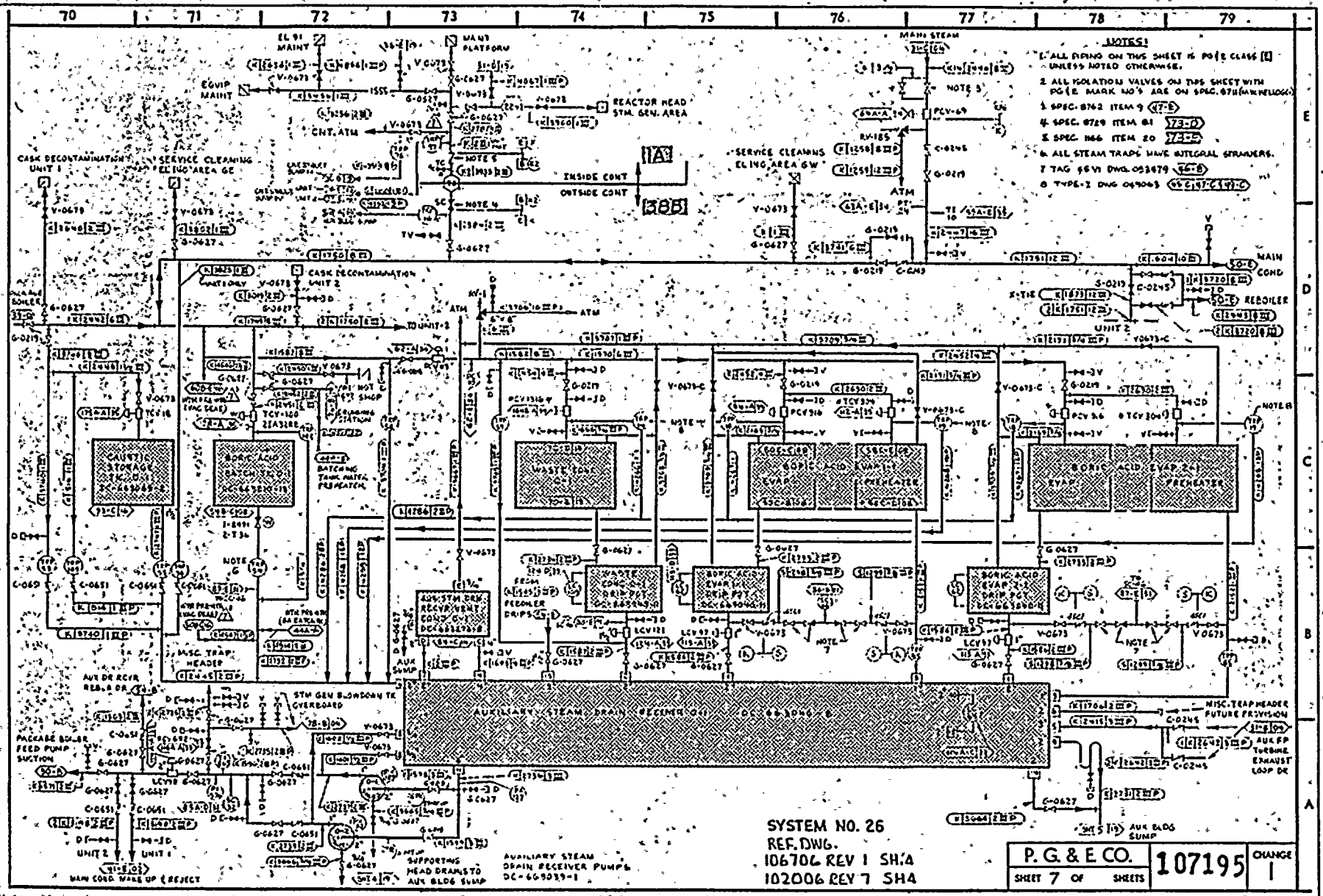

VALVE SYMBOLS
PGE & COMMON NOTE 7) TITLE WESTINGHOUSE
NON-CONTROLLED (MANUAL)
SEE VALVE SPEC. - DWG. 049060
ADDITIONAL VALVE DESCRIPTION
SERIES NO.
PRESSURE RATING
TYPE
SIZE (SHOWN ONLY IF DIFF FROM LINE SIZE)
FOR TUBING VALVE IDENTIFICATION SEE DWG 053478
VALVE TYPE
VALVE SIZE
SPECIFIED ON VALVE
REFERENCE GUIDES DC-663219-30
ITEM NO. SEE DWG. 40 5018 (ALTERNATE SPEC)
MODULATING VALVE
NORMALLY CLOSED VALVE (ON-OFF)
NORMALLY OPEN VALVE (ON-OFF)
THROTTLED VALVE (MANUAL)
USES THE VALVE TYPE DESIGNATION SHOWN BELOW
PG&E USES THE FUNCTIONAL DESIGNATION SHOWN ABOVE
GATE VALVE
GATE VALVE (DOUBLE DISC)
NEEDLE VALVE
GLOBE VALVE
BALL VALVE
DIAPHRAGM VALVE
BUTTERFLY VALVE
THREEWAY VALVE NORMALLY CLOSED PORT
CHECK VALVE
CHECK VALVE WITH OPERATOR
DAMPER
SEE ABBREVIATION
AIR OPERATOR
AIR OPERATOR WITH POSITIONER
INSTRUMENT ACTUATED OPERATOR WITH VALVE POSITIONER
PROCESS ACTUATED OPERATOR VALVE WITH VALVE POSITIONER
PROCESS ACTUATED VALVE OPERATOR WITH PILOT (DOWNSTREAM BLEED)
DOUBLE DISC GATE VALVE WITH THERMAL RELIEF CONNECTION
ELECTRIC SOLENOID OPERATOR
ELECTRIC MOTOR OPERATOR
MANUAL REGULATOR OR SELF CONTAINED REGULATOR
PRESSURE REDUCING REGULATOR WITH EXTERNAL PRESSURE TAP
RUPTURE DISC
RELIEF VALVE
VACUUM BREAKER
STEM LEAKOFF
STEM LEAKOFF OR EXTENSION STEM DWG OR OPERATOR THRU WALL PENETRATION
EQUIPMENT SYMBOLS
PGE & COMMON NOTE 7) TITLE WESTINGHOUSE
HEAT EXCHANGER (UNIT TYPE)
HEAT EXCHANGER (ALTERNATE)
FLOW STRAIGHTENING VANE
PULSATION DAMPENER
POSITIVE DISPLACEMENT PUMP
BLOWER
CENTRIFUGAL PUMP
SHELL CANNED MOTOR PUMP
FAN, BLOWER OR COMPRESSOR
JOHNSON SCREEN
MIXER
EJECTOR, EDUCTOR
RESTRICTING ORIFICE
FLOW PRIMARY ELEMENT
STEAM TRAP (SEE DWG. 049063 FOR DETAILS)
FILTER
STRAINER (NUMBER IS NOT NEEDED FOR START-UP STRAINER)
CONTAM. STRAINER (FOR START-UP ONLY)
EXPANSION JOINT
FLEXIBLE CONNECTION
FLEXIBLE HOSE
DISCONNECT COUPLING
BLIND PIPE END (PLUG OR CAP)
BLIND FLANGE
FIRE HOSE CONNECTION
NOZZLE TERMINAL (SIZE SHOWN ONLY IF DIFF. FROM PIPE)
MFR. NOZZLE IDENTIFICATION (IF AVAILABLE)
REDUCER
FLANGE CONNECTION (PIPING OR EQUIPMENT)
HEATER (STEAM OR ELECTRICAL)
LOOP SEAL (TRAP)
SPRAY NOZZLES (INSIDE VESSEL)
SPARGER (INSIDE VESSEL)
SPECTACLE FLANGE
THERMAL SLEEVE
INSTRUMENT SYMBOLS
COMMON NOTE 7) TITLE
INSTRUMENT NO IDENTIFICATION BALLOON (SEE TABLE BELOW)
INSTRUMENT SCHEMATIC REFERENCE - USED FOR ALL MULTIPLE DEVICE INSTRUMENT LOOPS
INSTRUMENT NO.
COMPUTER INPUT NO.
MECHANICAL PANEL NO. (SEE DWG. 101904)
INST. FUNCTION - SEE LISTING BELOW (USED FOR SINGLE DEVICE INSTRUMENT ONLY)
DEVELOPMENT OF TAG NO. DESIGNATION (SEE ALSO SPECIAL TAGS)
INSTRUMENT FUNCTION (STENCILED TO PIPE ONLY)
PROCESS VARIABLE
ANNUNCIATION
CONTROL VALVE
MOTOR/VALVE
SENSOR OR ELEMENT
SWITCH
BLIND
W/MOTOR/VALVE
TEST
TRANSMITTER
CONTROL
BLIND
W/MOTOR/VALVE
ANALYSIS
FLOW
LEVEL
NUCLEAR
PRESSURE
RADIATION
TEMPERATURE
POSITION
MISC. (VIBRATION DP, SPEED CONTROL, ETC.)
POSITIONER
TH-USED FOR THERMOCOUPLE ELEMENT ALSO
TE-USED FOR RTD ELEMENT ONLY
INST. FUNCTION LEGEND
APS-AUTOMATIC PUMP START/STOP
HIA-HIGH ALARM
LOA-LOW ALARM
INT-INTERLOCK
TST-TEST
HLA-HIGH/LOW ALARM
SPECIAL TAGS
RV-RELIEF VALVE
SC-SAMPLE COOLER
SV-SOLENOID VALVE
STR-STRAINER
TOP-TRAP
MOV-MPRO CONTROL VALVE
RTD-RESISTANCE TEMPERATURE DETECTOR
LINE CODING
COMMON NOTE 7) TITLE
INSULATION SPECIFICATION (SEE NOTE 8)
LINE SIZE (INCHES)
LINE NO. (OMITTED FOR EQUIPMENT RUN PIPING SPECIFICATION (SEE NOTE 8))
ALTERNATE
INSULATING FLANGE
MAIN FLOW LINES
SECONDARY FLOW LINES
INSTRUMENT LINES (PROCESS)
MAIN HEADER (AIR)
BELLOWS SENSOR FILLED SEALED SYSTEM (CAPILLARY)
INDICATES CHANGE OF LINE SPEC, SIZE OR NO. AND EQUIP. BOUNDARY
PIPE PENETRATION NO.
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
CHANGE OF PIPING SPEC.
INSIDE
OUTSIDE
SHIELD WALL PENETRATION
CHANGE OF PG&E CLASS
HEAT TRACING AND BOUNDARY
PG&E CODE CLASS
APPLICABLE CODES
SEISMIC DESIGN CLASS
A
B
C
C
C
NPMS
VENT, DRAIN, TELL TALE SYSTEM IDENTIFICATION
TEST VENT
VENT
VENT (EQUIPMENT)
(SEE DWG. 049068 FOR V-CENT VALVE DETAILS. ALL OTHER VALVES TO BE IDENTIFIED.
DRAIN FUNNEL
DRAIN
TEST CONN.
TELL TALE
REFERENCE BLOCK
COMMON NOTE 7)
PIPING OR INSTR. SCHEM. "FLAG"
DWG. NO. (LAST TWO DIGITS) (OMITTED FOR THE SAME DWG.)
DWG. COORDINATE (SIDE)
DWG. COORDINATE (TOP)
ALTERNATE
ABBREVIATION & DESCRIPTION
NFPA NATIONAL FIRE PROTECTION ASSOCIATION
RWST REFUELING WATER STORAGE TANK
SPFT SPENT RESIN STORAGE TANK
PRT PRESSURIZER RELIEF TANK
PRL PRESSURE RELIEF LINE
ATM ATMOSPHERE
PW PRIMARY WATER
FAS FAIL AS IS
FTC FAIL CLOSE
FTO FAIL OPEN
SC SEALED CLOSE
SO SEALED OPEN
DH DRAIN HEADER
GA GAS ANALYZER
HUT HOLD-UP TANK (LIQUID)
NO NORMALLY OPEN
NC NORMALLY CLOSE
ECC EMERGENCY COOLING CONNECTION
VH VENT HEADER
DM DEMINERALIZED WATER
LOCAL DRAIN
V VENT TO ATMOSPHERE
N NITROGEN
H HYDROGEN
CI CONTAINMENT ISOLATION SIGNAL (PHASE A)
SI SAFETY INJECTION SIGNAL
CS CONTAINMENT SPRAY SIGNAL
CIB CONTAINMENT ISOLATION SIGNAL (PHASE B)
RCDT REACTOR COOLANT DRAIN TANK
IBS INSIDE MISSILE BARRIER
OBS OUTSIDE MISSILE BARRIER
BR BEACH ROD
ISI INDICATE PG&E SCOPE WITH A (N) SYSTEM
WM WALL MOUNTED
(W) WESTINGHOUSE ELECTRIC CO.
(N) SUPPLIED WITH ASSOCIATED EQUIPMENT.
GENERAL NOTES:
1. FOR UNIT LINE NO. SEE LINE DESIGNATION (102040)
2. SEE INDIVIDUAL SCHEMATIC FOR SPECIAL SYMBOLS NOT SHOWN ON THIS LEGEND.
3. ON VENTS AND DRAINS WHERE A DOUBLE BARRIER IS REQUIRED REFER TO DWG 049068 NOTE 4
4. DC-663211-16 DENOTES UNIT 1&2
DC-663211-17 DENOTES UNIT 1
DC-663211-18 DENOTES UNIT 2
SHEET NUMBER
RECORD NUMBER
5. ALL VALVES SHOWN TO HAVE LEAKOFF CONNECTIONS SHALL BE PERMANENTLY PIPED TO THE APPROPRIATE DRAIN POINT. ALL OTHER VALVES WITH LEAKOFF WILL HAVE LEAKOFF CONNECTIONS CAPPED.
6. SUPPLIED WITH ASSOCIATED EQUIPMENT. (SEE PIPING SCHEMATIC FOR SPECIFIC INFO.)
INDICATES PIPE NOT SUPPLIED BY KELLOGG (SEE DC-663211 FOR 663211 PIPING SCHEMATIC FOR SPECIFIC INFORMATION)
7. COMMON-INDICATES THAT SAME SYMBOL IS USED FOR (N) OR PG&E, (W)-(E)
8. (N) SYMBOLS USED ON THIS SHEET EXTRACTED FROM DC-663200-10
9. EQUIPMENT NUMBERING:
0-1 - FOR UNITS 1 & 2 (COMMON)
11-11 - FOR UNIT 1 ONLY
[2-1] - FOR UNIT 2 ONLY
EQUIPMENT NUMBER
UNIT NUMBER
TO INCLUDE VALVE SPEC VENT OR DRAIN SYMBOLS.
USE 3700 UNIT 1 ONLY
USE 3700 UNIT 2 ONLY
TARGET SCHEMATICS LEGEND
SYSTEMS REQUIRED FOR INTERACTION STUDY. (SOLID BLACK)
SYSTEMS NOT REQUIRED FOR INTERACTION STUDY (GRAY).
(O) DEVICE SHALL BE CAPABLE OF COMPLETE OPERATION ON COMMAND: I.E. START/STOP PUMPS, OPEN/CLOSE VALVES.
(F) DEVICE SHALL ATTAIN & MAINTAIN FAIL-SAFE POSITION W/O OPERATOR ACTION (VALVES ONLY).
(I) DEVICE SHALL, AS A MINIMUM, MAINTAIN ITS PRESSURE BOUNDARY INTEGRITY.
FIRE ZONE AREA BOUNDARY
P.G.&E. CO.
DRAWING NO. 107195
CHANGE 1
SHEET 2 OF SHEETS
REF. DWG 102001 SH.3
107201 REV.1 SH.2
102001 REV.5 SH.3
AM INDEXED REV. 1
35 M/M NEG


CONDENSATE STG. TK. (1-U[2-1])
HEAT EXC. INSIDE BRG. HOUSING (TYP)
DRIVE TURBINE DC-663056-45 (1-1) (2-1)
GOV.
REAR BRG CLG. WTR. FLOOR DR. TYP (2)
THRUST BRG
RECIRC
SAMPLE
RAW WTR. STG. RESERVOIR
NOTE-5 AUX FEED PUMPS DC-663056-242-25
(ALARM) LEAK DETECTION FOR AUX. FW. PPS
LEAK DETECTOR FOR EL 115'-0"
ELECTRO HYDRAULIC TYP. FOR 4
FUTURE CHEM. INJ. CONN.
STEAM GEN. 1-3 1A 1C 2-3
STEAM GEN. 1-4 2-4
STEAM GEN. 1-2 1A 1C
STEAM GEN. 1-1 2-1
IN CONTAINMENT
NOTE 7 TYP FOR 8.
12. REMOVE HAND WHEEL AFTER VALVE ADJUSTMENT
11. UNIT-1 ONLY-LOCATE ITEM-10 VLV. CLOSE TO LINE-555. CAP THE VLV & END OF LINE 4111. JUMPER HOSE WILL BE NEEDED AS REQ'D
NOTES: 1. ALL MANUAL & MOTOR OPERATED VALVES ON THIS SHT WITH ITEM NO. ARE PER SPEC. 8729, "MOV" AS NOTED. (REF. DWG. 102093). VALVES WITH PG&E MARK NO. ARE PER SPEC. 8711 (KELLOGG) (DOTTED)
2. MANUAL & CONTROL VALVES AND PIPING UNDER THIS NOTE ARE SUBJECT TO ASME BOILER & PRESSURE VESSEL CODE SECT. 1, 1968 REQUIREMENTS
3. (DELETED)
4. (42-C) AFTER START UP, STRAINER TO BE REMOVED BUT SAME SPOOL WILL BE USED FOR UNITS-1 & 2
5. (42-A1B) FOR UNIT-1 ONLY-AFTER START UP, STRAINER (AND SPOOL) TO BE REPLACED WITH VLV (ITEM 32) & SHORT SPOOL.
6. (42-A1B) FOR UNIT-2 ONLY-AFTER START-UP, STRAINER TO BE REMOVED BUT SAME SPOOL WILL BE USED. VALVES (ITEM 32) SHALL BE INTEGRAL TO LINES 559 & 560.
7. (42-C) ITEMS 15 & 17 VALVES SHALL BE INSULATED.
8. P.I. TIED
9. ROCHE-A FEE-PIS AMBIENT SENSOR THERMAL BLKT
10. HEAT TRACE STRAIGHT RUNS ONLY WITH "CRISCO" TYPE HEAT TRACE, THICKNESS SEE 492-CD
106703 REV 3 SH 3
102003 REV 3 SH 4
SYSTEM NO. 01, 02
P.G.&E.
SHEET NO. 3 OF SHEETS
107195
CHANGE 1


40
41
42
43
REACTOR CONTAINMENT
ROOF AREA ABOVE 388
ROOF AREA ABOVE 388
388 EL 115
388 EL 115
FLOW LINE LEGEND
NOTES:
1. LIMITS OF ASME BOILER AND PRESSURE VESSEL CODE SECTION I (1968) JURISDICTION.
2. MANUAL AND MOTOR OPERATED VALVES WITH ITEM NUMBER ON CLASS 2 LINES ARE UNDER SPEC 8729 EXCEPT AS NOTED
3. ON ALL TRAPS LOW DRAIN, FULL ISOLATION IS USED UPSTREAM & OVERPANEL PROTECTION DOWNSTREAM.
4. NC BLANKETING TEMPORARY CONNECTION. CONNECT ONLY WHEN REQUIRED.
5. ALL STEAM TRAPS ARE TO HAVE INTEGRAL STEAM STRAINERS.
6. CHECK VALVE IS WELDED TO ISOLATION VALVE. BOTH ARE UNDER SPEC 8729.
7. MANUAL VALVES WITH THIS NOTE SHALL BE:
8. LT 536 PARALLEL LT 537
9. LT 546 PARALLEL LT 547
ORIFICE BLOCK
MAIN TURBINE
SYSTEM NO. 02, 03, 04
REF. DWG:
107704 RLV1 SH 2
102034 RLV8 SH 3
P. G. & E. CO.
DRAWING NO. 107195
SHEET 4 OF SHEETS
CHANGE 1
RM INDEXED REV. 1


50
51
52
53
MAIN STEAM LEADS 1 & 4 RV DRAINS
(SEE COOR. 3A)
MAIN TURBINE
LEAD-2 COLD REHEAT
SYSTEM NO. 02, 03, 04
REF. DWG.
106704 REV.2 SH.3
102004 REV.8 SH.5
P.G.&E. CO.
DRAWING NO. 107195
SHEET 5 OF SHEETS
CHANGE
RM INDEXED REV. 1
35 M/M NOS

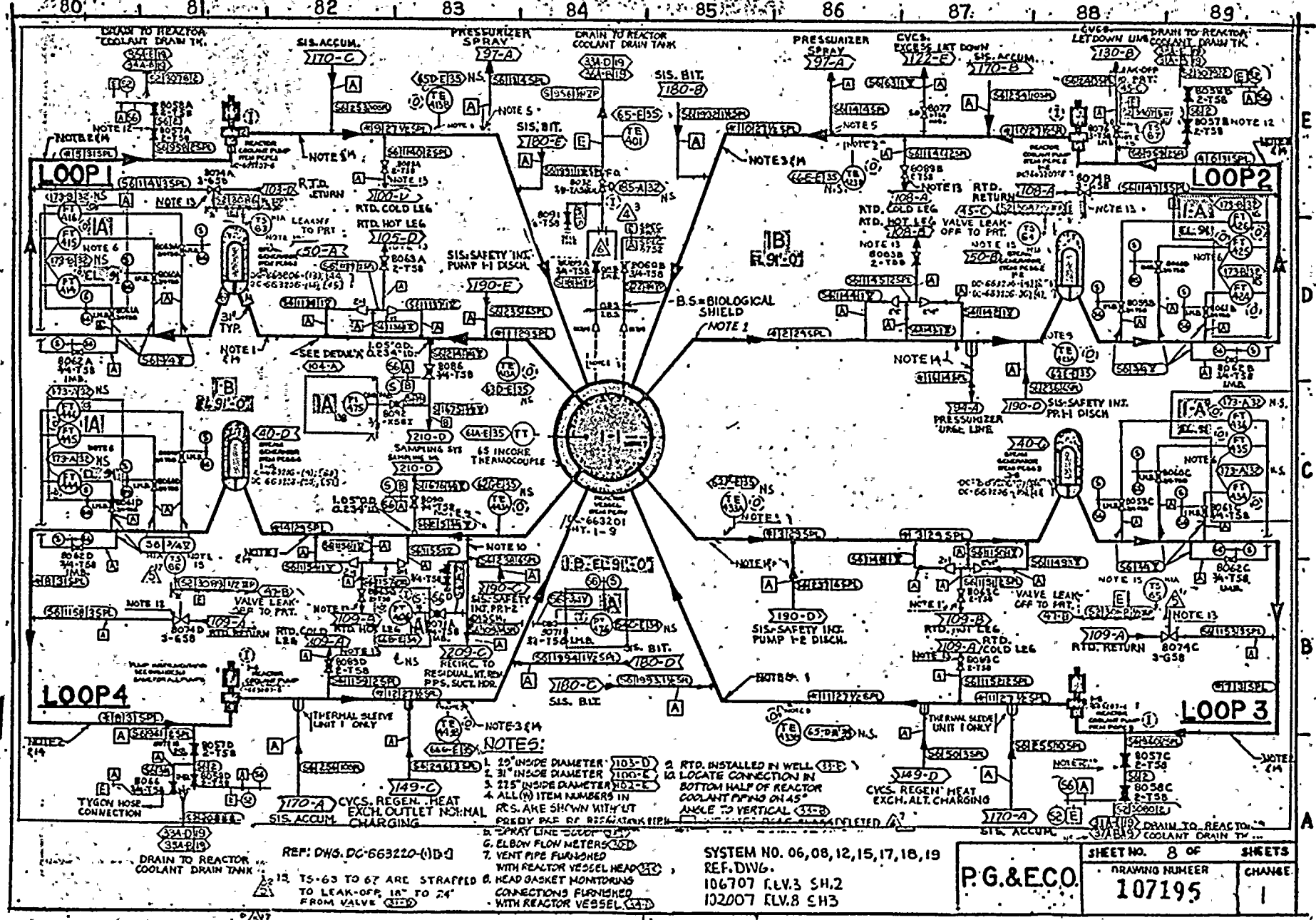

STEAM GENERATORS BLOWDOWN SYSTEM
REACTOR CONTAINMENT
FLASH TANK
1-1/2-1
BLOWDOWN SYSTEM HEAT EXCHANGERS
DC-678619-1
MAIN COND.
SYSTEM NO. 05
REF. DWG.
106704 REV. 1 SH. 18
102004 REV. 8 SH. 7
P. G. & E CO.
SHEET 6 OF SHEETS
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV. 1

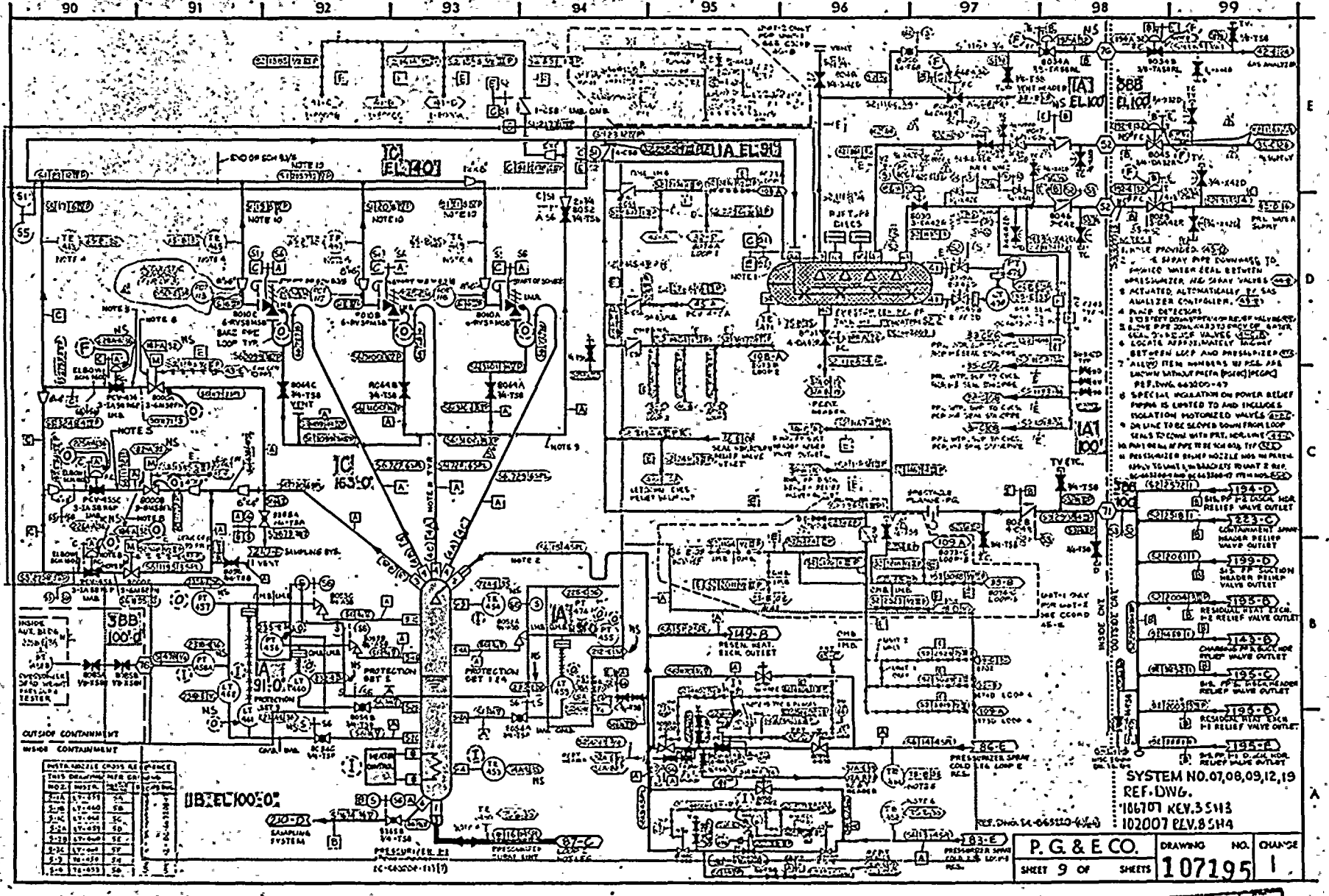


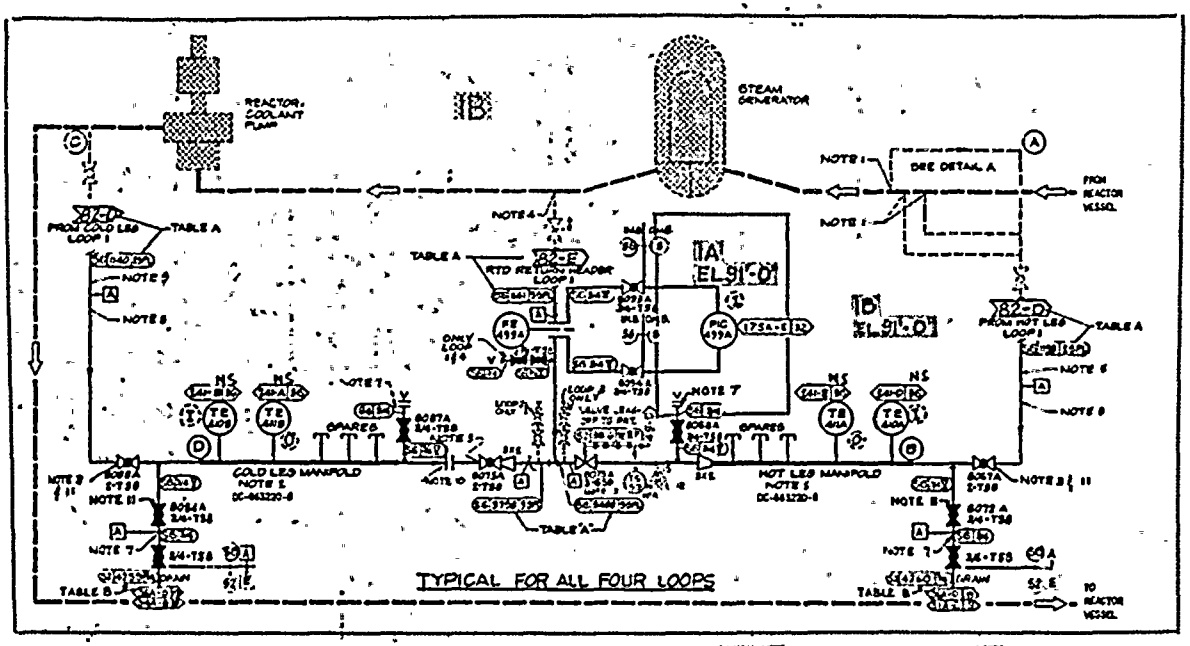
SYSTEM NO. 26
REF. DWG.
106706 REV 1 SH 4
102006 REV 7 SH 4

P. G. & E. CO.	107195	CHANGE
SHEET 7 OF SHEETS		1

35 RM INDEXED REV. 1


LOOP 1
LOOP 2
LOOP 3
LOOP 4
NOTES:
1. 29" INSIDE DIAMETER
2. 31" INSIDE DIAMETER
3. 225" INSIDE DIAMETER
4. ALL (W) ITEM NUMBERS IN RCS. ARE SHOWN WITH 'UT' PREDY PCE BY REGISTERED
5. SPRAY LINE
6. ELBOW FLOW METERS
7. VENT PIPE FURNISHED WITH REACTOR VESSEL HEAD
8. HEAD GASKET MONITORING CONNECTIONS FURNISHED WITH REACTOR VESSEL
9. RTD. INSTALLED IN WELL
10. LOCATE CONNECTION IN BOTTOM HALF OF REACTOR COOLANT PIPING ON 45° ANGLE TO VERTICAL
12. TS-63 TO 67 ARE STRAPPED TO LEAK-OFF 18" TO 24" FROM VALVE
B.S.=BIOLOGICAL SHIELD
REF: DWG. DC-663220-(1)D-1
SYSTEM NO. 06,08,12,15,17,18,19
REF. DWG.
106707 ELV.3 SH.2
102007 ELV.8 SH3
P.G.&E.CO.
SHEET NO. 8 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1
RM. INDEXED REV


90
91
92
93
94
95
96
97
98
99
SYSTEM NO.07,08,09,12,19
REF.DWG.
106701 REV.3 SH3
102007 REV.8 SH4
P. G. & E. CO.
SHEET 9 OF SHEETS
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV. 1



RTD BYPASS INSTRUMENTATION					
INSTRUMENT		LOOP 1	LOOP 2	LOOP 3	LOOP 4
HOT LEG MANIFOLD					
1	TEMPERATURE ELEMENT	TE-410A	TE-420A	TE-430A	TE-440A
2		TE-411A	TE-421A	TE-431A	TE-441A
COLD LEG MANIFOLD					
1	TEMPERATURE ELEMENT	TE-410B	TE-420B	TE-430B	TE-440B
2		TE-411B	TE-421B	TE-431B	TE-441B
BYPASS RETURN LINE					
FLOW ELEMENT		FE-408A	FE-408B	FE-408C	FE-408D
FLOW INDICATOR & ALARM REFERENCE BLOCK		FIC-408A (1PM-C13)	FIC-408B (1PM-C12)	FIC-408C (1PM-C11)	FIC-408D (1PM-C10)
		N-5.	N-5.	N-5.	N-5.
HOT LEG					
TEMPERATURE SWITCH		TS-59	TS-60	TS-61	TS-62

TABLE A				
	RTD MANIFOLD CONNECTION LINE			
	LOOP 1	LOOP 2	LOOP 3	LOOP 4
HOT LEG MANIFOLD DISCHARGE	103-C	103-C	103-C	103-C
COLD LEG MANIFOLD DISCHARGE	102-C	102-C	102-C	102-C
FROM HOT LEG LINE	82-D	87-D	87-B	82-B
FROM COLD LEG LINE	82-D	87-E	87-B	82-B
BYPASS RETURN LINE	82-E	87-E	88-B	181-B
VALVE LEAK-OFF TO PRESS RELIEF TANK	95-E	95-D	97-B	97-A

TABLE A				
	HOT LEG MANIFOLD DRAIN		COLD LEG MANIFOLD DRAIN	
LOOPS	LINE NO.	REFERENCE	LINE NO.	REFERENCE
1				
2				
3				
4				

DETAIL A

GENERAL NOTE:
PARALLEL 1 INCH PIPE PATHS SHOULD BE OF APPROX. EQUAL EQUIVALENT LENGTHS WITH FLOW PATH NOT EXCEEDING 6 PIPE PENETRATIONS SHOULD BE IN THE SAME VERTICAL PLANE.

NOTES:
1. HOT LEG BYPASS LINE SCOOPS.
2. RTD MANIFOLD-PIPE AND RTD'S SUPPLIED AS A PACKAGE MANIFOLD APPROX. 20 INCHES LONG.
3. LOCATE RTD MANIFOLD ISOLATION VALVES MAX. 14 INCHES FROM MANIFOLD.
4. LOCATE CONNECTION ON UPPER 180° OF PIPE CIRCUMFERENCE.
5. ALL BYPASS LOOP PIPING AND THE RTD MANIFOLDS SHALL HAVE REMOVABLE INSULATION UP TO LOOP ROOT VALVES.
6. TRANSFERRED TO SHEET 3, NOTE 13
7. VENT TO BE INSTALLED AT HIGH POINT AND DRAIN AT LOW POINT.
8. LENGTH OF HOT LEG 2 INCH PIPE UPSTREAM OF RTD A TO B TO BE A MAXIMUM OF 3 FEET.
9. LENGTH OF COLD LEG 2 INCH PIPE UPSTREAM OF RTD MANIFOLD C TO D TO BE MAXIMUM OF 6 FEET.
10. FLANGES ARE INSTALLED FOR INSERTION OF FLOW LIMITING ORIFICES. IF REQUIRED FOR WILL FURNISH BLANK ORIFICE PLATES TO BE DRILLED TO SIZE IF REQUIRED.
11. VALVES WITH SUFFIX A REFER TO LOOP 1
    B REFER TO LOOP 2
    C REFER TO LOOP 3
    D REFER TO LOOP 4
    100-C
12. TS-59, 60, 61, & 62 ARE STRAPPED TO LEAKOFF PIPE 18" TO 24" FROM VALVE

SYSTEM NO. 06
REF. DWG.
106707 REV. 3 SH. 4
102007 REV. 5 SH. 5

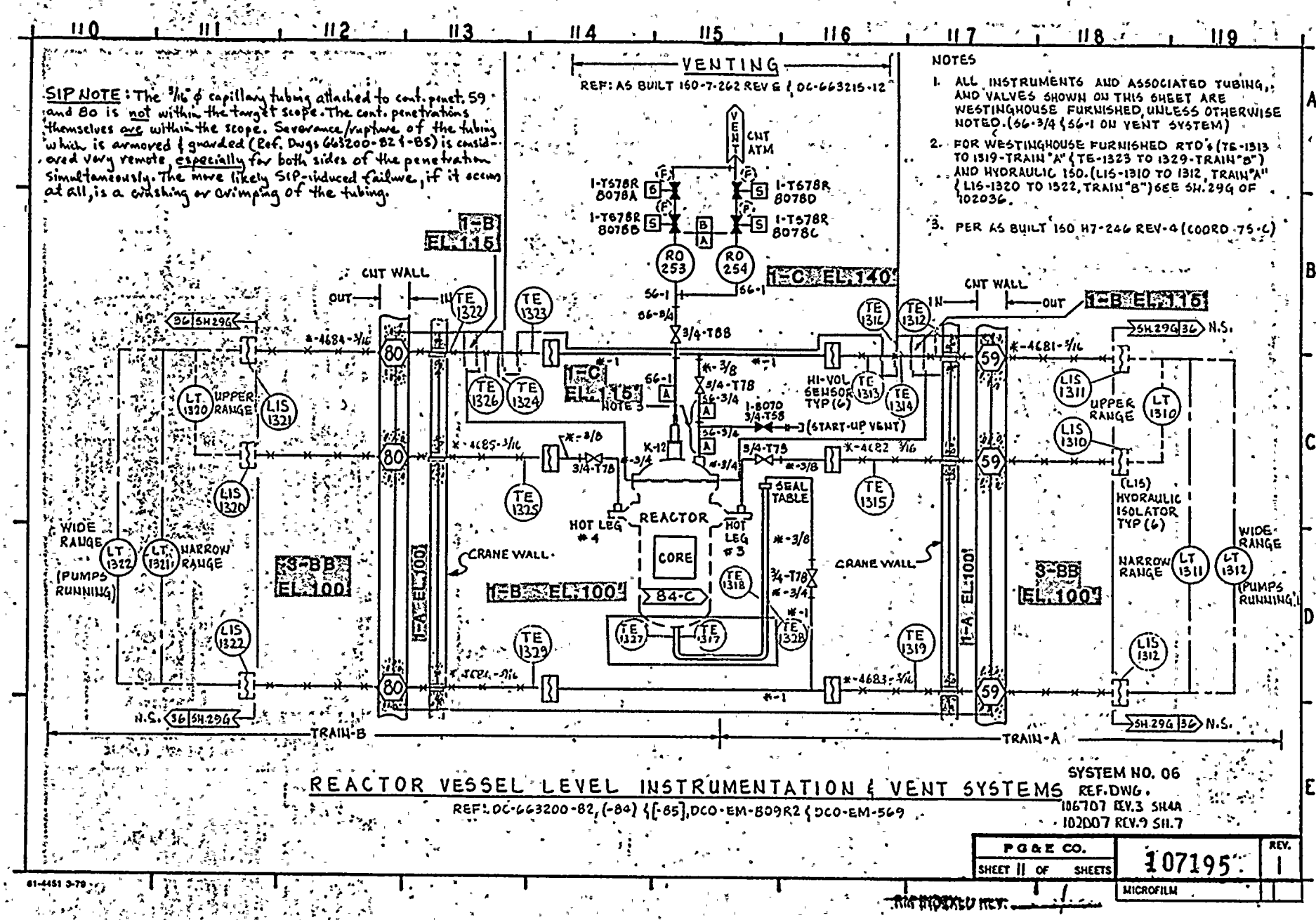
REF DWG DC-663220-7

RM INDEXED REV. 1

P. G. & E. CO.	DRAWING NO.	CHANGE
SHEET 10 OF SHEETS	107195	1

RM INDEXED REV. 1

35 [illegible]



REACTOR VESSEL LEVEL INSTRUMENTATION & VENT SYSTEMS

REF: DC-663200-82, (-84) & [-85], DCO-EM-809R2 & DCO-EM-569

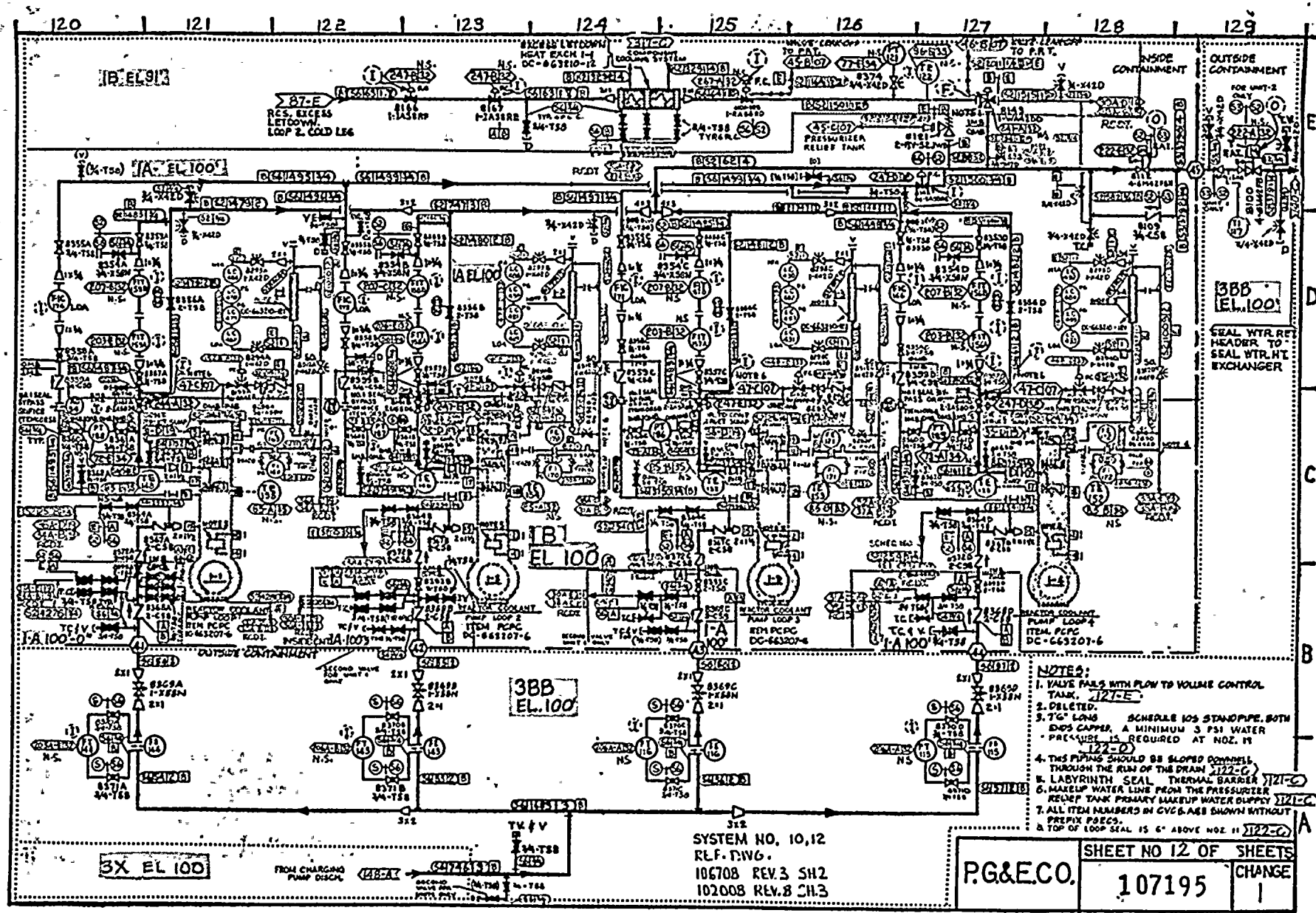
SYSTEM NO. 06

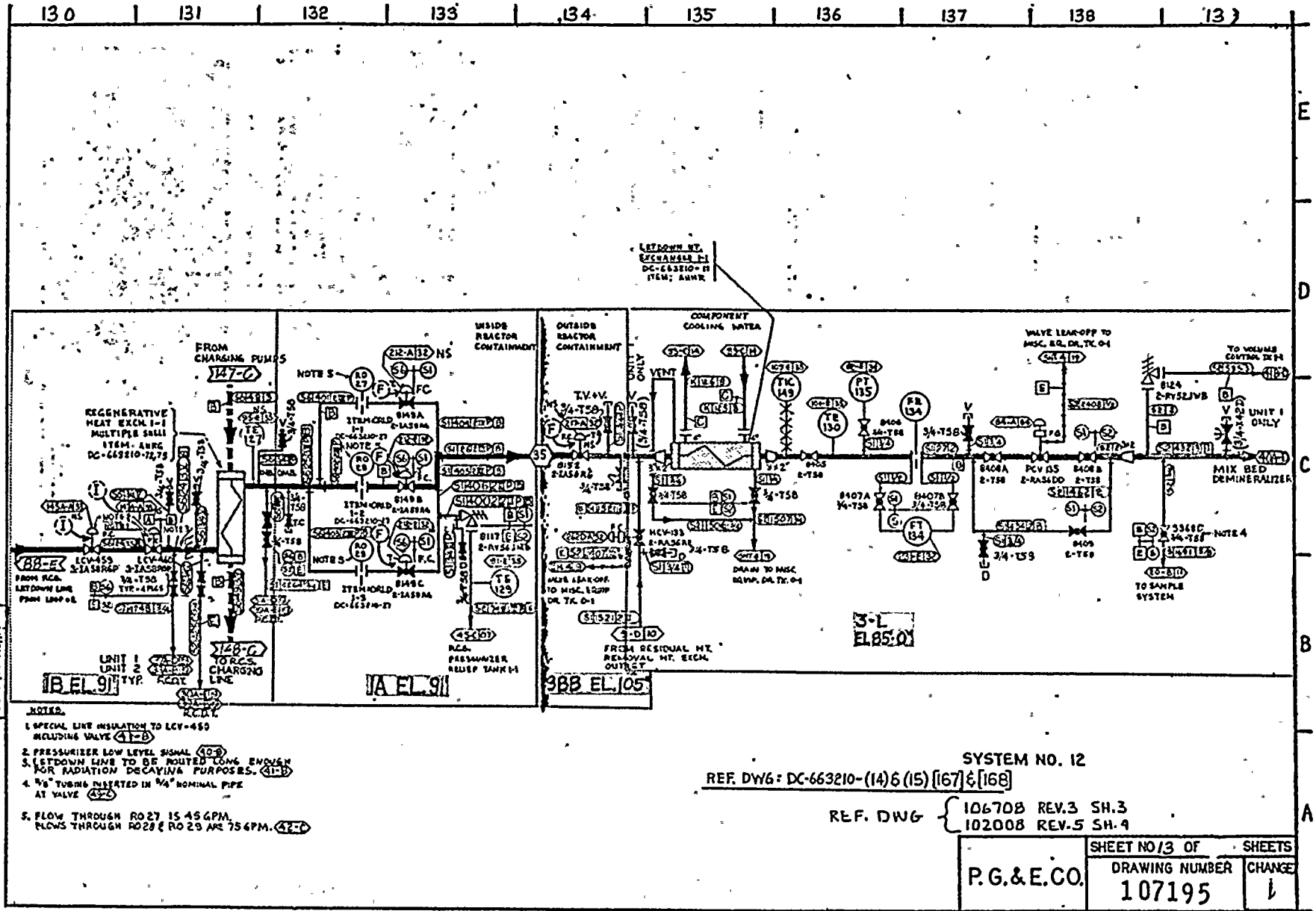
REF. DWG. 106707 REV. 3 SH. 4A
102007 REV. 9 SH. 7

PG&E CO.	107195	REV.
SHEET 11 OF SHEETS	MICROFILM	1

RIM INDEXED REV.

61-4451 3-79


120
121
122
123
124
125
126
127
128
129
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
[B EL 91']
[A EL 100']
[B EL 100']
3BB EL. 100'
3X EL 100'
SEAL WTR. RET HEADER TO SEAL WTR. HT EXCHANGER
RCDT
PRESSURIZER RELIEF TANK
REGEN HX
REGEN PCPC
DC-663207-6
SYSTEM NO. 10,12
REF. DWG.
106708 REV. 3 SH 2
102008 REV. 8 SH 3
NOTES:
1. VALVE FAILS WITH FLOW TO VOLUME CONTROL TANK. 121-E
2. DELETED.
3. 7'6" LONG SCHEDULE 105 STANDPIPE, BOTH ENDS CAPPED. A MINIMUM 3 PSI WATER PRESSURE IS REQUIRED AT NOZ. 11 122-D
4. THIS PIPING SHOULD BE SLOPED DOWNHILL THROUGH THE RUN OF THE DRAIN 122-G
5. LABYRINTH SEAL THERMAL BARRIER 121-C
6. MAKEUP WATER LINE FROM THE PRESSURIZER RELIEF TANK PRIMARY MAKEUP WATER SUPPLY 121-C
7. ALL ITEM NUMBERS IN CVCS & ABB SHOWN WITHOUT PREFIX 8 SECS.
8. TOP OF LOOP SEAL IS 6" ABOVE NOZ. 11 122-C
P.G.&E.CO.
SHEET NO 12 OF SHEETS
107195
CHANGE 1
RM INDEXED REV. 1



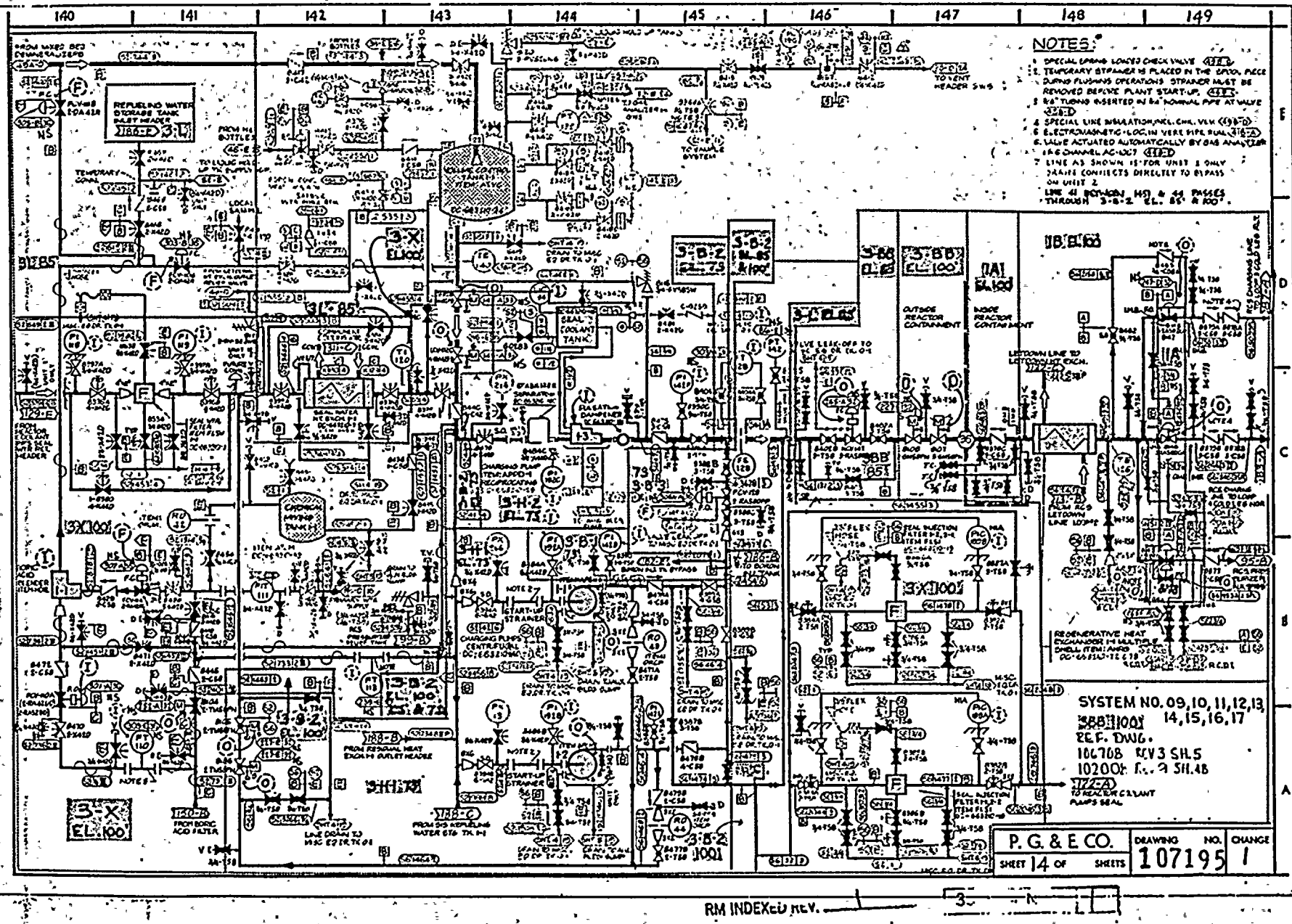
SYSTEM NO. 12

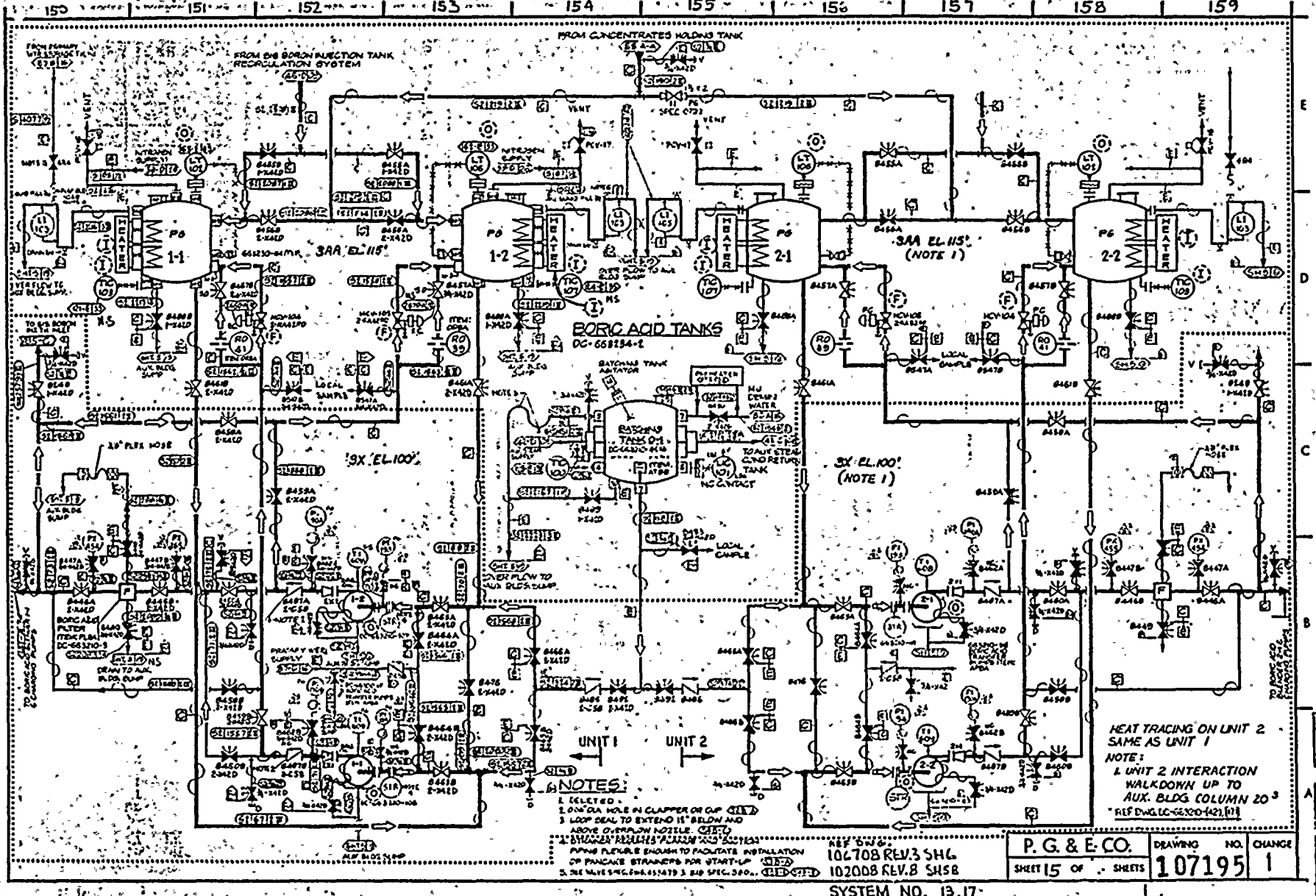
REF. DWG: DC-663210-(14) & (15) [167] & [168]

REF. DWG { 106708 REV. 3 SH. 3
102008 REV. 5 SH. 9

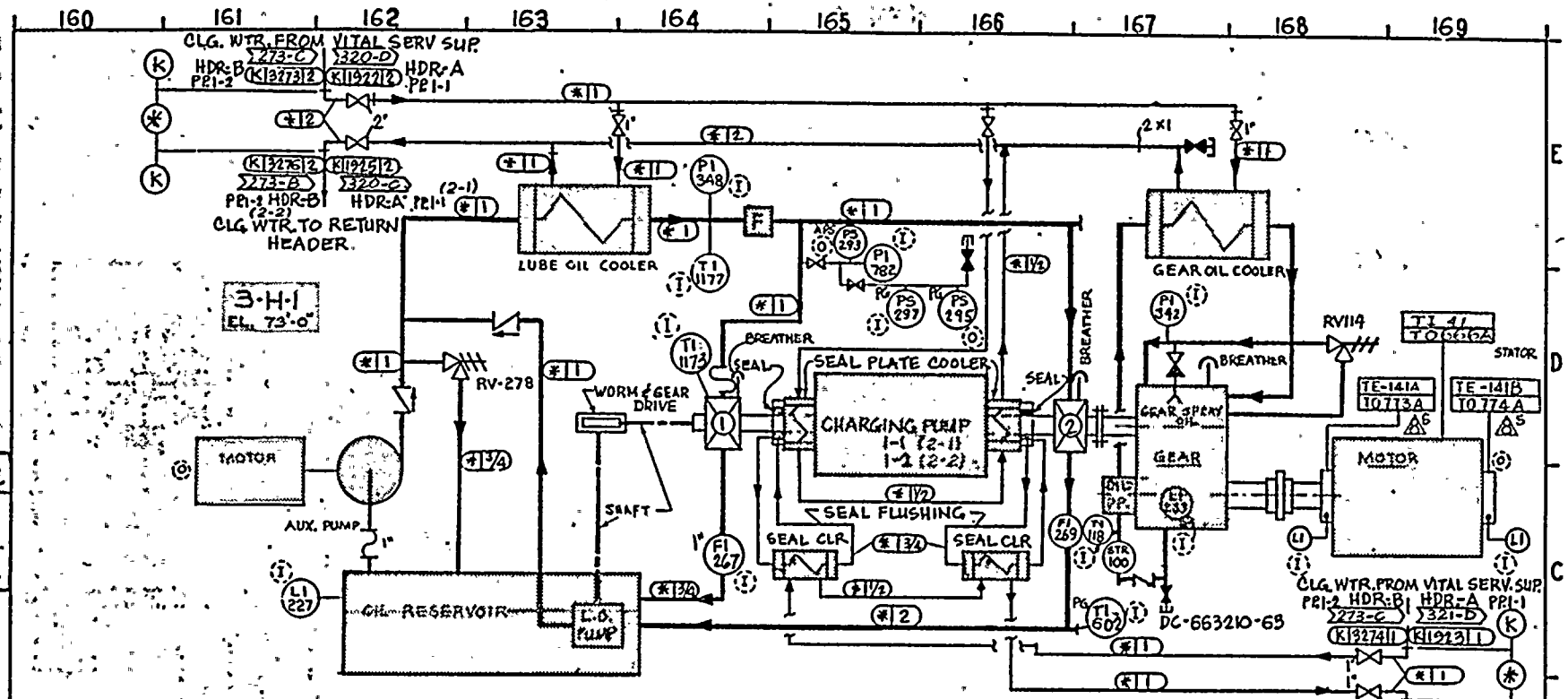
P.G.&E.CO.	SHEET NO 13 OF SHEETS	CHANGE
	DRAWING NUMBER 107195	1

RM INDEXED REV. 1 35 M/M Nat.


140
141
142
143
144
145
146
147
148
149
NOTES:
REFUELING WATER STORAGE TANK
SYSTEM NO. 09,10,11,12,13, 14,15,16,17
REF. DWG.
107195 SHEET 14 OF SHEETS
P. G. & E. CO.
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV.


150
151
152
153
154
155
156
157
158
159
FROM CONCENTRATES HOLDING TANK
FROM RHR BORON INJECTION TANK RECIRCULATION SYSTEM
VENT
PG 1-1
PG 1-2
PG 2-1
PG 2-2
HEATER
3AA EL 115'
3AA EL 115' (NOTE 1)
BORIC ACID TANKS
DC-668284-2
9X EL 100'
3X EL 100' (NOTE 1)
UNIT 1
UNIT 2
HEAT TRACING ON UNIT 2 SAME AS UNIT 1
NOTE:
1. UNIT 2 INTERACTION WALKDOWN UP TO AUX. BLDG. COLUMN 20
NOTES:
1. DELETED.
2. 0.06" DIA HOLE IN CLAPPER OR CUP
3. LOOP SEAL TO EXTEND 12" BELOW AND ABOVE O-SPRAYON NOZZLE
4. STRAINER REQUIRES MINIMUM SUCTION PIPING FLEXIBLE ENOUGH TO FACILITATE INSTALLATION OF PANCAKE STRAINERS FOR START-UP
5. SEE VALVE SPEC. FOR 65-1479 3 AND SPEC. 360...
REF DWG.
107708 REV.3 SH6
102008 REV.8 SH58
P. G. & E. CO.
SHEET 15 OF . SHEETS
DRAWING NO. 107195
CHANGE 1
SYSTEM NO. 13,17
RM INDEXED REV.

RM INDEXED REV /



CENTRIFUGAL CHARGING PUMPS

LUBE OIL, GEAR OIL, AND SEAL FLUSH & CLR. PIPING

CHARGING PUMP	INSTRUMENT ON LUBE OIL SYSTEM										INSTRUMENT ON GEAR OIL SYSTEM					
	OIL RESEV. LEVEL	RELIEF VALVE AFTER PUMP	LUBE OIL COOLER OUT	PRES. BEFORE FILTER	PRES. AFTER FILTER	AUTO PUMP START.	THRUST BRG. IND. (1)	THRUST BRG. OUT (1)	RAD BRG. OUT (2)	LUBE OIL COOLER WTR SUPPLY. CROSS REF. CO-ORD SCHEM	OIL RESEV LEVEL	OIL RESEV TEMP.	OIL PUMP DISCH STR	PRES. AFTER COOLER	RELIEF VALVE AFTER COOLER	GEAR COOLER WTR SUPPLY CROSS REF. CO-ORD. SCHEM
	LI	RV	TI	PI	PI	PS	TI	FI	FI		LI	TI	STR	PI	RV	
1-1 (2-1)	227	278	1177	348	782	293	1173	267	269	320-C	233	118	100	342	114	320-C
1-2 (2-2)	228	279	1178	349	783	294	1174	268	270	273-C	234	119	101	343	115	274-C

	INBD. MOTOR BRG.	OUTBD. MOTOR BRG.	PUMP INBD. BRG. OIL	STATOR WINDING
1-1 (2-1)	TE 141A/T0773A	TE 141B/T0774A	TI-602	TI 41/T0666A
1-2 (2-1)	TE 141C/T0775A	TE 141D/T0776A	TI-603	TI 42/T0667A

CHARGING PP.	MTR. INTERLOCK	L.P. ALARM	
1-1 (2-1)	PS-295	PS-297	TO BE PURCHASED BY P.G.&E. & FIELD LOCATED
1-2 (2-2)	PS-296	PS-298	
SET POINTS	CLOSE 9 PSI INCR OPEN 7 PSI DECR	CLOSE 7 PSI DECR OPEN 10 PSI INCR	

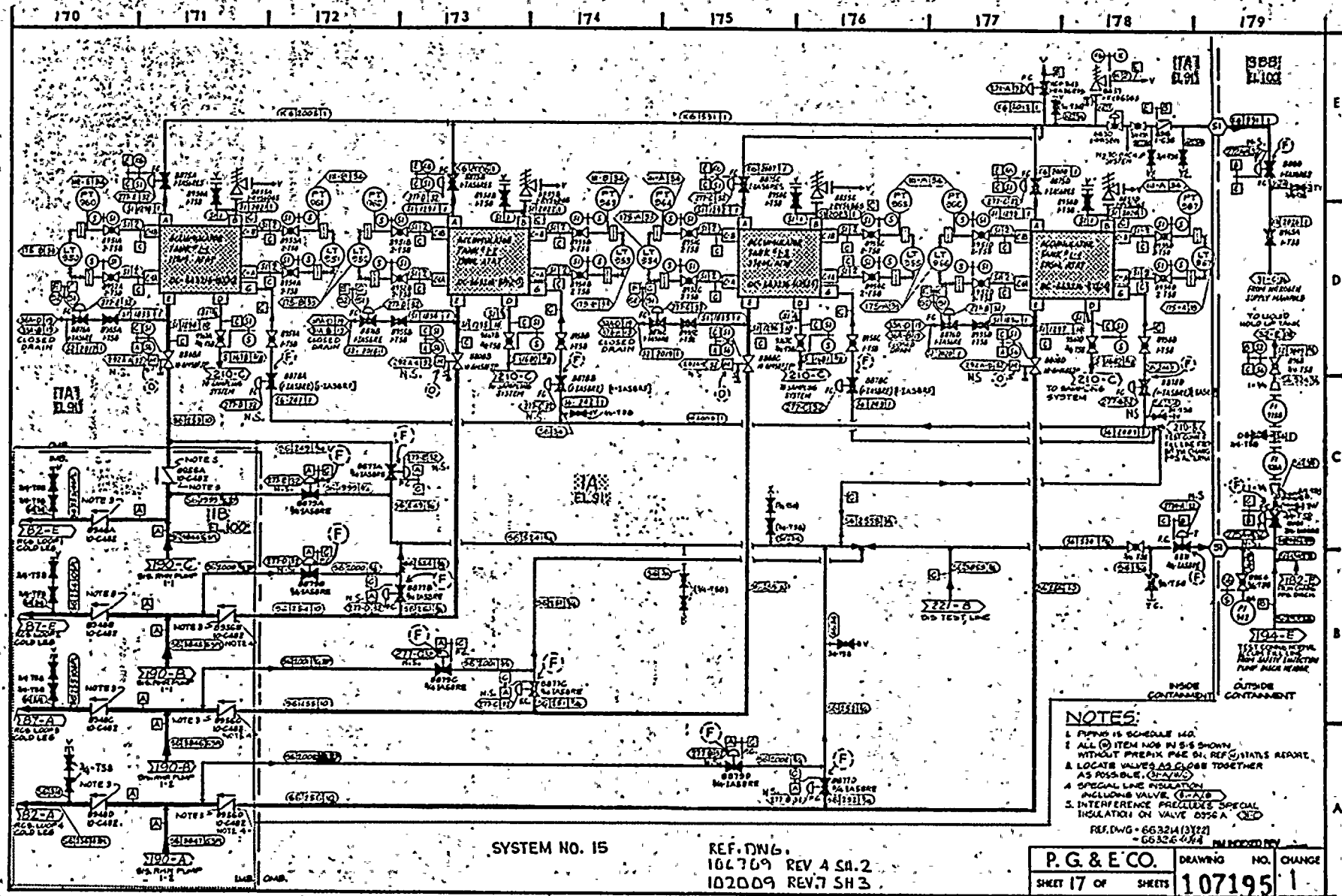
SYSTEM NO. 11
REF. DWG.
106708 REV. 3 SH. 12
102008 REV. 8 SH. 8

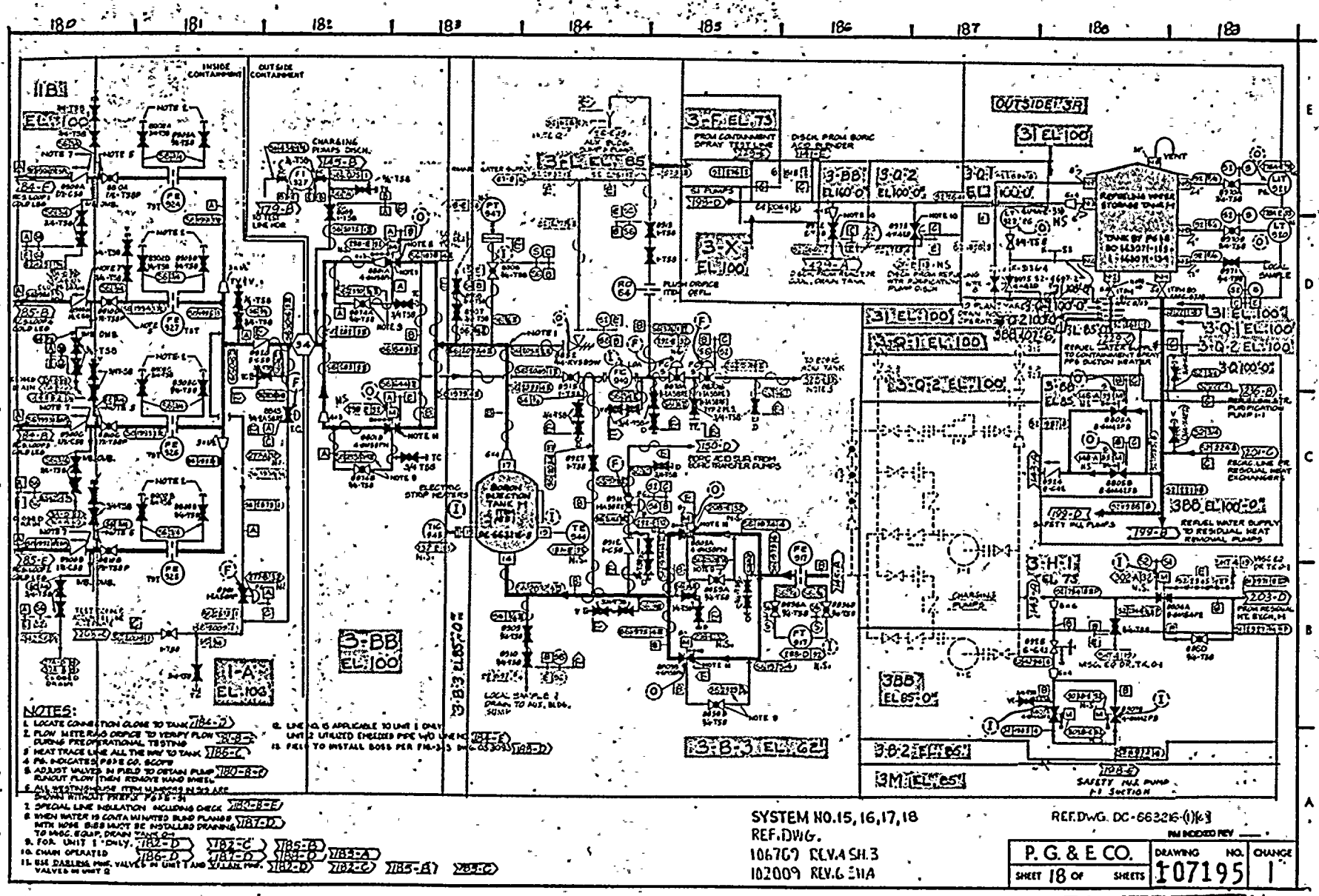
P.G.&E.CO.

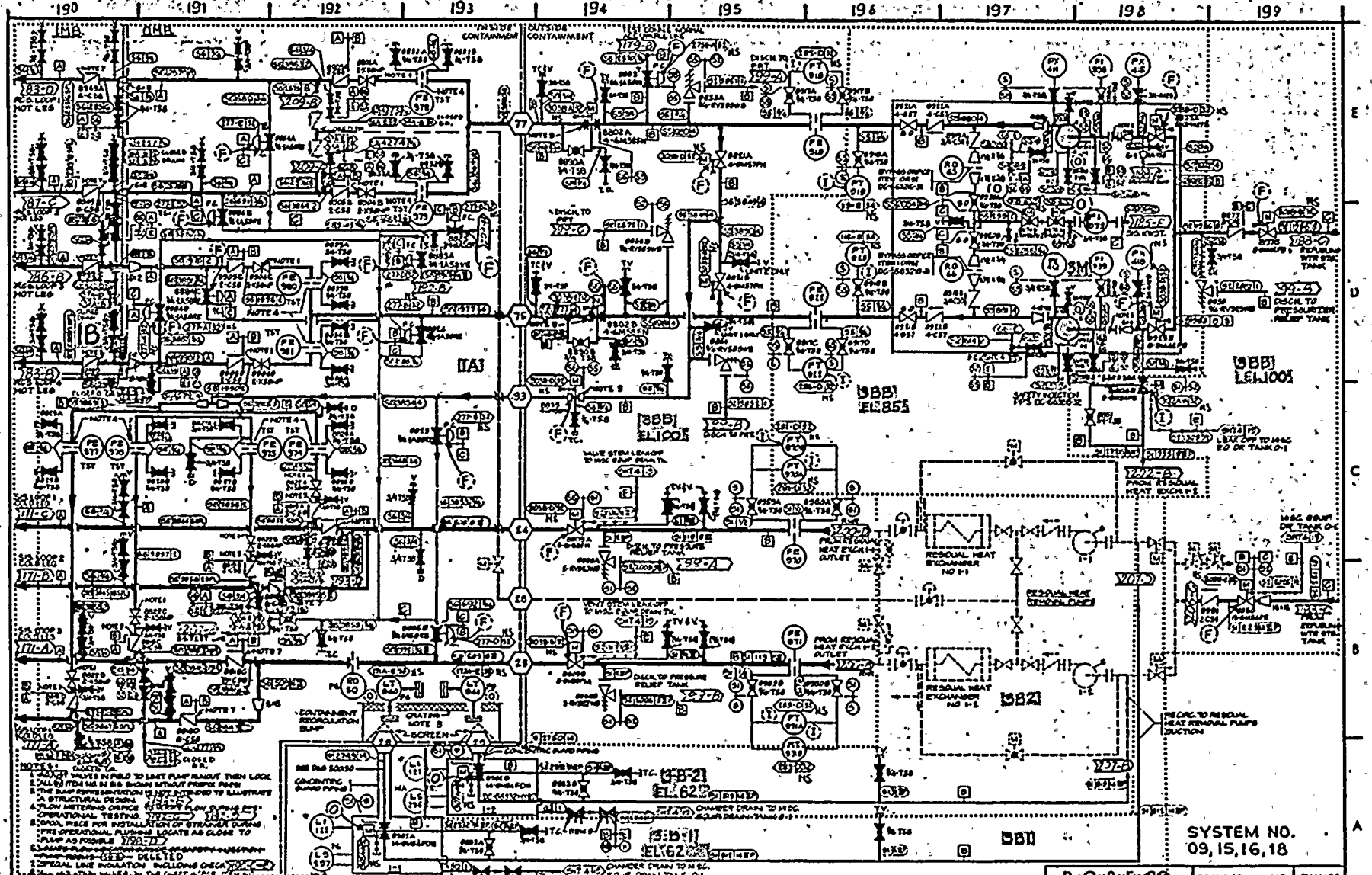
SHEET NO. 16 OF SHEETS

DRAWING NUMBER 107195

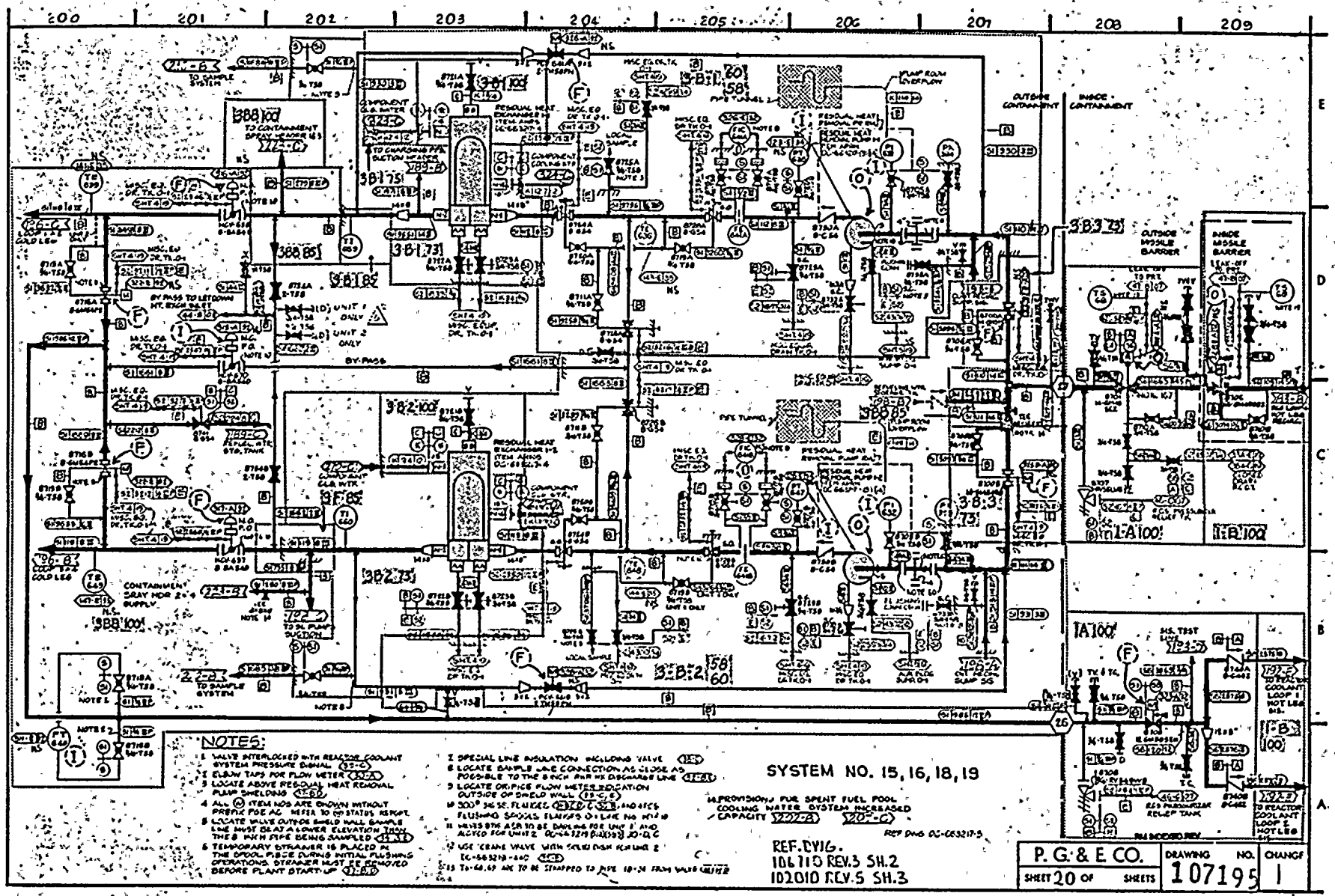
CHANGE 1

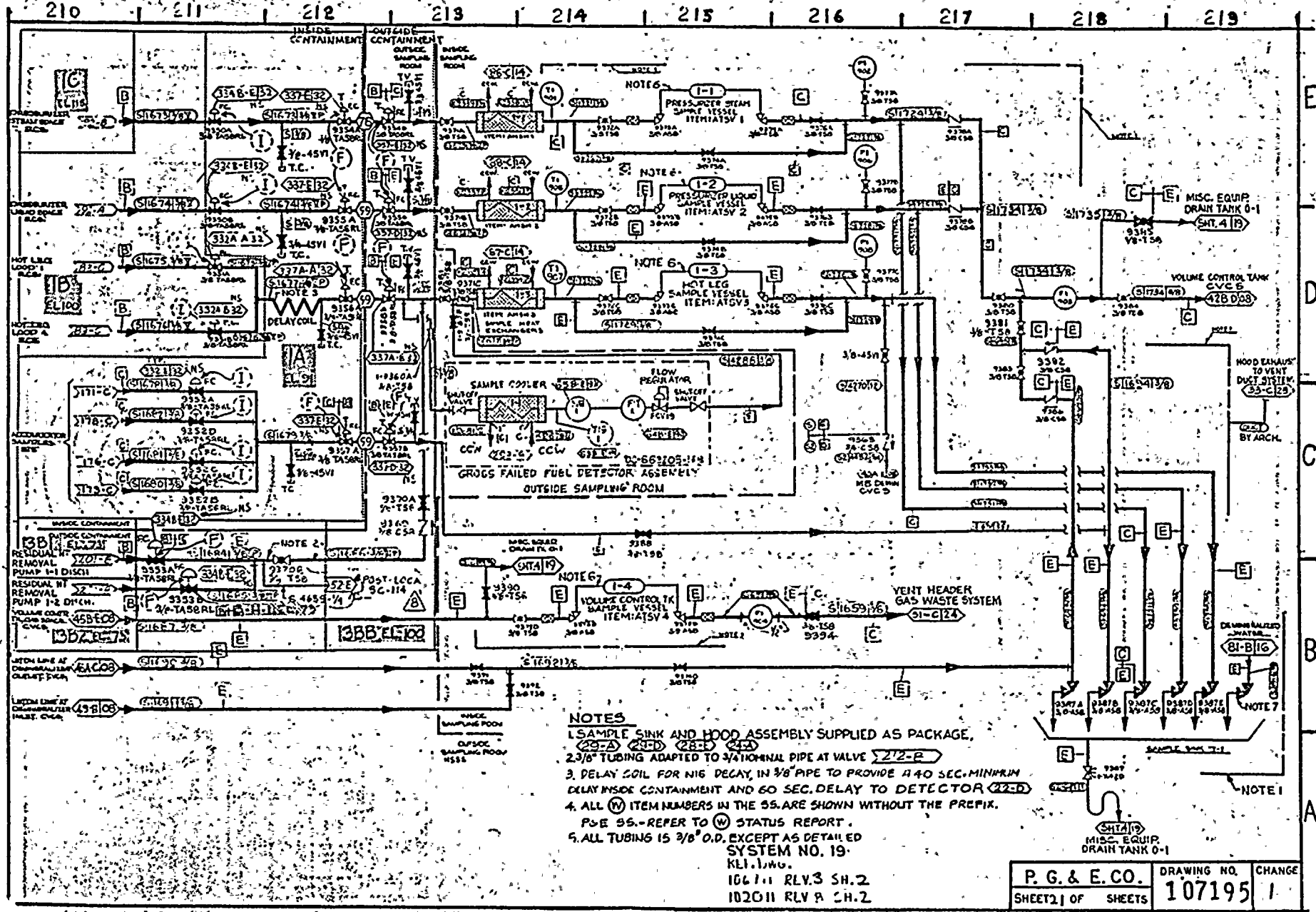

170
171
172
173
174
175
176
177
178
179
SYSTEM NO. 15
REF. DWG.
104709 REV 4 SH.2
102009 REV.7 SH 3.
NOTES:
1. PIPING IS SCHEDULE 140
2. ALL (M) ITEM NOS IN S-S SHOWN WITHOUT PREFIX P&E 51; REF (S) STATUS REQUIRE
3. LOCATE VALVES AS CLOSE TOGETHER AS POSSIBLE.
4. SPECIAL LINE INSULATION INCLUDING VALVE.
5. INTERFERENCE PRECLUDES SPECIAL INSULATION ON VALVE 8956 A
REF. DWG - 66324 (3)(22)
- 66326 (4)(4)
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
P. G. & E. CO.
SHEET 17 OF SHEETS
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV. 1


INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
3-BB EL 100
1-A EL 103
3-F EL 73
3-F EL 85
3-X EL 100
3-B-3 EL 62'
OUTSIDE 3R
3 EL 100
3-Q-2 EL 100
3-Q-1 EL 100
3BB EL 100-0"
3BB EL 85'-0"
3-H-1 EL 75
3M EL 85'
3-Q-2 EL 85'
NOTES:
1. LOCATE CONNECTION CLOSE TO TANK
2. FLOW METER AND ORIFICE TO VERIFY FLOW DURING PREOPERATIONAL TESTING
3. HEAT TRACE LINE ALL THE WAY TO TANK
4. P&I INDICATES P&ID CO. SCOPE
5. ADJUST VALVES IN FIELD TO OBTAIN PUMP RUNOUT FLOW THEN REMOVE HAND WHEEL
6. ALL WESTINGHOUSE ITEM NUMBERS IN 300 ARE SHOWN WITHOUT PREFIX P&ID-31
7. SPECIAL LINE INSULATION INCLUDING CHECK
8. WHEN WATER IS CONTAMINATED BLIND FLANGE WITH HOSE BIBB MUST BE INSTALLED DRAINING TO WMOG EQUIP. DRAIN TANK OR
9. FOR UNIT 1 ONLY.
10. CHAIN OPERATED
11. USE DARLING PNE. VALVES IN UNIT 1 AND VILLAR PNE. VALVES IN UNIT 2
12. LINE NO. IS APPLICABLE TO UNIT 1 ONLY UNIT 2 UTILIZES ENCLOSED PIPE W/O LINE NO.
13. FIELD TO INSTALL BOSS PER FM-3-5
SYSTEM NO. 15, 16, 17, 18
REF. DWG.
106709 REV. 4 SH. 3
102009 REV. 6 SH. 4
REF. DWG. DC-663216-(1)(3)
P. G. & E. CO.
SHEET 18 OF SHEETS
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV. 1



RM INDEXED REV. 1 3 A


200
201
202
203
204
205
206
207
208
209
NOTES:
SYSTEM NO. 15, 16, 18, 19
REF. DWG.
106710 REV.3 SH.2
102010 REV.5 SH.3
P. G. & E. CO.
DRAWING NO. 107195
SHEET 20 OF SHEETS
CHANGE 1
RM INDEXED REV.



NOTES

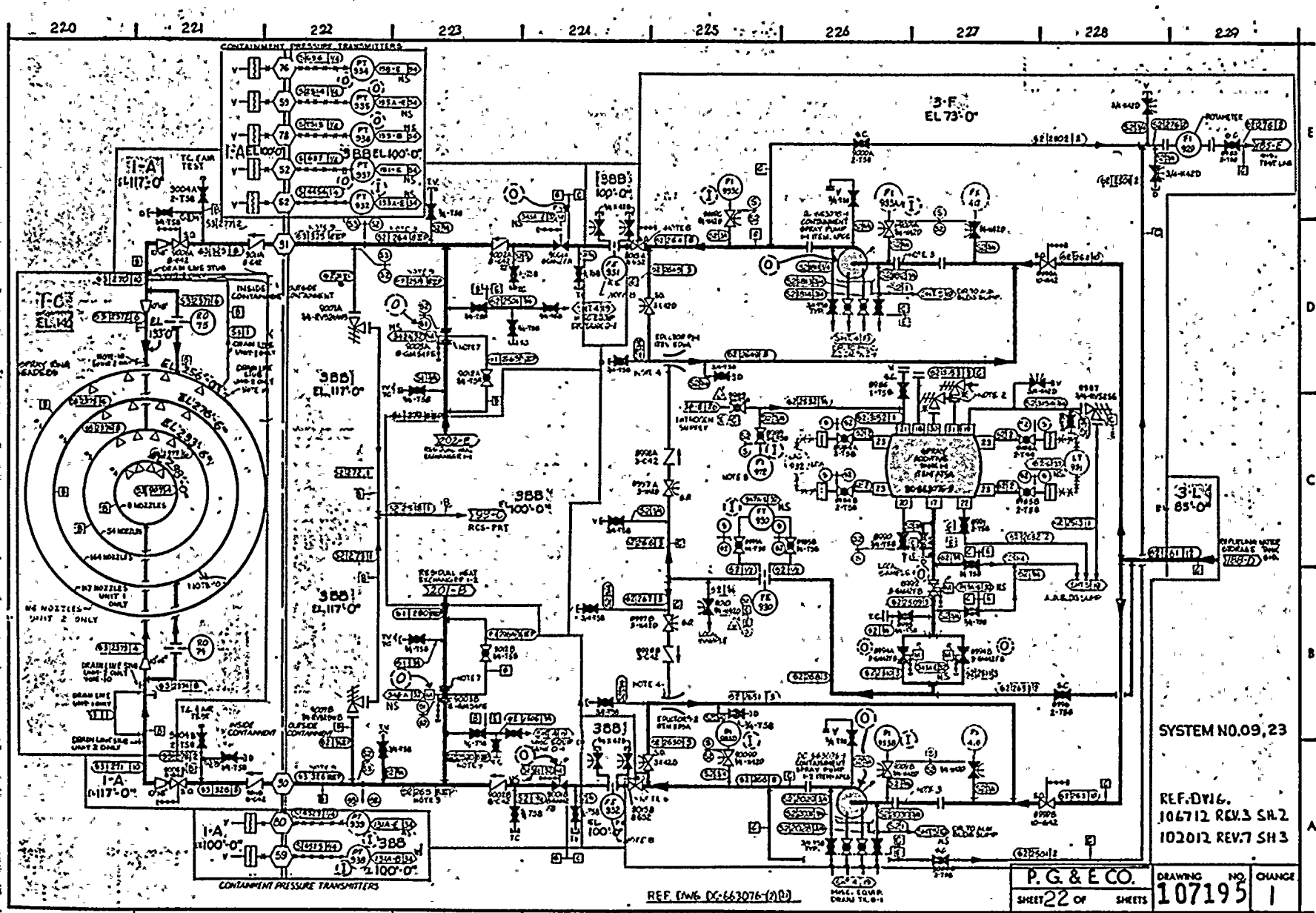
1. SAMPLE SINK AND HOOD ASSEMBLY SUPPLIED AS PACKAGE, 20-A 21-D 28-D 45A
2. 3/8" TUBING ADAPTED TO 3/4 NOMINAL PIPE AT VALVE 272-B
3. DELAY COIL FOR N16 DECAY, IN 3/8" PIPE TO PROVIDE A 40 SEC. MINIMUM DELAY INSIDE CONTAINMENT AND 60 SEC. DELAY TO DETECTOR 22-D
4. ALL (W) ITEM NUMBERS IN THE 33. ARE SHOWN WITHOUT THE PREFIX. P&E 33.- REFER TO (W) STATUS REPORT.
5. ALL TUBING IS 3/8" O.D. EXCEPT AS DETAILED

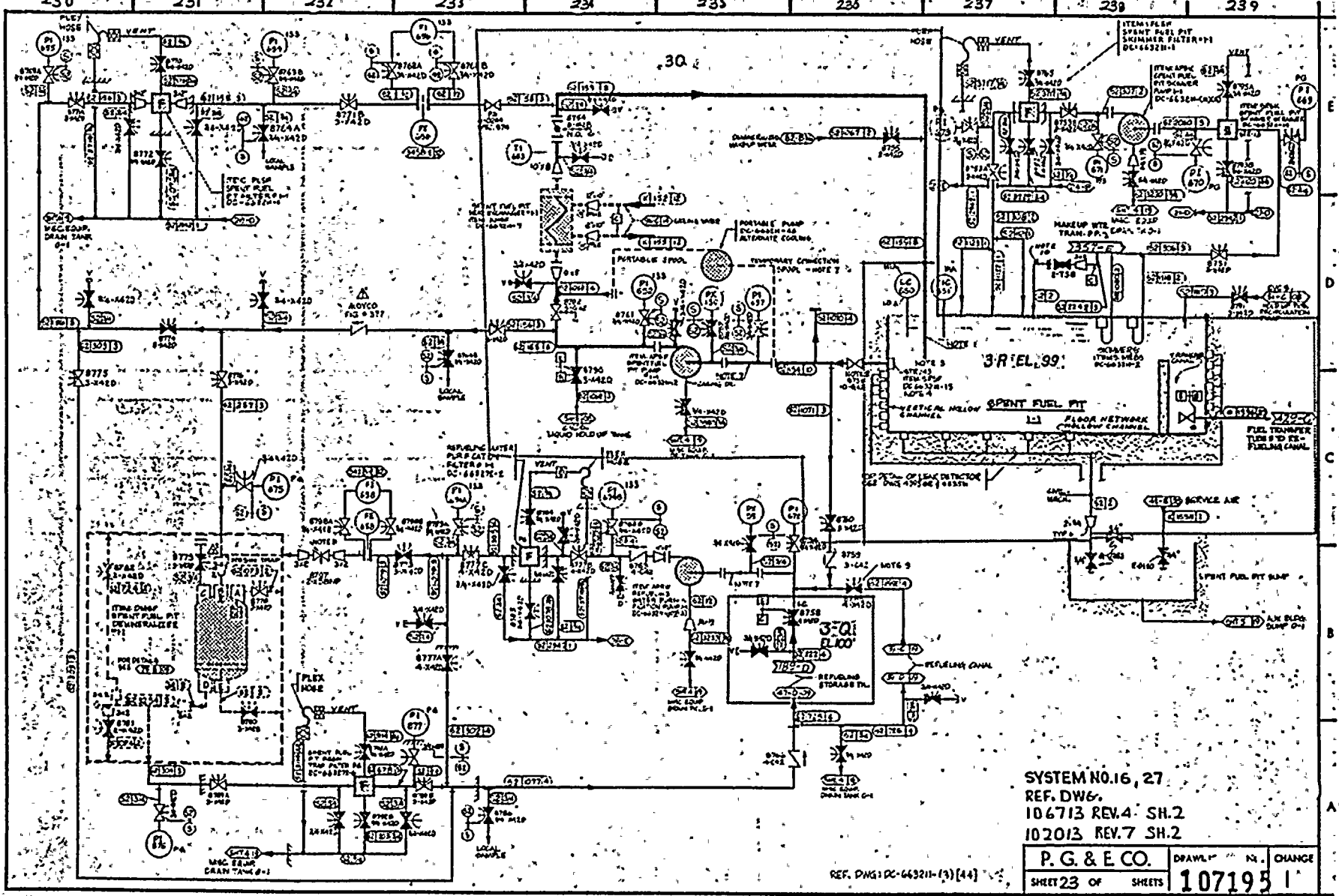
SYSTEM NO. 19.
KLI.1MG.
106711 RLV.3 SH.2
102011 RLV.8 SH.2

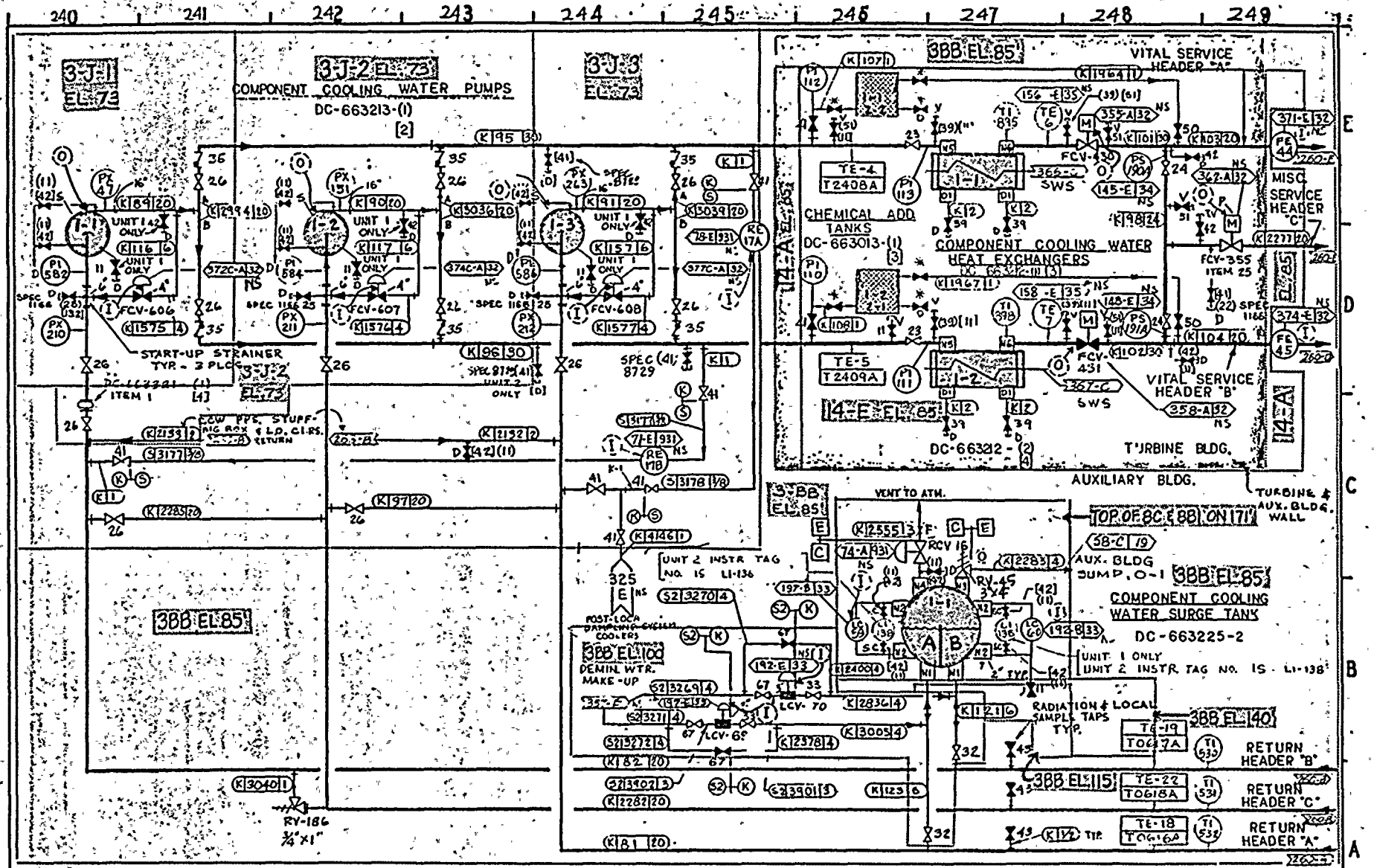
P. G. & E. CO.	DRAWING NO.	CHANGE
SHEET 21 OF SHEETS	107195	1

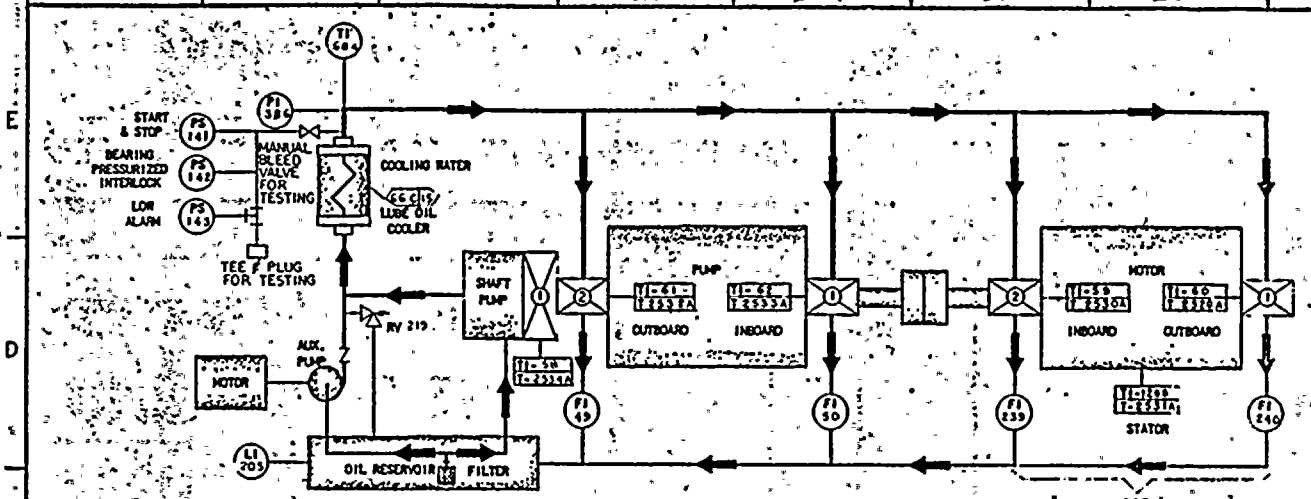
RM INDEXED REV. 1

3


220
221
222
223
224
225
226
227
228
229
CONTAINMENT PRESSURE TRANSMITTERS
3-F
EL 73'-0"
3-E
EL 85'-0"
388
EL 100'-0"
388
EL 117'-0"
1-A
EL 117'-0"
T-C
EL 133'-0"
RCS-PRT
RESIDUAL HEAT EXCHANGER
CONTAINMENT PRESSURE TRANSMITTERS
REF. DWG. DC-663076-(1)(2)
SYSTEM NO.09,23
REF. DWG.
106712 REV.3 SH.2
102012 REV.7 SH.3
P. G. & E. CO.
SHEET 22 OF SHEETS
DRAWING NO. 107195
CHANGE 1
RM INDEXED REV.


230
231
232
233
234
235
236
237
238
239
E
D
C
B
A
SPENT FUEL PIT
SYSTEM NO.16, 27
REF. DWG.
106713 REV.4 SH.2
102013 REV.7 SH.2
P. G. & E. CO.
SHEET 23 OF SHEETS
DRAWING NO.
107195
CHANGE
REF. DWG: DC-663211-(3)[44]


240
241
242
243
244
245
246
247
248
249
3-J-1 EL. 73
3-J-2 EL. 73
COMPONENT COOLING WATER PUMPS
DC-663213-(1) [2]
3-J-3 EL. 73
3BB EL. 85
VITAL SERVICE HEADER "A"
MISC. SERVICE HEADER "C"
CHEMICAL ADD TANKS
DC-663013-(1) [3]
COMPONENT COOLING WATER HEAT EXCHANGERS
SWS
VITAL SERVICE HEADER "B"
TURBINE BLDG.
AUXILIARY BLDG.
TURBINE & AUX. BLDG. WALL
START-UP STRAINER TYR - 3 PLCS
FCV-606
FCV-607
FCV-608
FCV-355
FCV-431
VENT TO ATM.
TOP OF BC-E 88 ON 17'
AUX. BLDG SUMP, O-1
COMPONENT COOLING WATER SURGE TANK
DC-663225-2
UNIT 1 ONLY
UNIT 2 INSTR TAG NO. IS LI-138
UNIT 2 INSTR TAG NO. IS LI-136
DEMIN WTR. MAKE-UP
LCV-70
LCV-69
RADIATION & LOCAL SAMPLE TAPS TYP.
3BB EL. 140
3BB EL. 115
RETURN HEADER "B"
RETURN HEADER "C"
RETURN HEADER "A"
RY-186 3/4"x1"
SYSTEM NO. 20
P.G.&E.CO.
SHEET NO. 24 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1
RM INDEXED REV. 3



INSTRUMENT NUMBERS																										
		PUMPING SYSTEM							DISTRIBUTION & RETURN SYSTEM																	
									PUMP												MOTOR					
									BEARING																	
									BRG. METAL			BRG. OIL RETURN							BRG. METAL			STATOR				
									1 THRUST	2 OUTBOARD	1 INBOARD	2 OUTBRD.	1 INBOARD	2	1	OUTBRD.			2 INBOARD	1 OUTBRD.						
LUBE OIL PUMP SYSTEM		LUBE OIL COOLER WATER SUPPLY CROSS REF. COOR-SCHEM. 1020 XX	OIL RESEV. LEVEL	AUXILIARY LUBE OIL PUMP			HEADER			TEMP.	TEMP. INDIC. COMPUTER POINT		TIXXXX TXXXXA	FI				TEMP. INDIC. COMPUTER POINT		TIXXXX TXXXXA					
				RELIEF VALVE	START & STOP	INTRL. PRESS-URIZE BRGS. BEFORE ROLLING	PRESSURE LO ALARM	PRESSURE INDIC.		XCH'GR OUT																
			LI	RV	PS	PS	PS	PI		TI																
COMPONENT COOLING WATER DC 663213-4	1-1	53A-C-14	201	233	322	244	321	859	1256		1257/0640	1258/0639	1259/0638	245	246	SELF-LUBRICATED BEARING SEE NOTE NO 2			1268/0637	1268/0636	1024/0641					
	1-2	54A-C-14	202	234	324	245	323	860	1260		1261/0646	1262/0645	1263/0644	247	248				1271/0643	1270/0642	1025/0647					
	1-3	57A-C-14	203	235	326	246	325	861	1264		1265/0652	1266/0651	1267/0650	249	250				1273/0649	1272/0648	1026/0653					
HEATER 2 DRAIN TANK DC 663043-1		55-C-15	204	218	138	139	140	385	683		NONE	57/2433	56/2434	47	45				55/2431	54/2430	1232/2432					
CONDENSATE BOOSTER DC 663046-16	1-1	66-C-15	205	219	141	142	143	386	684		58/2534	61/2532	62/2533	49	50	239	240		59/2530	60/2529	1238/2531					
	1-2	67-C-15	206	220	144	145	146	387	685		63/2540	66/2538	67/2539	51	52	241	242		64/2536	65/2535	1244/2537					
	1-3	69-C-15	207	221	147	148	149	388	686		64/2546	71/2544	72/2545	53	54	243	244		69/2542	70/2541	1250/2543					

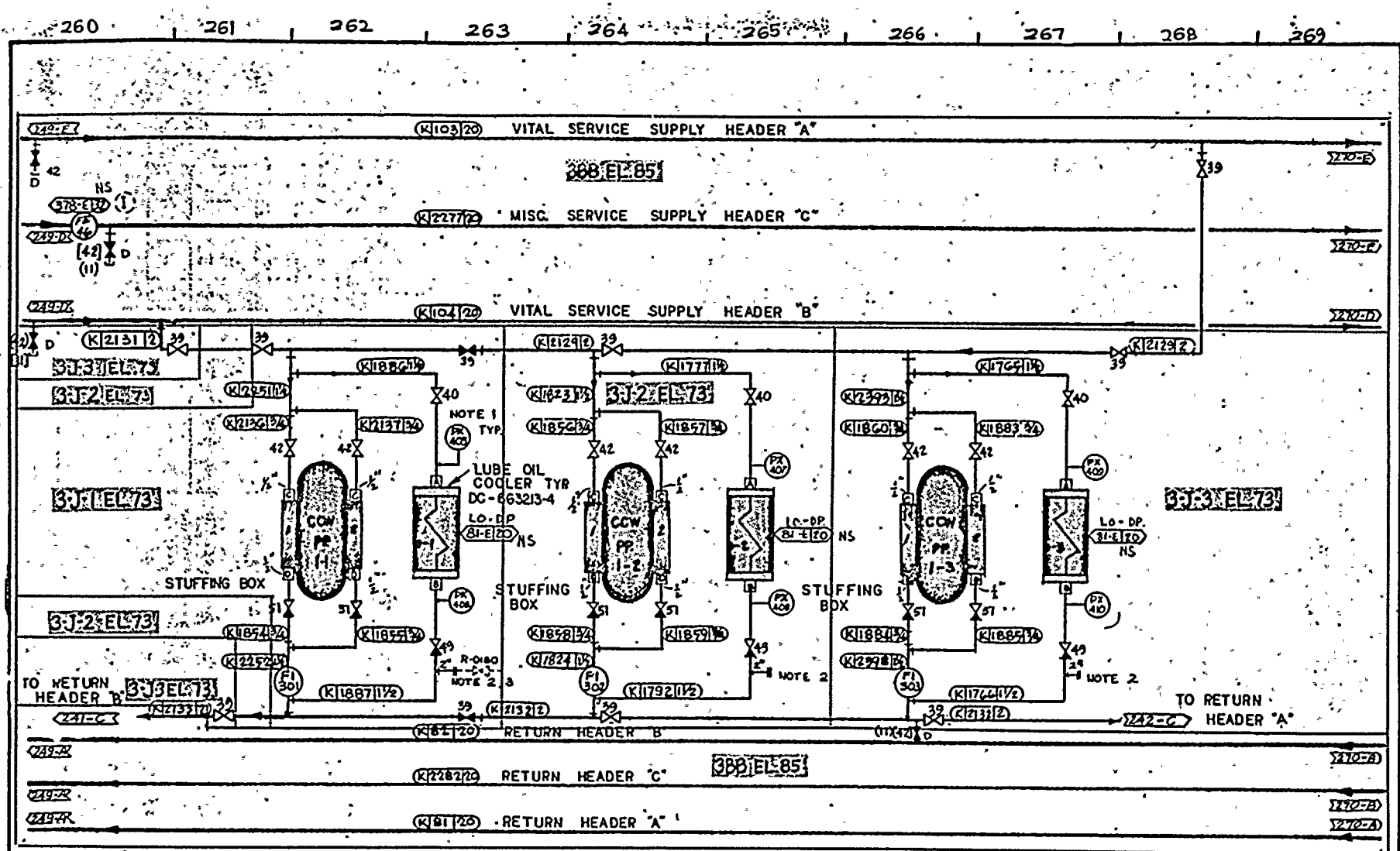
CONDENSATE BOOSTER PUMP 1-1

NOTES 1. ALL INSTRUMENTS ARE FURNISHED BY THE EQUIPMENT VENDOR.
2. COMPONENT COOLING WATER PUMP MOTORS AND HEATER 2 DRAIN TANK PUMP MOTOR ARE EQUIPPED WITH BEARING AUTOMATIC OILERS.

SYSTEM NO. 20
REFERENCE DWG. 102020 REV 8 SH 8

P. G. & E. CO.	DRAWING NO.	CHANGE
SHEET 25 OF SHEETS	107195	

RM INDEXED REV. 1 3



NOTES:
1. PXS TO BE LOCATED WITHIN 1' OF HEAT EXCHANGER 53A-D
2. LOCATE FLANGE FOR EASY CONNECTION OF TEMPORARY VALVE AND PRESSURE TEST GAGE. REPLACE WITH BLIND FLANGE AFTER TEST 53A-B
3. VALVE IS NON-CLASS I. 2" BALL VALVE WITH 2" FLANGE AT ONE END AND 2" MALE NIPPLE AT OTHER END. ONLY ONE VALVE WILL BE USED AT SEVERAL TEST POINTS. REMOVE VALVE PRIOR TO OPERATION. SYS. IS CLASS I 53A-B

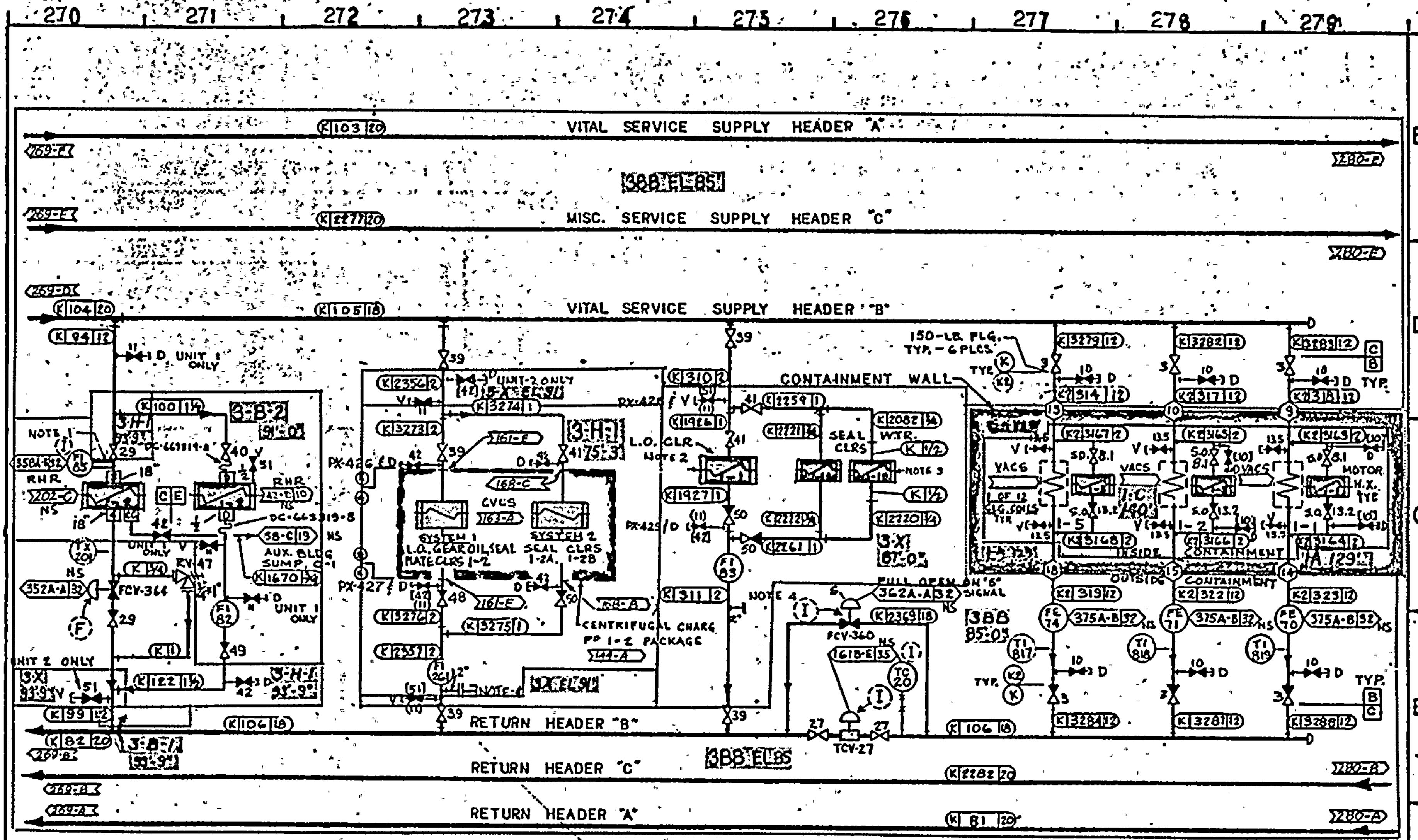
COMPONENT COOLING WATER PUMPS COOLING REQUIREMENTS

DC-663213 (1) (2)

REF. DWG
107714 REV. 1 SH. 3
107014 REV. 9 SH. 5A

SYSTEM NO. 20

P.G.&E.CO.	SHEET NO. 26 OF SHEETS	
	DRAWING NUMBER 107195	CHANGE 1



RESIDUAL H.X. 1-2
DC-663217-4

RES. HEAT REM. PP 1-2 SEAL WTR. CLR.
DC-663217-9,16

CENTRIFUGAL CHARGING PUMP 1-2 PACKAGE CLRS.
DC-663210-40, 47, 48, 49, 50

SAFETY INJECTION PP 1-1 COOLER
DC-663216-26, 32

REF. DWG.
106714 REV. 2 SH. 4
102014 REV. 10 SH. 6
SYSTEM NO. 20

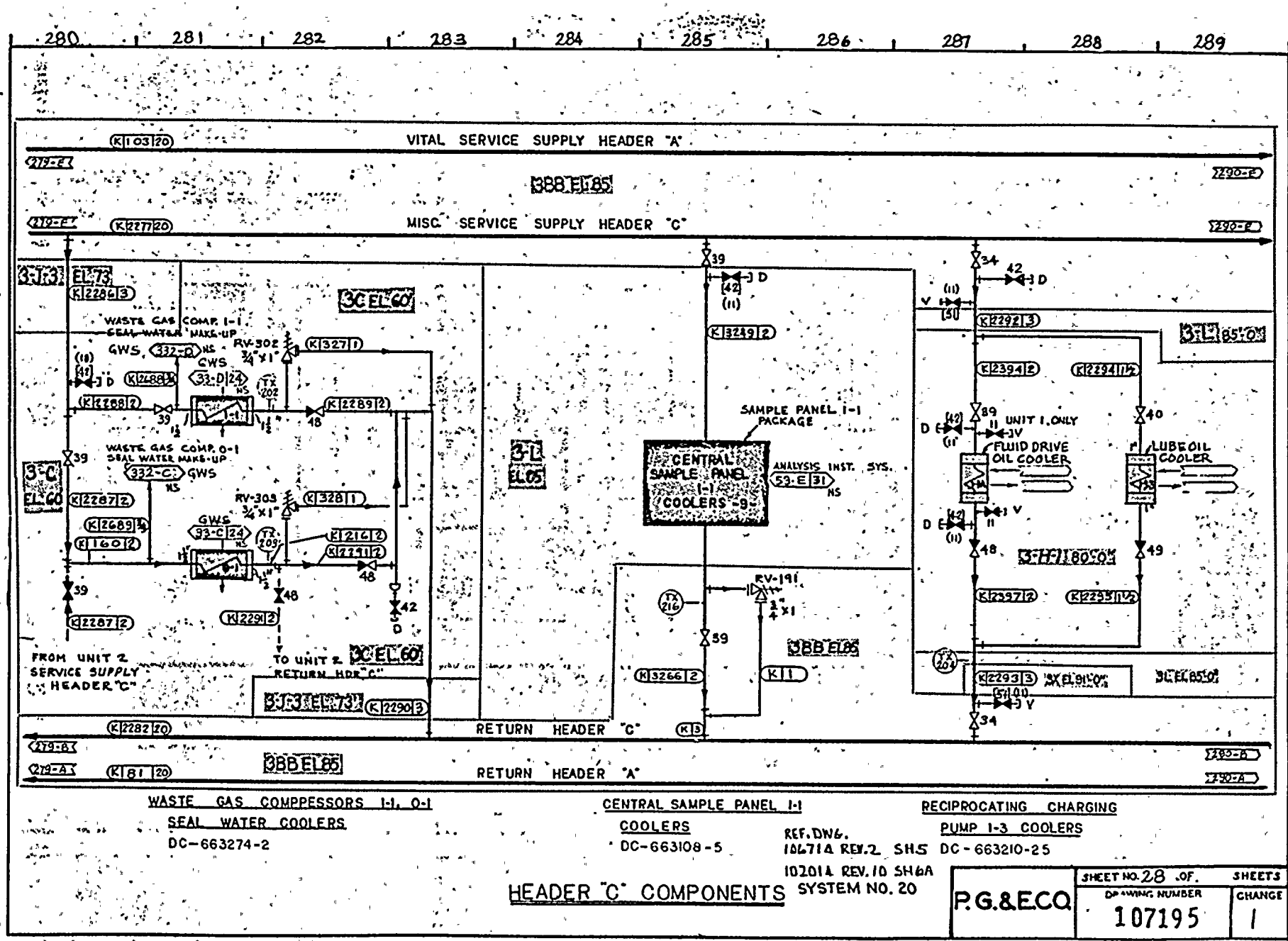
REACTOR CONTAINMENT FAN COOLERS
DC-663079-1, 2 CLG. COILS
5, 9 FAN MTRS. H.X.

NOTES:
1. ELBOW TAPS FOR FLOW INDICATION. (60-D)
2. REFER TO S.I.S. PUMP LUBE OIL COOLING SYSTEM, P.G.&E. RECORD NO. DC-663216-26 (65-C)
3. REFER TO SIS PP SEAL FLUSH SYSTEM DIAGRAM, PG&E RECORD NO. DC-663216-27 (65-C)
4. TEST POINT, SEE NOTES 2 & 3 SHT 5A COORD 63-B.

HEADER 'B' COMPONENTS

P.G.&E.CO.	SHEET NO. 27 OF SHEETS	
	DRAWING NUMBER 107195	CHANGE 1

A



WASTE GAS COMPPESSORS 1-1, 0-1 SEAL WATER COOLERS
DC-663274-2

CENTRAL SAMPLE PANEL 1-1 COOLERS
DC-663108-5

RECIPROCATING CHARGING PUMP 1-3 COOLERS
DC-663210-25

REF. DWG. 106714 REV. 2 SH. 5
102014 REV. 10 SH. 6A

HEADER "C" COMPONENTS

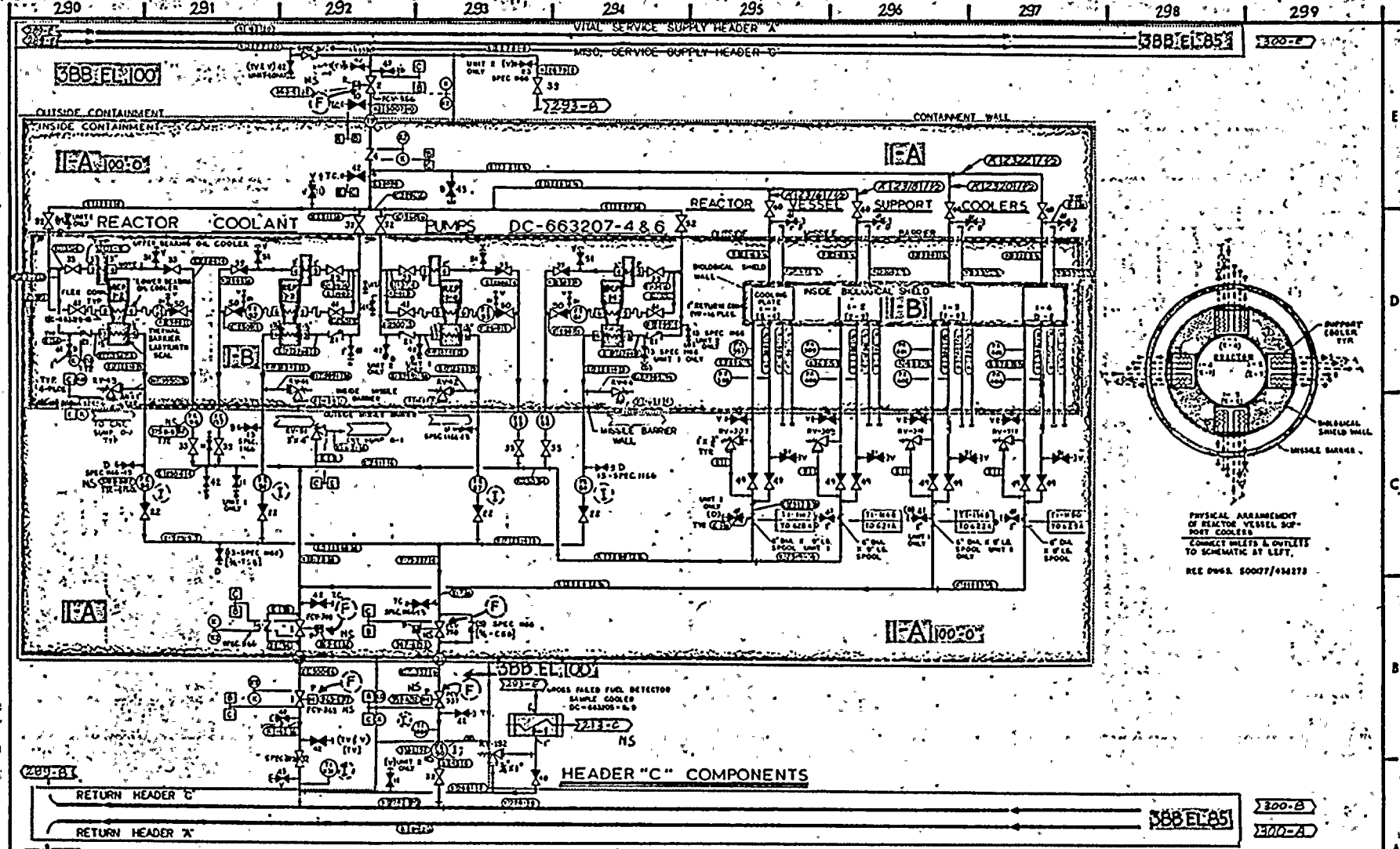
SYSTEM NO. 20

P.G.&E.CO.

SHEET NO. 28 OF SHEETS

DRAWING NUMBER 107195

CHANGE 1

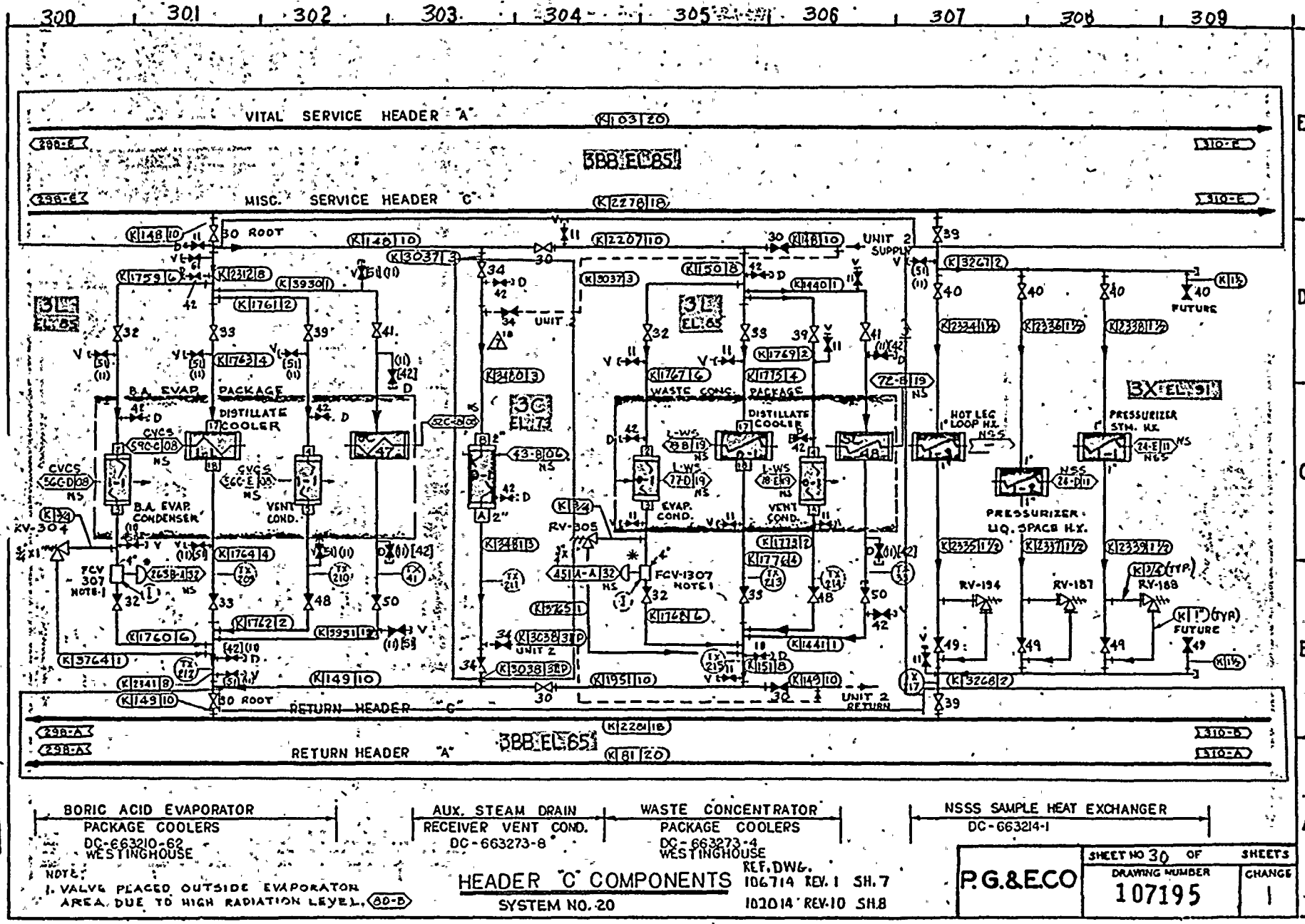


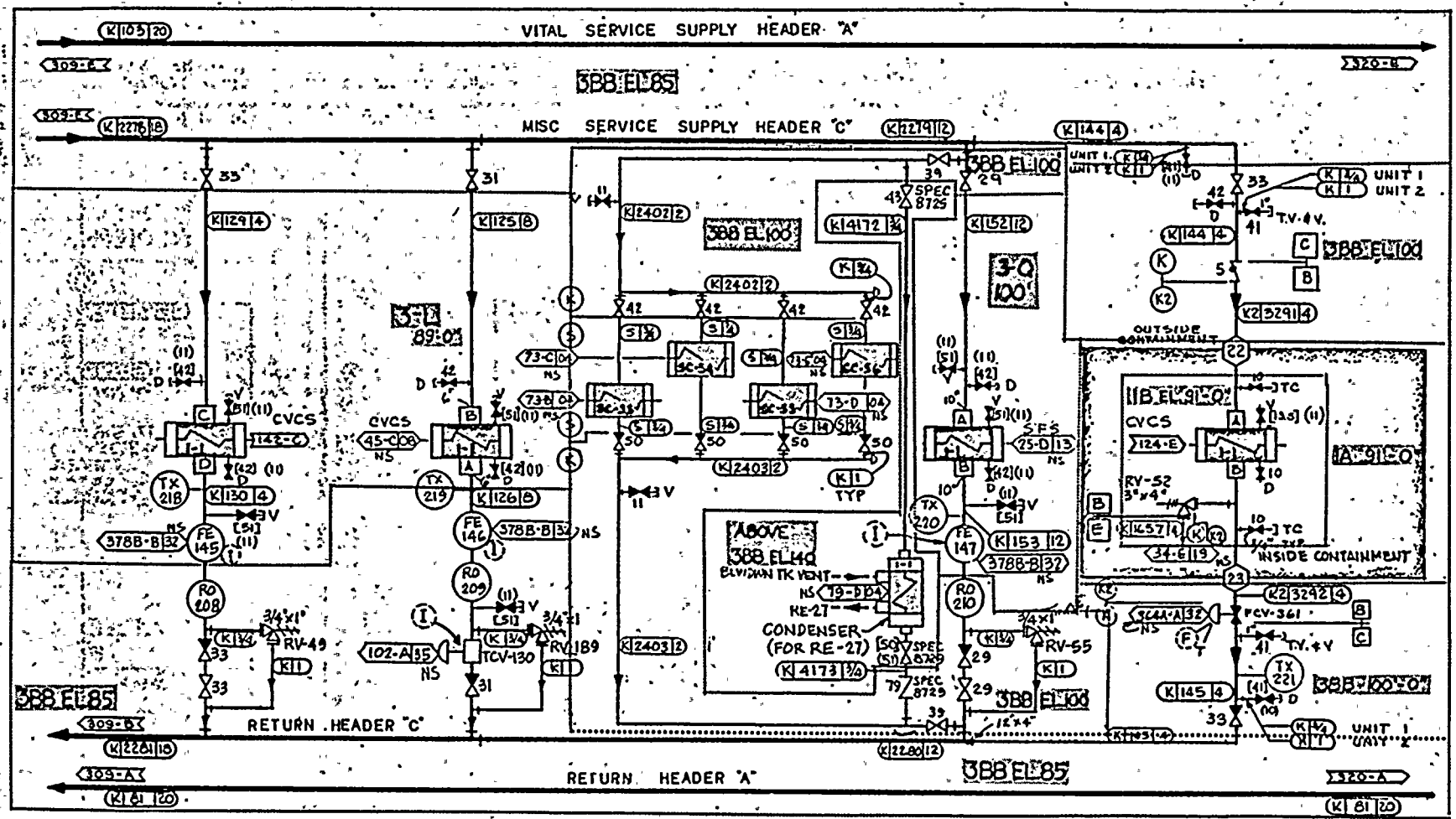
NOTE
1. REACTOR COOLANT PUMP 1-2 HAS SHORT PIPE (K-3) BETWEEN UPPER BEARING OIL COOLER OUTLET NOZZLE NO. 4 AND LINE NUMBER 2304. RCP 1-2 ONLY.

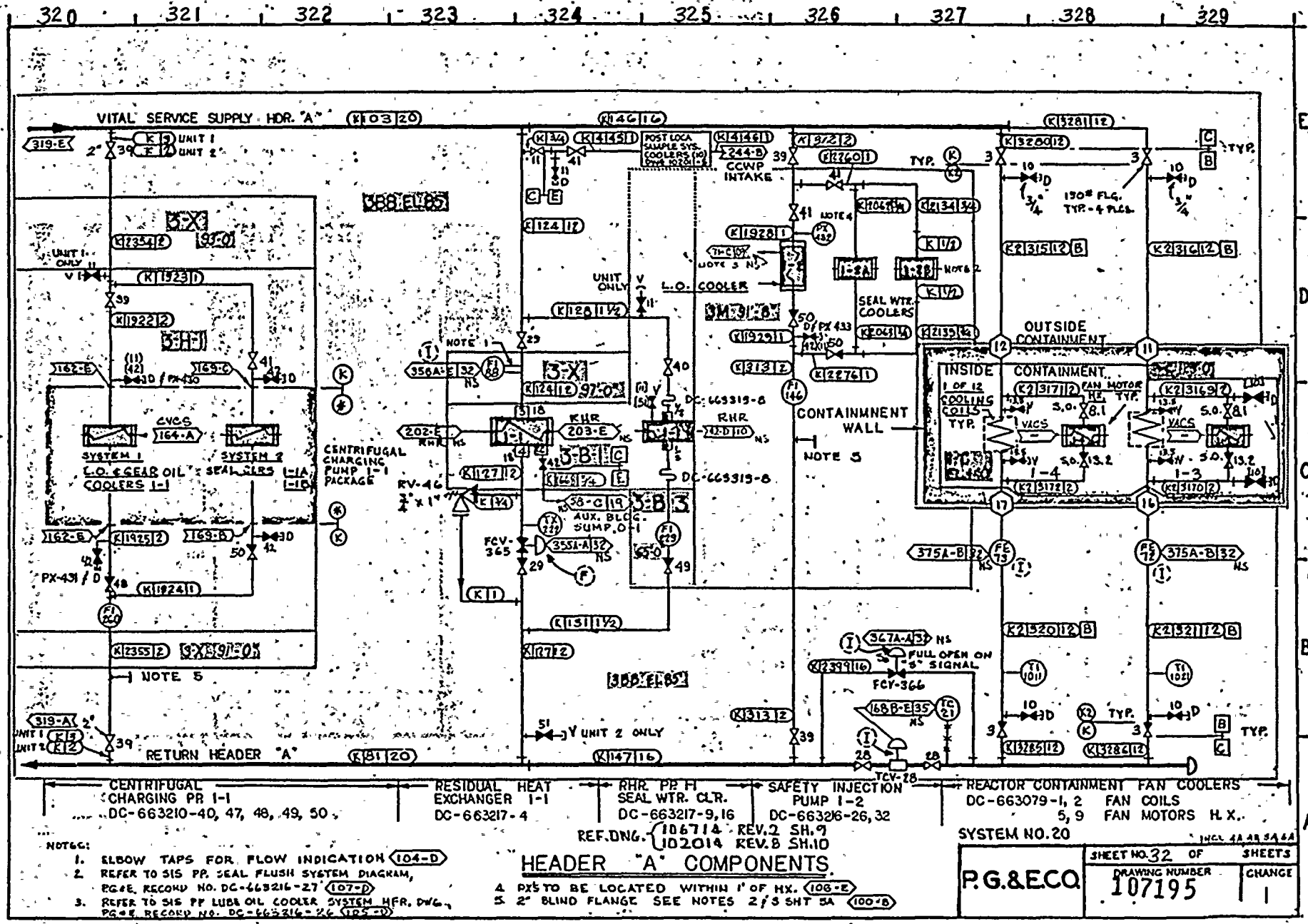
SYSTEM NO. 20
REF. DWG.
107714 REV. 2 SH. 6
102014 REV. 10 SH. 7

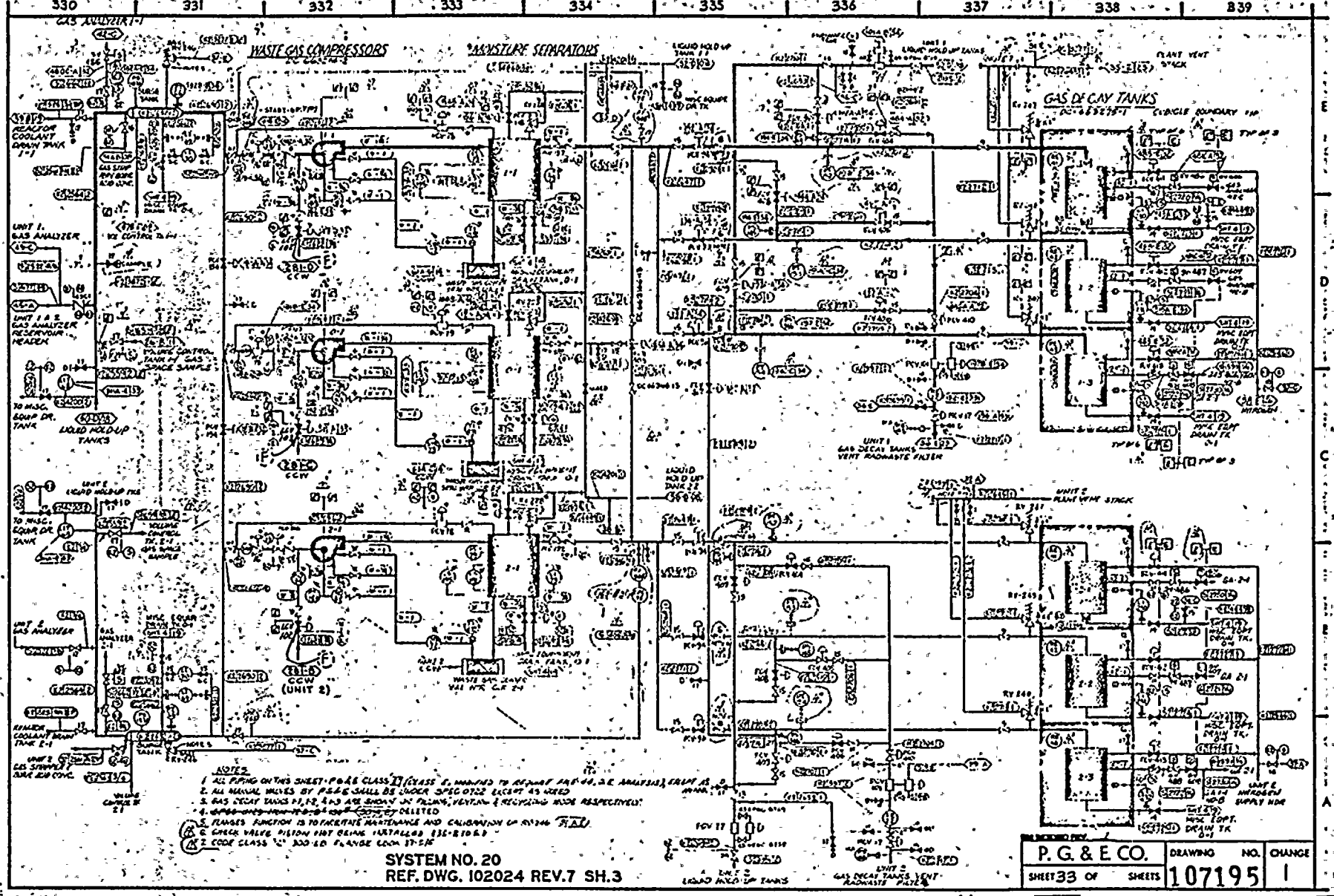
P. G. & E. CO. | DRAWING NO. 107195 | CHANGE 1
SHEET 29 OF SHEETS

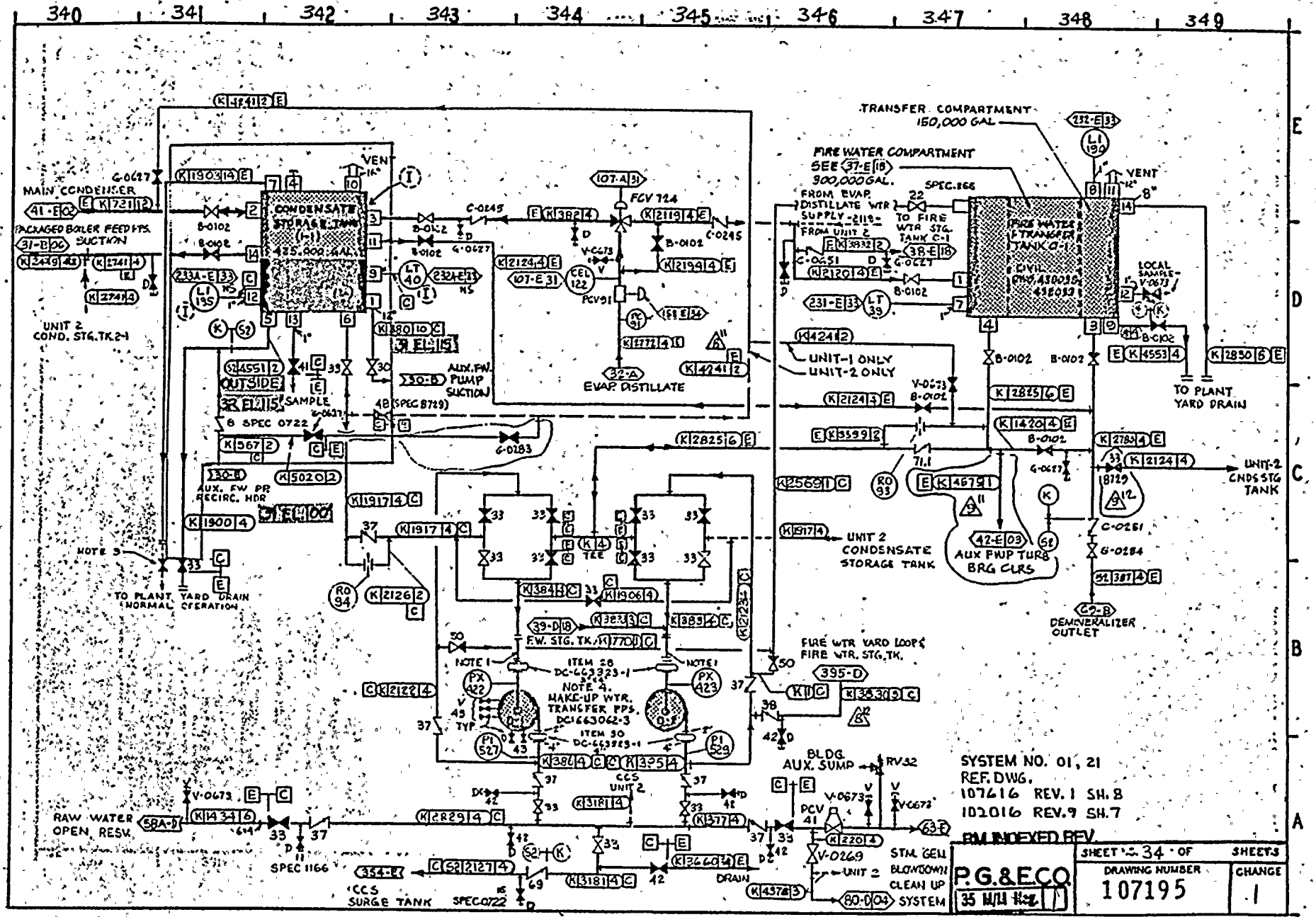
RM INDEX REV. 1

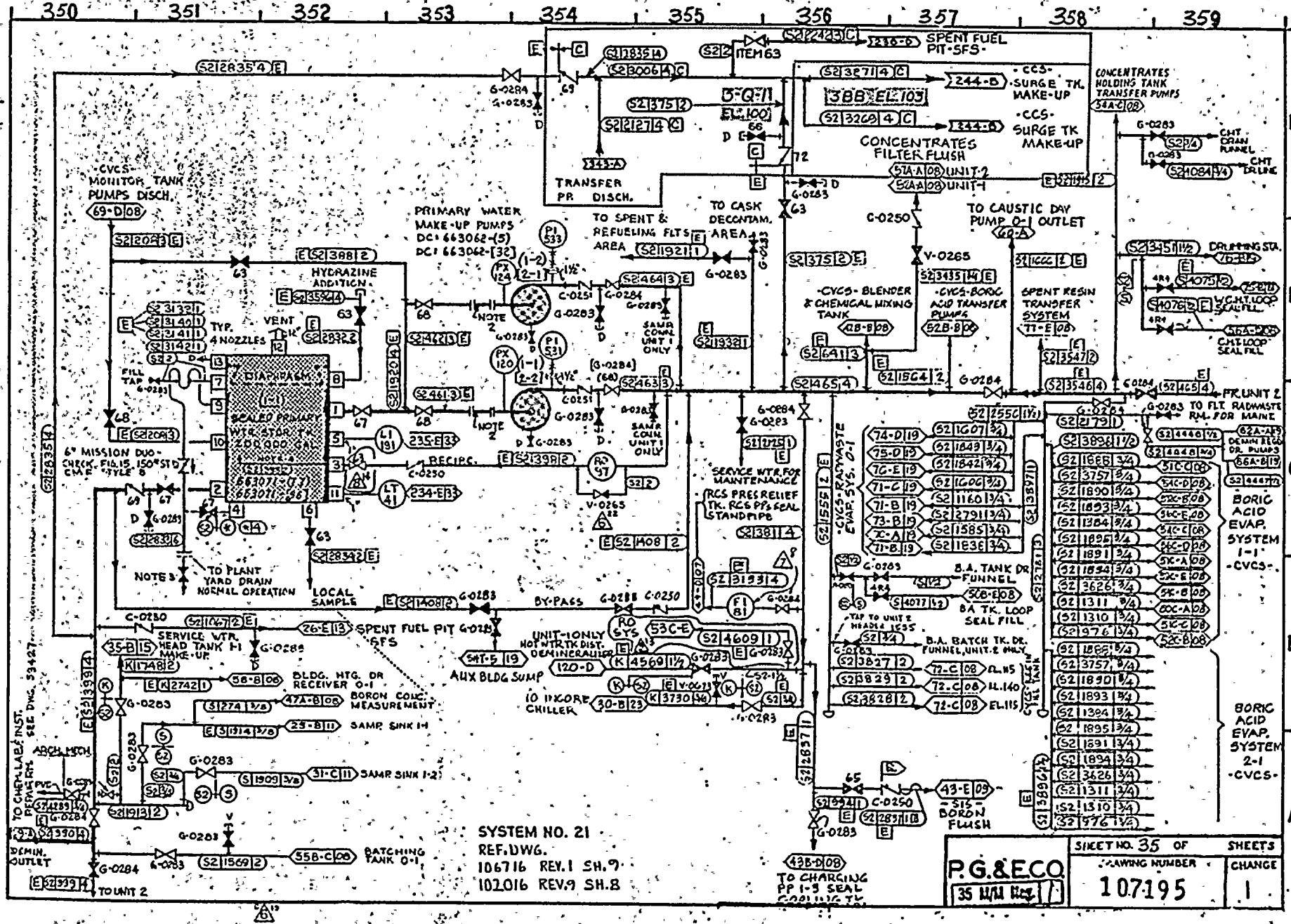

VITAL SERVICE HEADER "A"
MISC. SERVICE HEADER "C"
RETURN HEADER "C"
RETURN HEADER "A"
3BB EL 85'
3E EL 85'
3E EL 65'
3C EL 73'
3X EL 91'
B.A. EVAP. PACKAGE
DISTILLATE COOLER
B.A. EVAP. CONDENSER
VENT COND.
WASTE CONC. PACKAGE
EVAP. COND.
HOT LEG LOOP HX.
PRESSURIZER STM. HX.
PRESSURIZER LIQ. SPACE HX.
FCV-307 NOTE 1
FCV-1307 NOTE 1
RV-305
RV-194
RV-187
RV-188
UNIT 2 SUPPLY
UNIT 2 RETURN
FUTURE
BORIC ACID EVAPORATOR PACKAGE COOLERS DC-663210-62 WESTINGHOUSE
AUX. STEAM DRAIN RECEIVER VENT COND. DC-663273-8
WASTE CONCENTRATOR PACKAGE COOLERS DC-663273-4 WESTINGHOUSE
NSSS SAMPLE HEAT EXCHANGER DC-663214-1
NOTE: 1. VALVE PLACED OUTSIDE EVAPORATOR AREA DUE TO HIGH RADIATION LEVEL.
HEADER "C" COMPONENTS
SYSTEM NO. 20
REF. DWG. 106714 REV. 1 SH. 7
102014 REV. 10 SH. 8
P.G.&E.CO
SHEET NO 30 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1

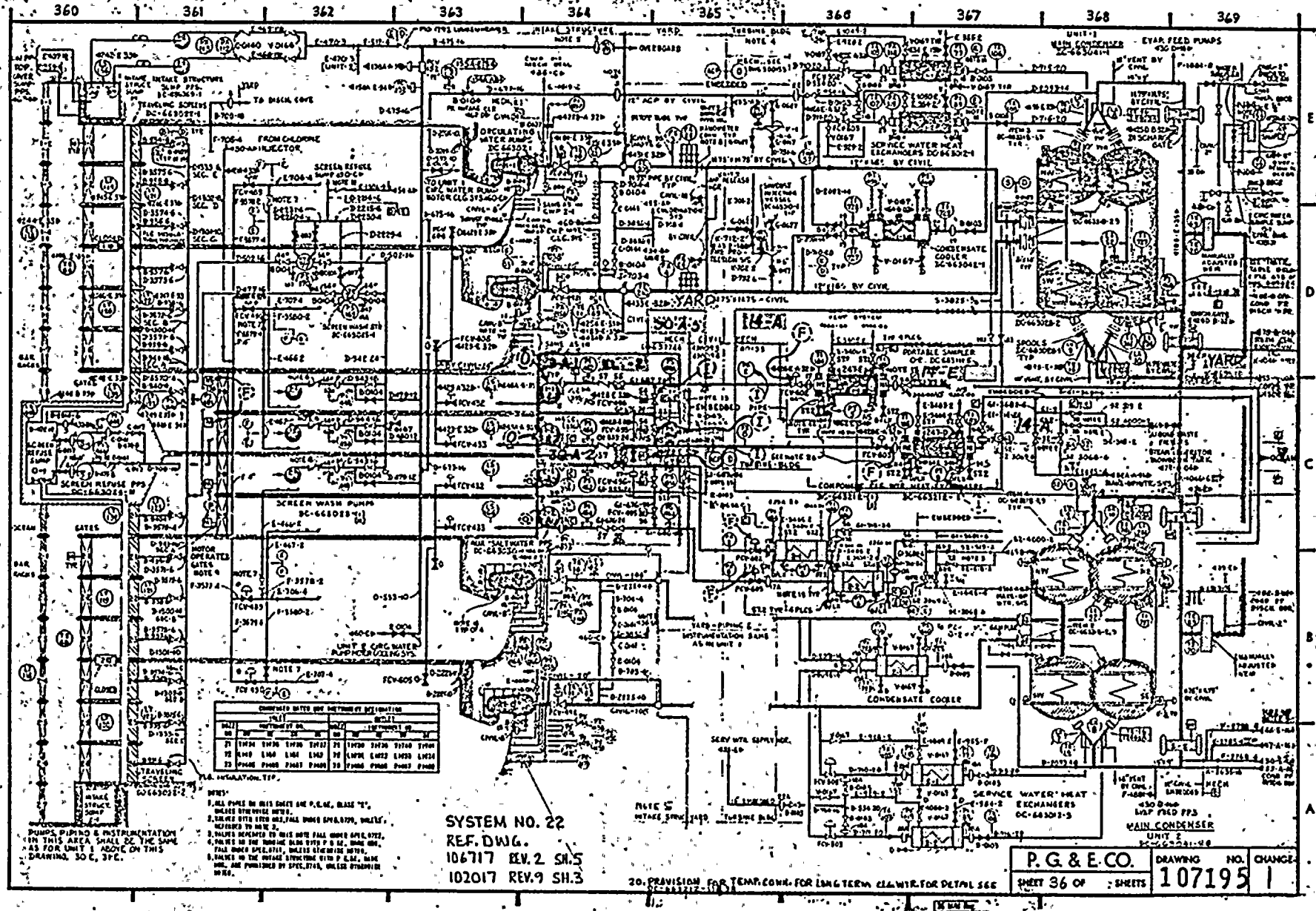

VITAL SERVICE SUPPLY HEADER "A"
MISC SERVICE SUPPLY HEADER "C"
RETURN HEADER "C"
RETURN HEADER "A"
388 EL 85
388 EL 100
388 EL 140
OUTSIDE CONTAINMENT
INSIDE CONTAINMENT
CVCS
SFS
ABOVE 388 EL 140
ELEVDWN TK VENT
CONDENSER (FOR RE-27)
SEAL WATER HEAT EXCHANGER DC-663210-7
LETDOWN HEAT EXCHANGER DC-663210-11
STEAM GENERATOR BLOWDOWN SAMPLE COOLERS FOR RADIATION MONITORS DC-663095-(1) [3]
SPENT FUEL PIT HEAT EXCHANGER DC-663211-7
EXCESS LETDOWN HEAT EXCHANGER DC-663210-12
SYSTEM NO. 20
REF. DWG.
106714 REV. 2 SH. 8
102014 REV. 10 SH. 9
HEADER "C" COMPONENTS
P.G.&E.CO.
SHEET NO. 3 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1

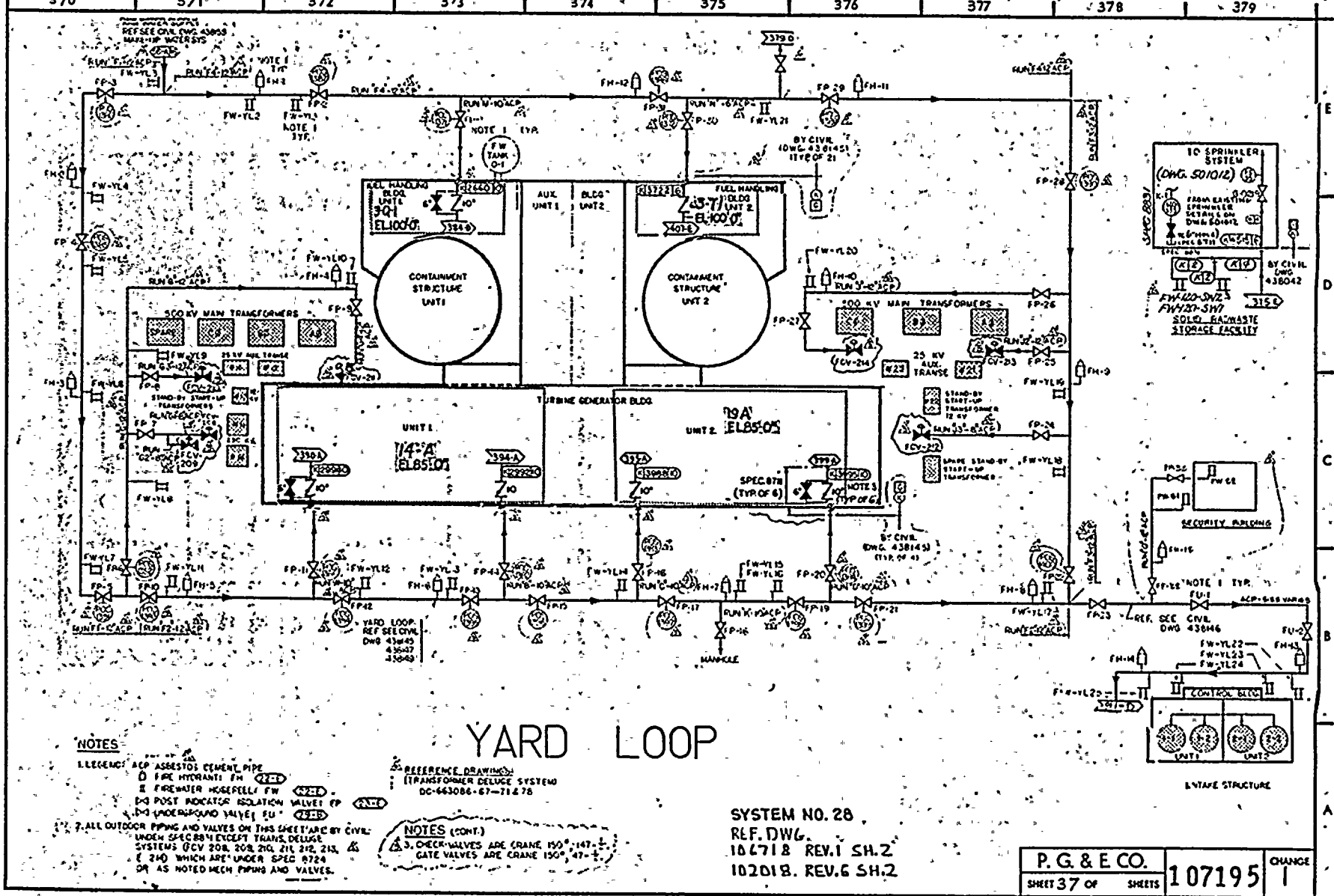

VITAL SERVICE SUPPLY HDR. "A"
RETURN HEADER "A"
UNIT 1
UNIT 2
UNIT 1 ONLY
UNIT 2 ONLY
CVCS
SYSTEM 1
SYSTEM 2
L.O. & GEAR OIL COOLERS 1-1
SEAL WTR. COOLERS 1-1A 1-1B
CENTRIFUGAL CHARGING PUMP 1-1 PACKAGE
RV-46
RHR
CCWP INTAKE
L.O. COOLER
SEAL WTR. COOLERS
CONTAINMENT WALL
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
1 OF 12 COOLING COILS TYP.
FAN MOTOR H.P. TYP.
VACS
1-4
1-3
1-2A
1-2B
AUX. BLDG. SUMP. 0-1
FCV-365
FCV-366
TCV-28
POST LOCA SAMPLE SYS. COOLERS
NOTE 5
NOTE 4
NOTE 1
NOTE 2
NOTE 3
FULL OPEN ON "S" SIGNAL
150# FLG. TYP. 4 PLCS.
TYP.
CENTRIFUGAL CHARGING PR 1-1
DC-663210-40, 47, 48, 49, 50
RESIDUAL HEAT EXCHANGER 1-1
DC-663217-4
RHR PR H SEAL WTR. CLR.
DC-663217-9, 16
SAFETY INJECTION PUMP 1-2
DC-663216-26, 32
REACTOR CONTAINMENT FAN COOLERS
DC-663079-1, 2 FAN COILS
5, 9 FAN MOTORS H. X.
SYSTEM NO. 20
REF. DNG. 106714 REV. 2 SH. 9
102014 REV. 8 SH. 10
NOTES:
1. ELBOW TAPS FOR FLOW INDICATION (104-D)
2. REFER TO SIS PP. SEAL FLUSH SYSTEM DIAGRAM, PG&E. RECORD NO. DC-663216-27 (107-D)
3. REFER TO SIS PP LUBE OIL COOLER SYSTEM HER. DWG., PG&E RECORD NO. DC-663216-26 (105-D)
4. PX'S TO BE LOCATED WITHIN 1' OF HX. (106-E)
5. 2" BLIND FLANGE SEE NOTES 2 & 3 SHT 5A (100-B)
HEADER "A" COMPONENTS
P.G.&E.CO.
SHEET NO. 32 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1


330
331
332
333
334
335
336
337
338
339
WASTE GAS COMPRESSORS
MOISTURE SEPARATORS
GAS DECAY TANKS
GAS ANALYZER I-1
REACTOR COOLANT DRAIN TANK I-1
UNIT 1 GAS ANALYZER
UNIT 1 & 2 GAS ANALYZER RESERVOIR HEADER
TO MISC. EQUIP DR. TANK
LIQUID HOLD UP TANKS
UNIT 2 GAS ANALYZER
RINSER COOLANT DRAIN TANK I-1
UNIT 2 GAS SAMPLE & SURGE RM EXH.
CCW (UNIT 2)
UNIT 1 GAS DECAY TANKS VENT RADWASTE FILTER
UNIT 2 GAS DECAY TANKS VENT RADWASTE FILTER
UNIT 2 PLANT VENT STACK
PLANT VENT STACK
NOTES
1. ALL PIPING ON THIS SHEET: P.G.&E. CLASS "F" (CLASS "F" MEANING TO REMAIN GAS-AIR, N.C. ANALYSIS) EXCEPT AS NOTED
2. ALL MANUAL VALVES BY P.G.&E. SHALL BE UNDER SPEC 07552 EXCEPT AS NOTED
3. GAS DECAY TANKS #1, #2, #3 & #4 SHOWN ON PIPING, VENTING & RECYCLING MODE RESPECTIVELY
4. [illegible] DELETED
5. FLANGES FUNCTION IS TO FACILITATE MAINTENANCE AND CALIBRATION OF PIPING
6. CHECK VALVE PISTON TYPE BRAND INSTALLED (SEE-B10&3)
7. CODE CLASS "C" 300 LB FLANGE (CODE 17-5)
SYSTEM NO. 20
REF. DWG. 102024 REV.7 SH.3
P. G. & E. CO.
DRAWING NO. 107195
CHANGE 1
SHEET 33 OF SHEETS
RM INDEX...D REV. 1
E
D
C
B
A


340
341
342
343
344
345
346
347
348
349
E
D
C
B
A
CONDENSATE STORAGE TANK (T-1) 425,000 GAL.
MAIN CONDENSER
PACKAGED BOILER FEED PPS. SUCTION
UNIT 2 COND. STG. TK. T-1
VENT
FCV 724
EVAP. DISTILLATE
AUX. FW. PUMP SUCTION
OUTSIDE SAMPLE
AUX. EW PP RECIRC. HDR
TO PLANT YARD DRAIN NORMAL OPERATION
RAW WATER OPEN RESV.
SPEC 1166
CCS SURGE TANK
SPEC 0722
CCS UNIT 2
DRAIN
STM. GEN. BLOWDOWN CLEAN UP SYSTEM
BLDG. AUX. SUMP
PCV 41
V-0269
FIRE WATER COMPARTMENT
SEE 37-E 18
300,000 GAL.
TRANSFER COMPARTMENT
150,000 GAL
FIRE WATER TRANSFER TANK C-1
CIVIL CNV. 430035 430052
FROM EVAP. DISTILLATE WTR SUPPLY -2119-
FROM UNIT 2
TO FIRE WTR STG. TANK C-1
LOCAL SAMPLE V-0673
UNIT-1 ONLY
UNIT-2 ONLY
TO PLANT YARD DRAIN
UNIT 2 CONDENSATE STORAGE TANK
AUX FWP TURB BRG CLRS
UNIT-2 CNDS STG TANK
DEMINERALIZER OUTLET
FIRE WTR YARD LOOPS FIRE WTR. STG. TK.
F.W. STG. TK.
NOTE 4. MAKE-UP WTR. TRANSFER PPS. DC-663062-3
ITEM 30 DC-663923-1
ITEM 28 DC-663923-1
NOTE 1
TYP
SYSTEM NO. 01, 21
REF. DWG.
107616 REV. 1 SH. 8
102016 REV. 9 SH. 7
P&I INDEXED REV.
P.G.&E.CO.
SHEET 34 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1


350
351
352
353
354
355
356
357
358
359
SPENT FUEL PIT-SFS-
CCS-SURGE TK. MAKE-UP
CONCENTRATES HOLDING TANK TRANSFER PUMPS
CONCENTRATES FILTER FLUSH
CCS-SURGE TK MAKE-UP
TRANSFER PP. DISCH.
CVCS-MONITOR TANK PUMPS DISCH.
PRIMARY WATER MAKE-UP PUMPS
TO SPENT & REFUELING FLTS AREA
TO CASK DECONTAM. AREA
TO CAUSTIC DAY PUMP O-1 OUTLET
HYDRAZINE ADDITION
TYP. 4 NOZZLES
VENT
DIAPHRAGM
SEALED PRIMARY WTR. STOR. TK. 200,000 GAL
6" MISSION DUO-CHECK, FIG. 15 150# STD CAST STYLE B
RECIRC.
SAMP. CONN. UNIT 1 ONLY
CVCS-BLENDER & CHEMICAL MIXING TANK
CVCS-BORIC ACID TRANSFER PUMPS
SPENT RESIN TRANSFER SYSTEM
CHT. DRAIN FUNNEL
CHT. DR. LINE
CHT. LOOP SEAL FILL
DRAINING STA.
FR. UNIT 2 TO FLT. RADWASTE RM. FOR MAINT.
DEMIN. FEED DR. PUMPS
BORIC ACID EVAP. SYSTEM 1-1 -CVCS-
BORIC ACID EVAP. SYSTEM 2-1 -CVCS-
CVCS-RADWASTE EVAP. SYS. 0-1
SERVICE WTR. FOR MAINTENANCE
RCS PRESS RELIEF TK. RCS PPS SEAL STANDPIPE
B.A. TANK DR. FUNNEL
B.A. TK. LOOP SEAL FILL
B.A. BATCH TK. DR. FUNNEL, UNIT-2 ONLY
SPENT FUEL PIT G-028
SERVICE WTR. HEAD TANK H-1 MAKE-UP
BLDG. HTG. DR. RECEIVER O-1
BORON CONC. MEASUREMENT
SAMP. SINK 1-1
SAMP. SINK 1-2
AUX BLDG. SUMP
UNIT-1 ONLY HOT WTR. TK DIST. DEMINERALIZER
TO INDORE CHILLER
BY-PASS
LOCAL SAMPLE
TO PLANT YARD DRAIN NORMAL OPERATION
SCALED PRIMARY WTR. STOR. TK. 663071-(1) 663071-(2)
SYSTEM NO. 21
REF. DWG.
106716 REV. 1 SH. 9
102016 REV. 9 SH. 8
TO CHEM. LAB. INST. SEE DWG. 59427
DEMIN. OUTLET
TO UNIT 2
BATCHING TANK O-1
TO CHARGING PP 1-3 SEAL COOLING TK.
SIS-BORON FLUSH
P.G.&E.CO.
35 M/11 Hng
SHEET NO. 35 OF SHEETS
DRAWING NUMBER
107195
CHANGE
1


360
361
362
363
364
365
366
367
368
369
SYSTEM NO. 22
REF. DWG.
106717 REV. 2 SH.5
102017 REV.9 SH.3
P. G. & E. CO.
DRAWING NO. 107195
CHANGE 1
SHEET 36 OF : SHEETS
MAIN CONDENSER
CONDENSATE COOLER
SERVICE WATER HEAT EXCHANGERS
YARD
35 M/H



35 M/M

YARD LOOP

NOTES

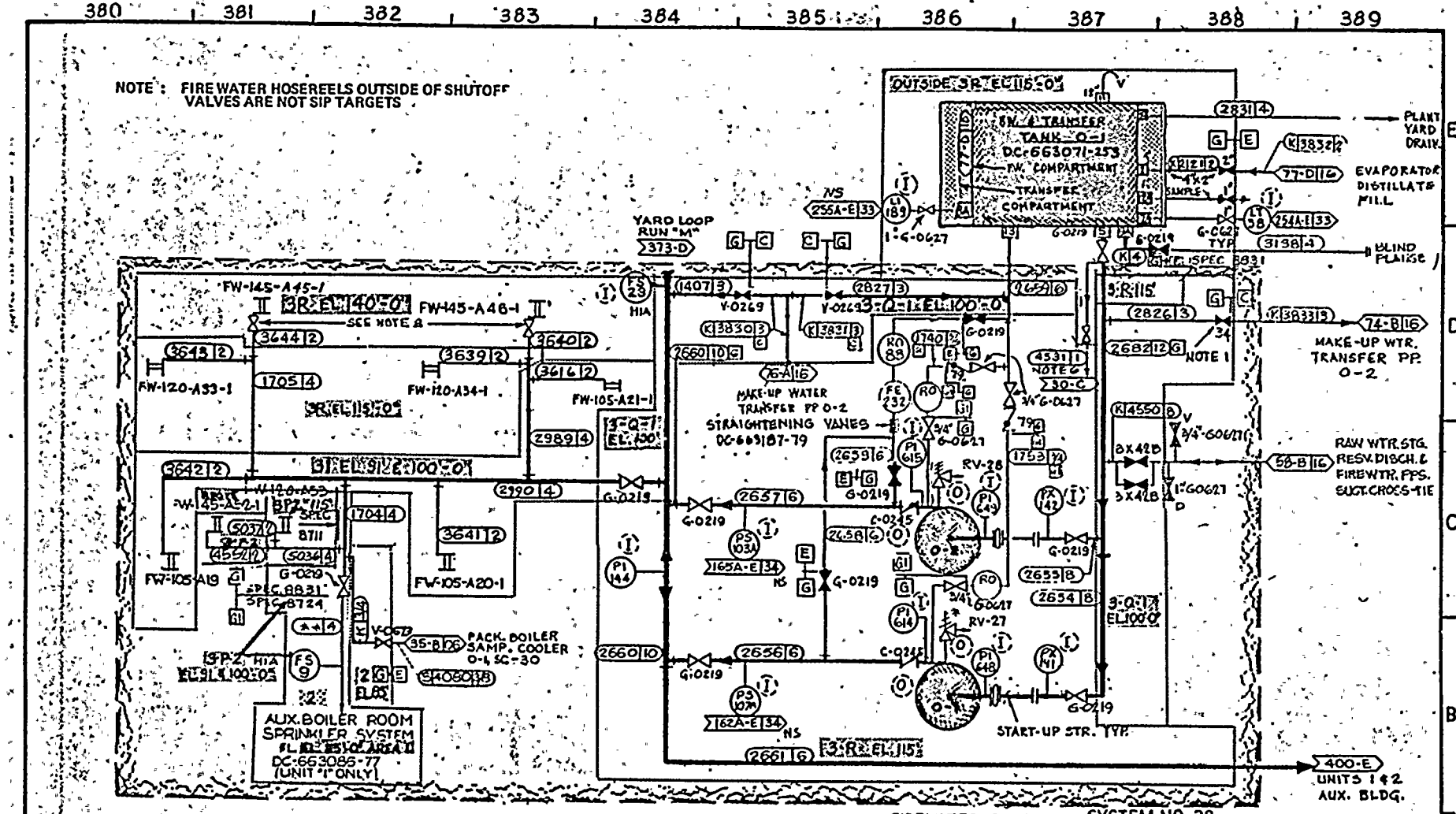
1. LEGEND: ACP ASBESTOS CEMENT PIPE
   FH FIRE HYDRANT
   FW FIREWATER HOSEREEL
   FP POST INDICATOR ISOLATION VALVE
   FU UNDERGROUND VALVE
2. ALL OUTDOOR PIPING AND VALVES ON THIS SHEET ARE BY CIVIL UNDER SPEC 884 EXCEPT TRANS. DELUGE SYSTEMS (CV 208, 209, 210, 211, 212, 213, & 214) WHICH ARE UNDER SPEC 8724 OR AS NOTED MECH PIPING AND VALVES.

REFERENCE DRAWING (TRANSFORMER DELUGE SYSTEM)
DC-663086-67-71&78

NOTES (CONT.)
3. CHECK VALVES ARE CRANE 150°, 147-½
   GATE VALVES ARE CRANE 150°, 47-½

SYSTEM NO. 28
REF. DWG.
106718 REV. 1 SH. 2
102018. REV. 6 SH. 2

P. G. & E CO.			
SHEET 37 OF SHEETS	107195	CHANGE 1



UNIT 1 FUEL HANDLING BLDG.

NOTES:

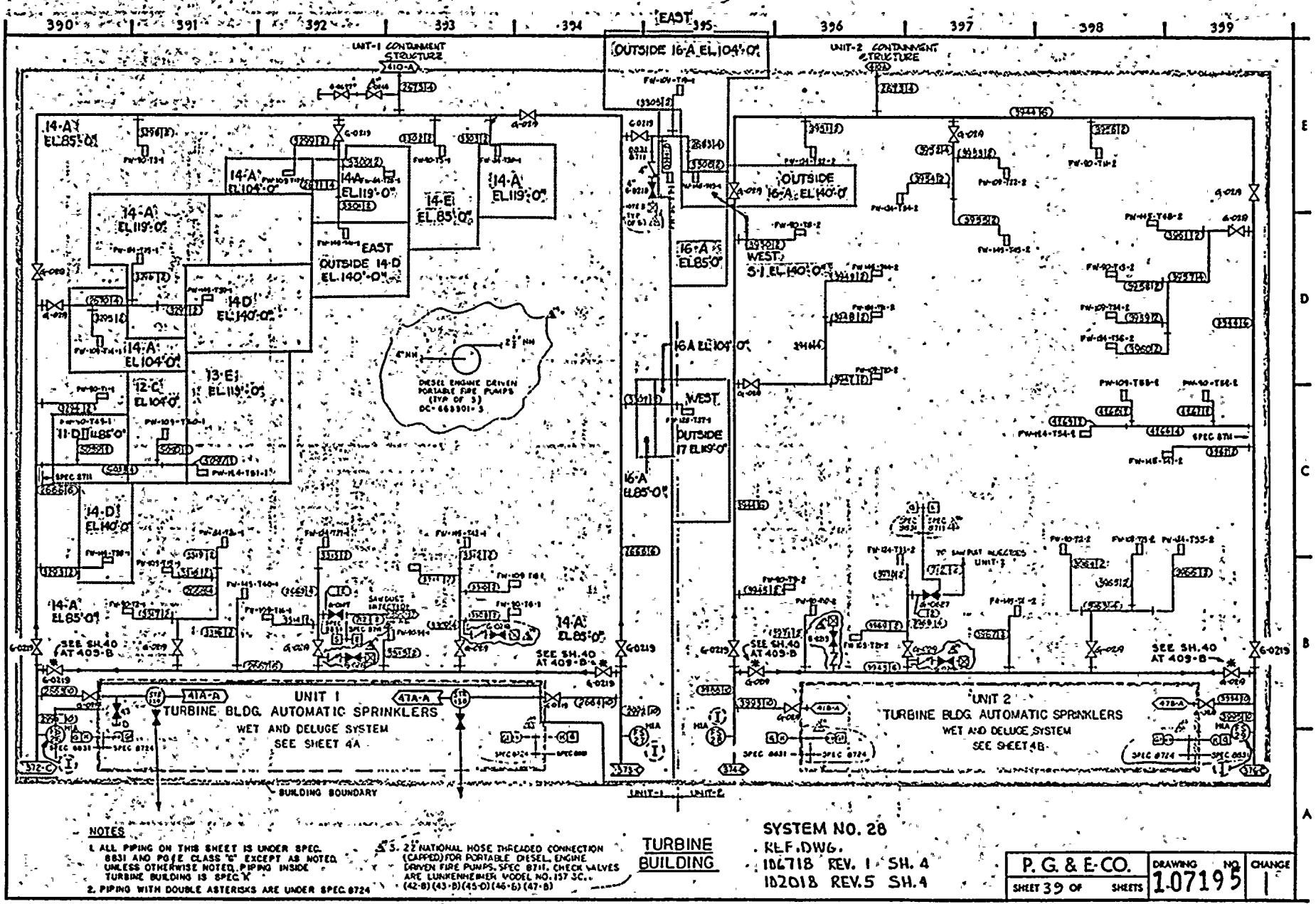
1. VALVE IT NOS. 34&79 ARE UNDER SPEC. 8729 AND INSTALLED UNDER SPEC. 8831 388-D
2. ALL PIPING WITH P.G.&E. CLASS "C" & "E" ARE UNDER 8711 EXCEPT AS NOTED.
3. ALL PIPING & VALVES WITH P.G.&E. CLASS "G" & G1 ARE UNDER SPEC. 8831, AND WITH XX INDICATE UNDER SPEC. 8724.
4. ALL PIPING ON THIS SHEET IS PIPING SPEC "K" AND CODE CLASS "G", EXCEPT AS NOTED
8. BONNEY FORGE 2" SW GATE VALVE CAT # HCW-108 (BODY A-105, SEAT/STEM/DISC-13 CR. WD-800, TEMP. 850°F) COOK D. 391/393-D 35 M/H Req.

P.G.&E.CO.

SHEET NO. 38 OF SHEETS

DRAWING NUMBER 107195

CHANGE 1



NOTES

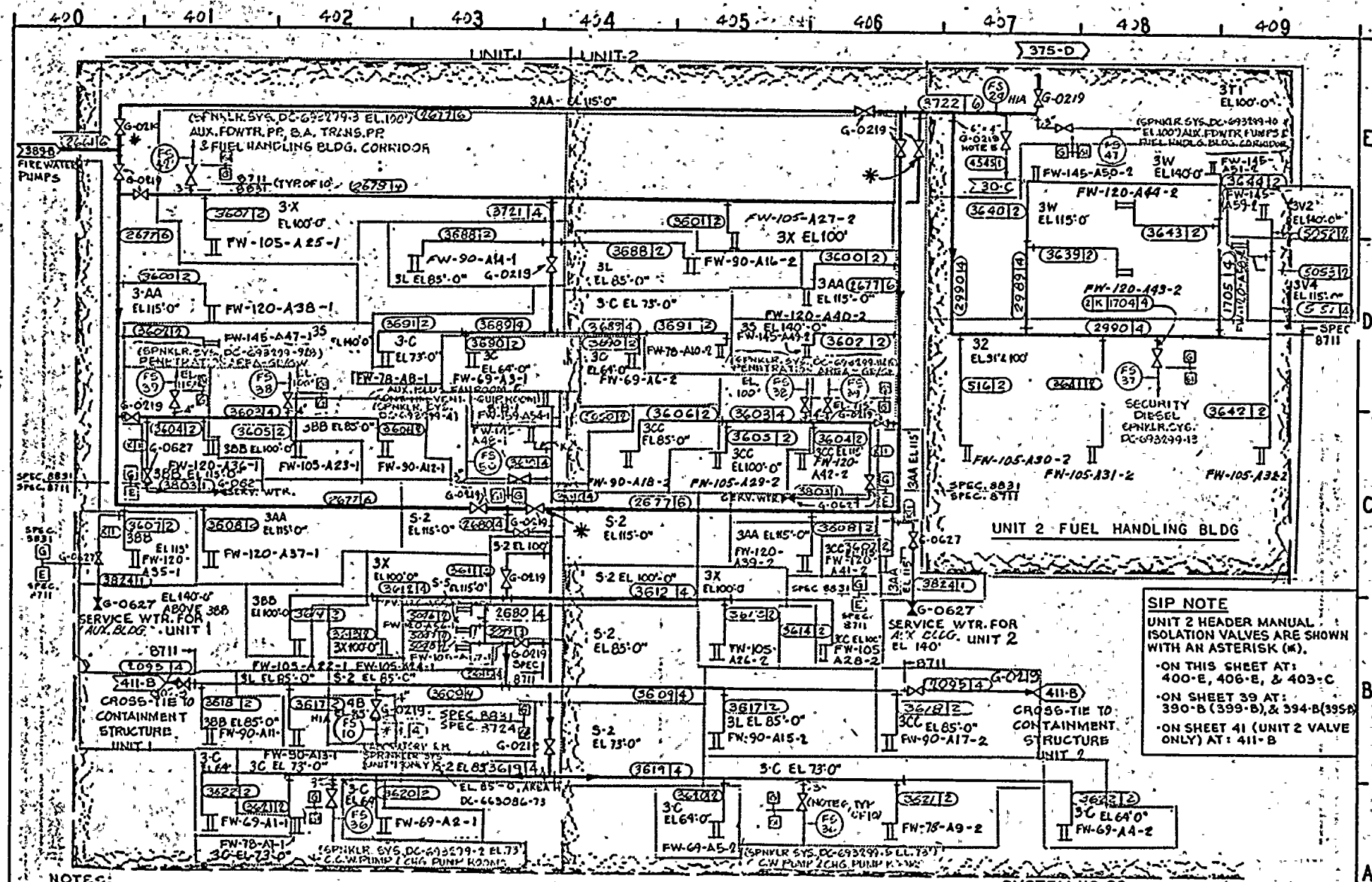
1. ALL PIPING ON THIS SHEET IS UNDER SPEC. 8831 AND PG&E CLASS "C" EXCEPT AS NOTED. UNLESS OTHERWISE NOTED, PIPING INSIDE TURBINE BUILDING IS SPEC. "X"
2. PIPING WITH DOUBLE ASTERISKS ARE UNDER SPEC. 8724
3. 2½" NATIONAL HOSE THREADED CONNECTION (CAPPED) FOR PORTABLE DIESEL ENGINE DRIVEN FIRE PUMPS. SPEC. 8711. CHECK VALVES ARE LUNKENHEIMER MODEL NO. 157 SC. (42-B) (43-B) (45-D) (46-B) (47-B)

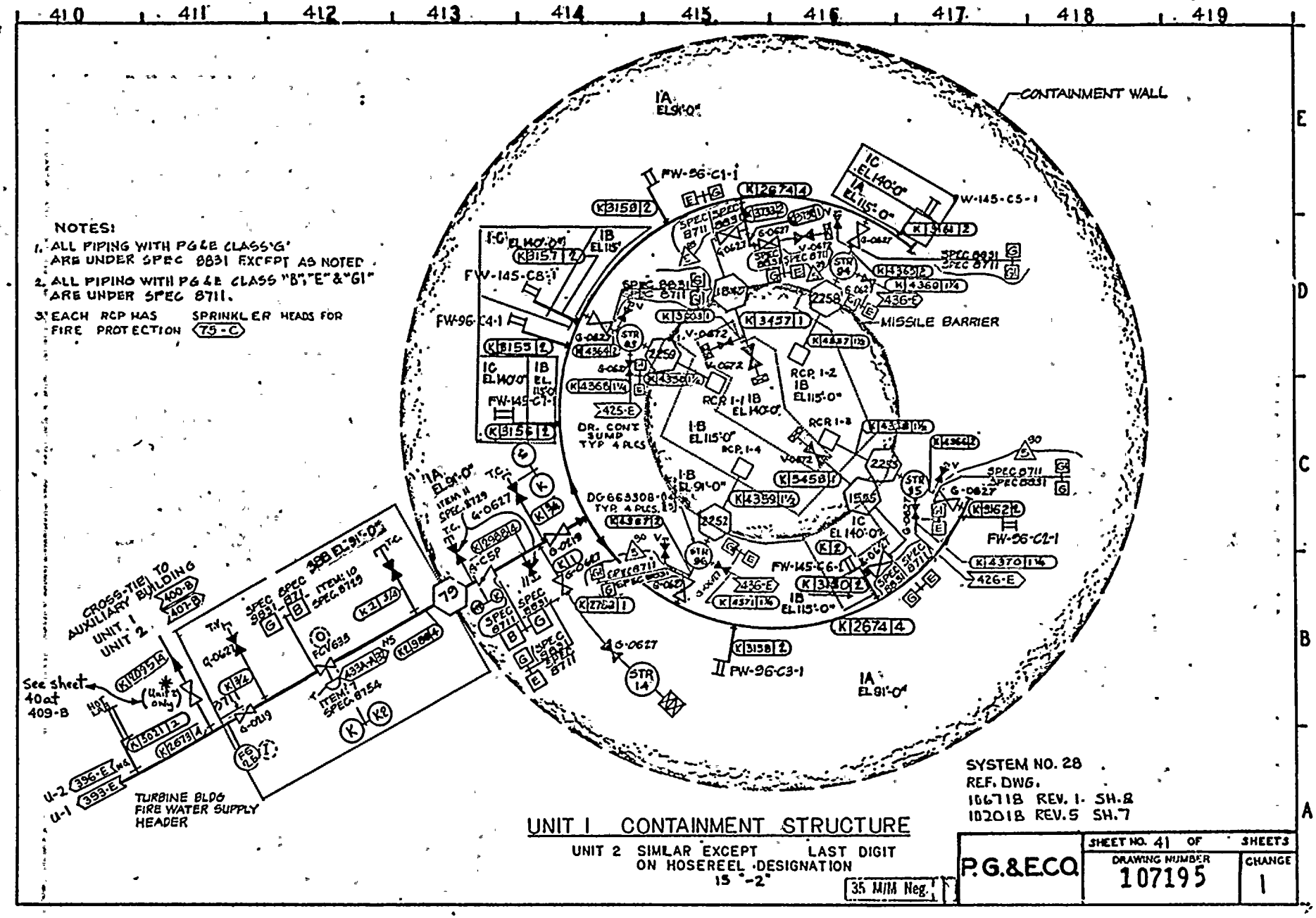
TURBINE BUILDING

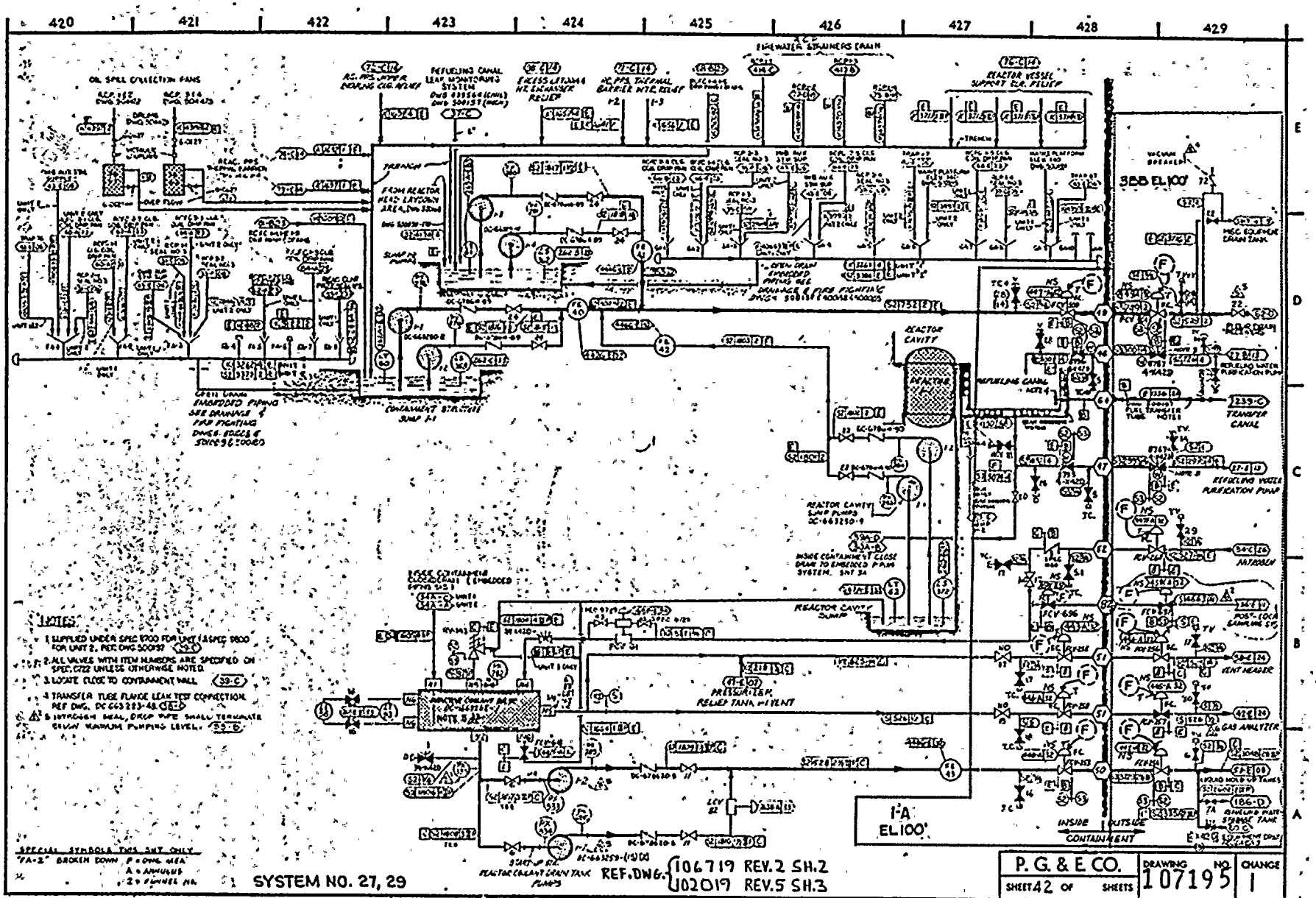
SYSTEM NO. 28
REF. DWG.
106718 REV. 1 SH. 4
102018 REV. 5 SH. 4

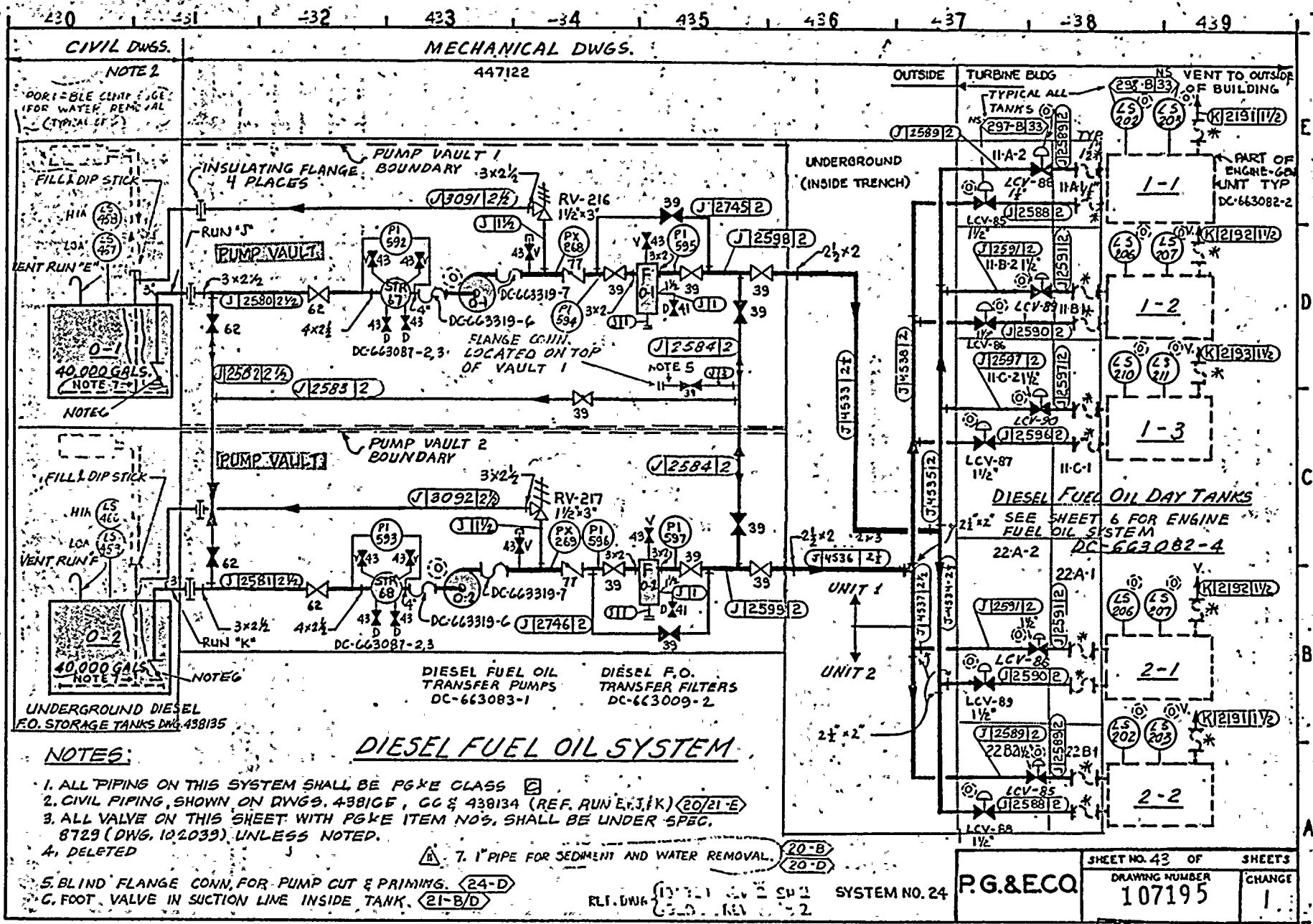
P. G. & E. CO.	DRAWING NO.	CHANGE
SHEET 39 OF SHEETS	107195	1

35 M/M


UNIT 1
UNIT 2
375-D
UNIT 2 FUEL HANDLING BLDG
SECURITY DIESEL
SPNKLR. SYS. DC-693299-13
SERVICE WTR. FOR AUX. BLDG. UNIT 1
SERVICE WTR. FOR A.B. UNIT 2
CROSS-TIE TO CONTAINMENT STRUCTURE UNIT 1
CROSS-TIE TO CONTAINMENT STRUCTURE UNIT 2
FIRE WATER PUMPS
SIP NOTE
UNIT 2 HEADER MANUAL ISOLATION VALVES ARE SHOWN WITH AN ASTERISK (*).
·ON THIS SHEET AT: 400-E, 406-E, & 403-C
·ON SHEET 39 AT: 390-B (399-B), & 394-B(395-B)
·ON SHEET 41 (UNIT 2 VALVE ONLY) AT: 411-B
NOTES:
1. ALL PIPING & VALVES ON THIS SHEET ARE SUPPLIED & INSTALLED UNDER SPEC 8831, EXCEPT AS NOTED.
2. ** INDICATES PIPING & VALVES UNDER SPEC. 8724
3. DELETED
4. ALL PIPING ON THIS SHEET HAVE SPEC. 8831 EXCEPT AS NOTED
UNITS 1 & 2 AUXILIARY BUILDING
REF. DWG. 106718 REV. 1 CH. 6
106261 REV. 5 CH. 5
SYSTEM NO. 28
P.G.&E.CO.
SHEET NO. 40 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1


410
411
412
413
414
415
416
417
418
419
E
D
C
B
A
NOTES:
1. ALL PIPING WITH PG&E CLASS 'G' ARE UNDER SPEC 8831 EXCEPT AS NOTED
2. ALL PIPING WITH PG&E CLASS "B","E" & "G1" ARE UNDER SPEC 8711.
3. EACH RCP HAS SPRINKLER HEADS FOR FIRE PROTECTION 75-C
CONTAINMENT WALL
MISSILE BARRIER
RCP 1-1 IB EL 140'-0"
RCP 1-2 IB EL 115'-0"
RCP 1-3 IB EL 115'-0"
RCP 1-4 IB EL 115'-0"
DR. CONT SUMP TYP 4 PLCS
DG 663308-04 TYP 4 PLCS.
FW-96-C1-1
FW-96-C2-1
FW-96-C3-1
FW-96-C4-1
FW-145-C5-1
FW-145-C6-1
FW-145-C7-1
FW-145-C8-1
CROSS-TIE TO AUXILIARY BUILDING UNIT 1 UNIT 2
400-B
401-B
See sheet 40 at 409-B
HOT LAP
(Unit 2 only)
U-2
U-1
396-E
393-E
TURBINE BLDG FIRE WATER SUPPLY HEADER
SPEC 8831
SPEC 8711
ITEM 10 SPEC 8729
ITEM 11 SPEC 8729
ITEM 7 SPEC 8754
FCV 635
79
SYSTEM NO. 28
REF. DWG.
106718 REV. 1 SH. 8
102018 REV. 5 SH. 7
UNIT 1 CONTAINMENT STRUCTURE
UNIT 2 SIMILAR EXCEPT LAST DIGIT ON HOSEREEL DESIGNATION 15 -2
35 M/M Neg.
P.G.&E.CO.
SHEET NO. 41 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1


420
421
422
423
424
425
426
427
428
429
E
D
C
B
A
35 M/M
NOTES
1. SUPPLIED UNDER SPEC 9100 FOR UNIT 1 & SPEC 9100 FOR UNIT 2, PER DWG 500959
2. ALL VALVES WITH ITEM NUMBERS ARE SPECIFIED ON SPEC. G72 UNLESS OTHERWISE NOTED
3. LOCATE CLOSE TO CONTAINMENT WALL
4. TRANSFER TUBE FLANGE LEAK TEST CONNECTION REF DWG. DC 663283-48
5. NITROGEN SEAL, DROP PIPE SHALL TERMINATE BELOW MINIMUM PUMPING LEVEL.
SPECIAL SYMBOLS THIS UNIT ONLY
"FA-2" BROKEN DOWN F = DWG. NO.
A = ANNULUS
2 = PENNEL NO.
SYSTEM NO. 27, 29
REF. DWG. 106719 REV. 2 SH. 2
102019 REV. 5 SH. 3
1-A
EL 100'
INSIDE
CONTAINMENT
OUTSIDE
P. G. & E. CO.
SHEET 42 OF SHEETS
DRAWING NO. 107195
CHANGE 1



DIESEL FUEL OIL SYSTEM

NOTES:

1. ALL PIPING ON THIS SYSTEM SHALL BE PG&E CLASS C
2. CIVIL PIPING, SHOWN ON DWGS. 438106, CC & 438134 (REF. RUN E, J, K) (20/21-E)
3. ALL VALVE ON THIS SHEET WITH PG&E ITEM NOS. SHALL BE UNDER SPEC. 8729 (DWG. 102039) UNLESS NOTED.
4. DELETED
5. BLIND FLANGE CONN. FOR PUMP CUT & PRIMING. (24-D)
6. FOOT VALVE IN SUCTION LINE INSIDE TANK. (21-B/D)
7. 1" PIPE FOR SEDIMENT AND WATER REMOVAL. (20-B) (20-D)

REF. DWG. [illegible] SYSTEM NO. 24

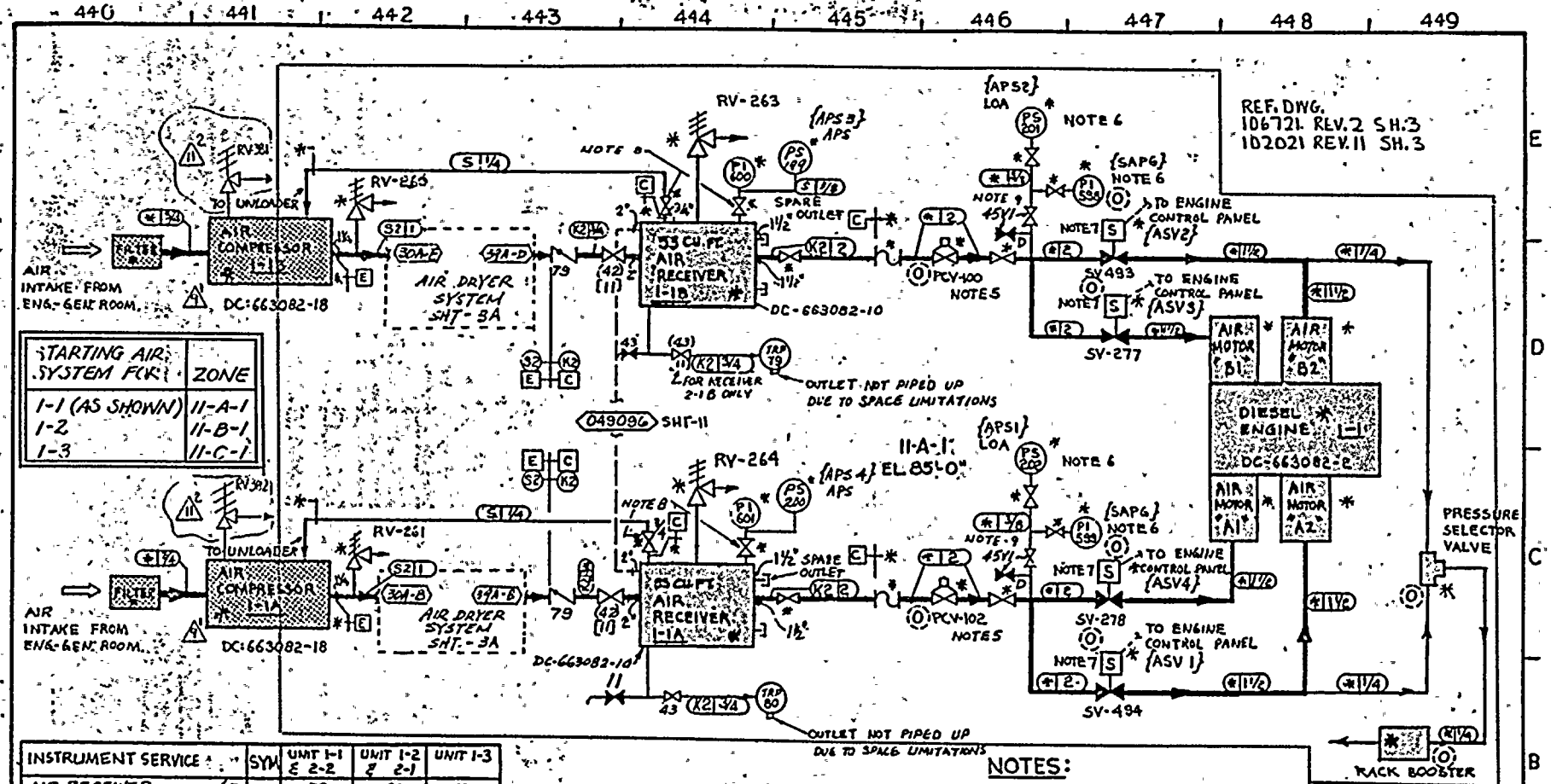
P.G.&E.CO.

SHEET NO. 43 OF SHEETS

DRAWING NUMBER 107195

CHANGE 1

35 M/M Neg.



STARTING AIR SYSTEM FOR:	ZONE
1-1 (AS SHOWN)	II-A-1
1-2	II-B-1
1-3	II-C-1

INSTRUMENT SERVICE	SYM	UNIT 1-1 & 2-2	UNIT 1-2 & 2-1	UNIT 1-3
AIR RECEIVER CONDENSATE TRAP {B}	TRP	79	81	83
AIR RECEIVER CONDENSATE TRAP {A}	TRP	80	82	84
AIR COMPRESSOR STARTING SWITCH {B}	PS	199	209	219
AIR COMPRESSOR STARTING SWITCH {A}	PS	200	210	220
LOW AIR PRESSURE ALARM SWITCH {B}	PS	201	211	221
LOW AIR PRESSURE ALARM SWITCH {A}	PS	202	212	222
STARTING AIR PRESSURE INDICATOR {B}	PI	598	620	640
STARTING AIR PRESSURE INDICATOR {A}	PI	599	621	641
AIR RECEIVER PRESSURE INDICATOR {B}	PI	600	622	632
AIR RECEIVER PRESSURE INDICATOR {A}	PI	601	623	634
AIR RECEIVER RELIEF VALVE {B}	RV	263	265	272
AIR RECEIVER RELIEF VALVE {A}	RV	264	269	273
AIR-COMP DISCH. HEAD RELIEF VALVE {B}	RV	381	383	385
AIR-COMP DISCH. HEAD RELIEF VALVE {A}	RV	382	384	386

INSTRUMENT SERVICE	SYM	UNIT 1-1 & 2-2	UNIT 1-2 & 2-1	UNIT 1-3
START AIR MOTOR PRESS REDUCING VALVES {B}	PCV	100	103	105
START AIR MOTOR PRESS REDUCING VALVES {A}	PCV	102	104	106
START AIR MOTOR SOLENOID VALVE {B1}	SV	277	281	283
START AIR MOTOR SOLENOID VALVE {A1}	SV	278	282	284
START AIR MOTOR SOLENOID VALVE {B2}	SV	493	495	497
START AIR MOTOR SOLENOID VALVE {A2}	SV	494	496	498

STARTING AIR SYSTEM

TYPICAL FOR FIVE ENGINE-GEN UNITS
REF DC-663082-6

8 FOR UNIT 2 REPLACE THESE VALVES WITH ITEM 11 SPEC 8729 (-C/D) NS

9 VALVE TAG 45V1 SPECS ARE IN DWG 053479 (-C)

NOTES:

1. * DENOTES MANUFACTURER SUPPLIED INSTRUMENTS AND EQUIPMENT
2. FIELD PIPING THIS SYSTEM SHALL BE PG&E CLASS C UNLESS OTHERWISE NOTED.
3. {} MANUFACTURER NUMBER
4. ALL VALVES THIS SHEET, WITH PG&E ITEM NO. SHALL BE UNDER SPEC 8729 (DWG. 102039), UNLESS NOTED.
5. PRESSURE REDUCING VALVE PROVIDED WITH STRAINER (-C/D)
6. MOUNTED ON ENGINE CONTROL PANEL. (-C/D)
7. STARTING AIR SOLENOID VALVES AIR EQUIPPED WITH AN EMERGENCY MANUAL OPENING DEVICE. (-C/D)

SYSTEM NO. 24

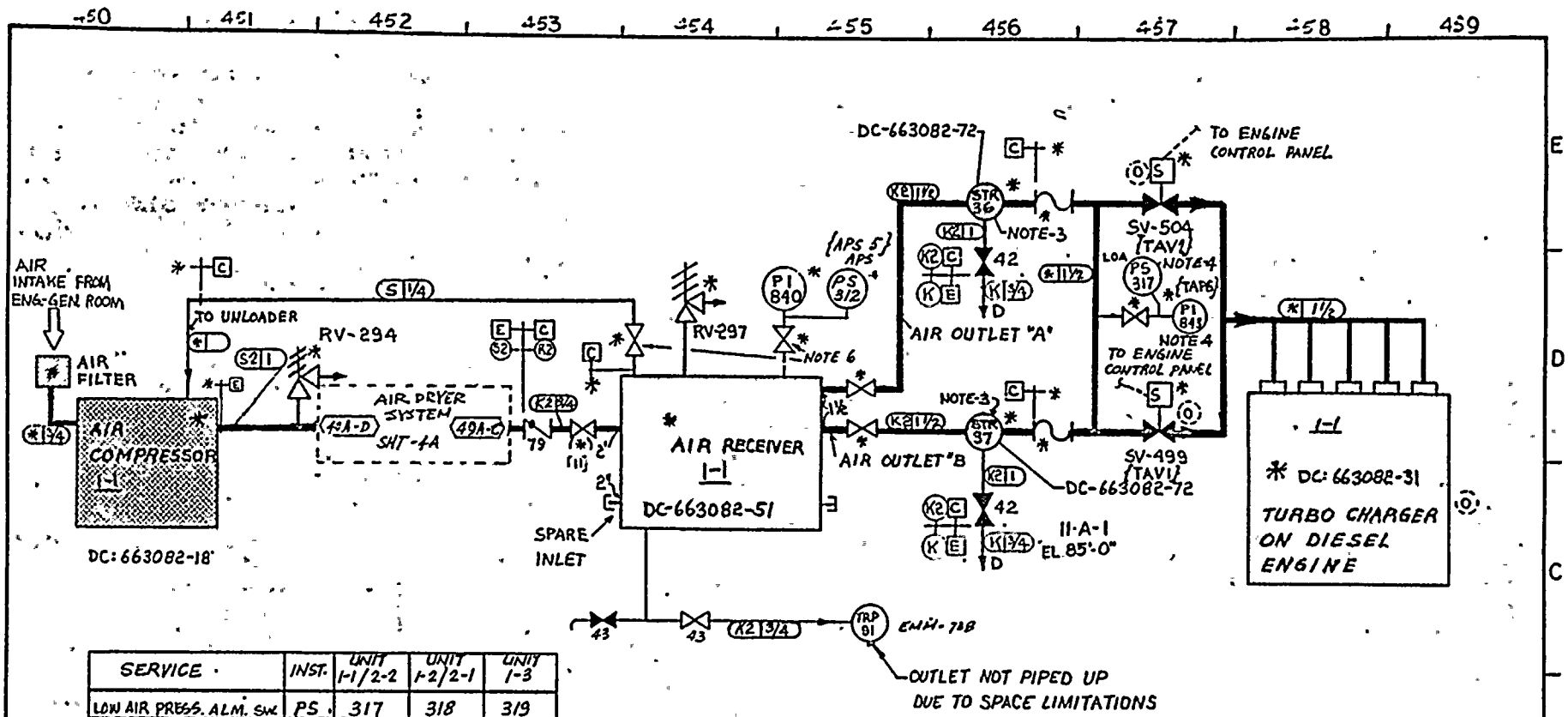
P.G.&E.CO.

SHEET NO. 44 OF SHEETS

DRAWING NUMBER 107195

CHANGE 1

AS BUILT



SERVICE	INST.	UNIT 1-1/2-2	UNIT 1-2/2-1	UNIT 1-3
LOW AIR PRESS. ALM. SW.	PS	317	318	319
AIR RECEIVER PRESSURE INDICATORS	PI	840	841	842
TURBO CHARGER AIR ASSIST INLET PRESS. INDICATOR		843	844	845
AIR COMPRESSOR START PRESS SWITCH	PS	312	313	314
AIR RECEIVER RELIEF VALVES	RV	297	298	299
AIR COMPRESSOR RELIEF VALVES		294	295	296
TURBO CHARGER INLET SOLENOID VALVES A	SV	499	505	506
TURBO CHARGER INLET SOLENOID VALVES B		504	500	501
AIR RECEIVER WATER TRAPS	TRP.	91	92	93
AIR RECEIVER OUTLET STRAINER A	STR	36	44	83
AIR RECEIVER OUTLET STRAINER B		37	45	84

TURBO CHARGER AIR ASSIST SYSTEM.

TYPICAL FOR FIVE ENG.-GEN UNITS
REF. DWG. DC-663082-31

SYSTEM NO. 24
REF. DWG.
102021 REV. 11 SH. 4
102021 REV. 2 SH. 5

NOTES:

1. * DENOTES MANUFACTURER SUPPLIED INSTRUMENTS AND EQUIPMENT
2. FIELD PIPING THIS SYSTEM SHALL BE PG&E CLASS C, UNLESS NOTED
3. AIR RECEIVER OUTLET STRAINERS BE INSTALLED HORIZONTALLY
4. MOUNTED ON ENGINE CONTROL PANEL. -D.
5. ALL VALVE ON THIS SHEET WITH PG&E ITEM NOS. SHALL BE UNDER SPEC. 8729 (DWG 102039) UNLESS NOTED -CLD
6. FOR UNIT 2 REPLACE THESE VALVE ITEM 11 SPEC 8729

RM INDEXED REV.

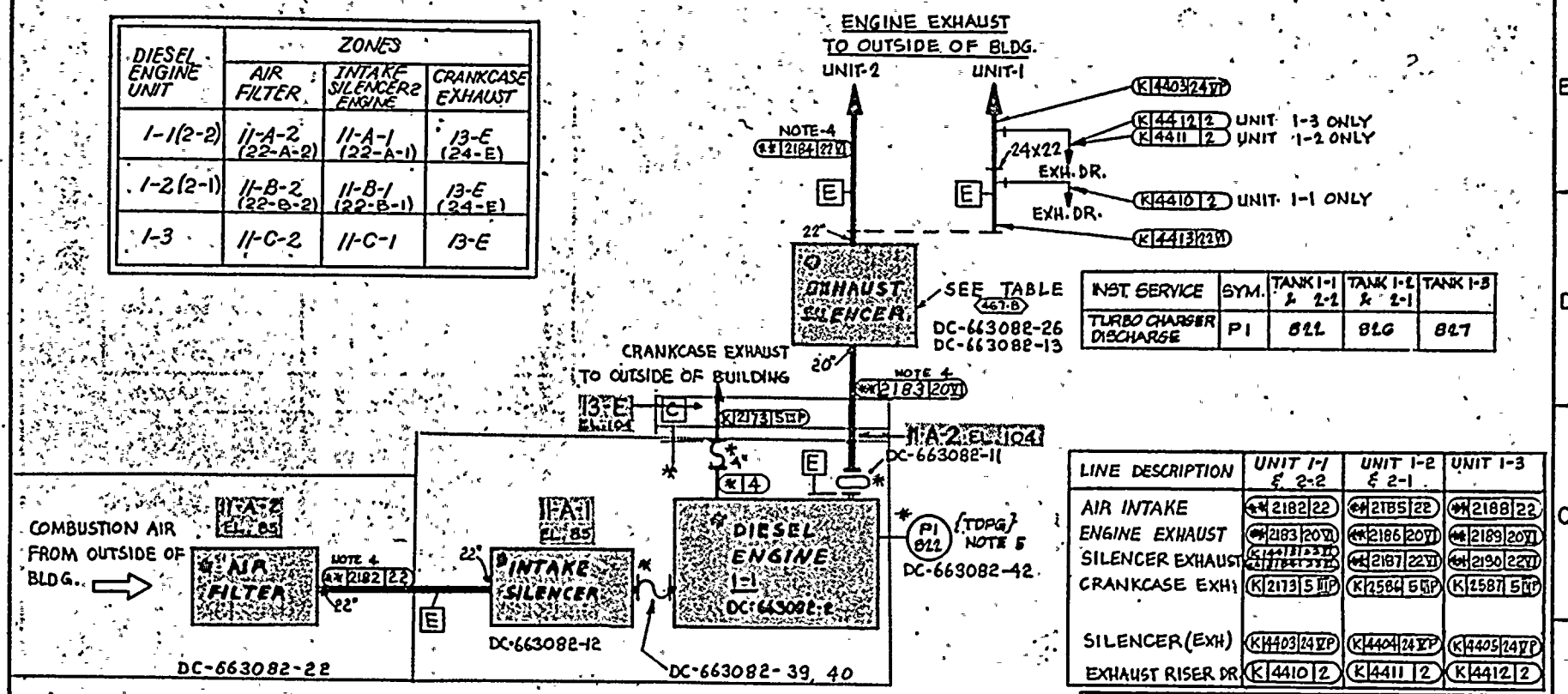
P.G.&E.CO.

SHEET NO. 45 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1

35 MM Neg.

460 461 462 463 464 465 466 467 468 469

DIESEL ENGINE UNIT	ZONES		
	AIR FILTER	INTAKE SILENCER ENGINE	CRANKCASE EXHAUST
1-1 (2-2)	11-A-2 (22-A-2)	11-A-1 (22-A-1)	13-E (24-E)
1-2 (2-1)	11-B-2 (22-B-2)	11-B-1 (22-B-1)	13-E (24-E)
1-3	11-C-2	11-C-1	13-E



INST. SERVICE	SYM.	TANK 1-1 & 2-2	TANK 1-2 & 2-1	TANK 1-3
TURBO CHARGER DISCHARGE	PI	822	826	827

LINE DESCRIPTION	UNIT 1-1 & 2-2	UNIT 1-2 & 2-1	UNIT 1-3
AIR INTAKE	** 2182 22	** 2185 22	** 2188 22
ENGINE EXHAUST	** 2183 20 YP	** 2186 20 YP	** 2189 20 YP
SILENCER EXHAUST	K 4412 2 YP K 4413 22 YP	** 2187 22 YP	** 2190 22 YP
CRANKCASE EXH.	K 2173 5 HP	K 2584 5 HP	K 2587 5 HP
SILENCER (EXH)	K 4403 24 YP	K 4404 24 YP	K 4405 24 YP
EXHAUST RISER DR	K 4410 2	K 4411 2	K 4412 2

EXHAUST SILENCERS		
UNIT 1-1/2-2	UNIT 1-2/2-1	UNIT 1-3
RIGHT ANGLE DC-663082-13	STRAIGHT THRU DC-663082-26	STRAIGHT THRU DC-663082-26

COMBUSTION AIR & EXHAUST SYSTEM

TYPICAL FOR FIVE ENG-GEN UNITS

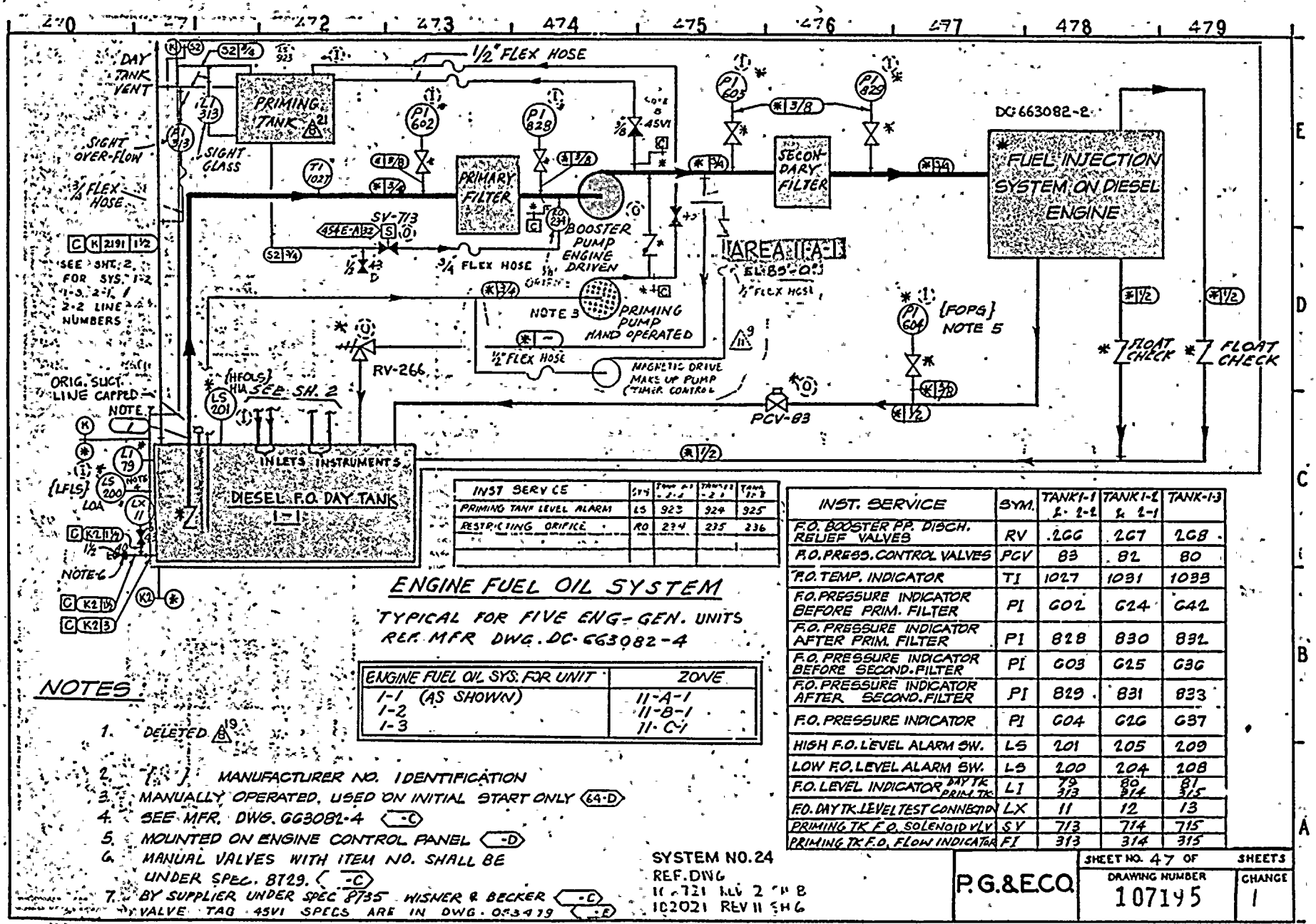
NOTES:

1. ☐ INDICATES PG&E PIPING CLASS
2. * DENOTES MANUFACTURER SUPPLIED INSTRUMENTS & EQUIPMENT
3. {} MANUFACTURER NUMBER IDENTIFICATION
4. "**" PIPING TO BE INSTALLED UNDER SPEC. 8711, & PROVIDED UNDER DC-663084-1
5. MOUNTED ON ENGINE CONTROL PANEL ⬭

SYSTEM NO. 24
REF. DWG.
106721 REV. 2 SH. 7
102021 REV. 7 SH. 5

INDEXED REV. ____

P.G.&E.CO.	SHEET NO. 46 OF SHEETS	
	DRAWING NUMBER 107195	CHANGE 1



INST SERVICE	SYM	TANK 1-1 & 2-2	TANK 1-2 & 2-1	TANK 1-3
PRIMING TANK LEVEL ALARM	LS	923	924	925
RESTRICTING ORIFICE	RO	234	235	236

ENGINE FUEL OIL SYSTEM

TYPICAL FOR FIVE ENG-GEN. UNITS
REF. MFR DWG. DC-663082-4

ENGINE FUEL OIL SYS. FOR UNIT	ZONE
1-1 (AS SHOWN)	11-A-1
1-2	11-B-1
1-3	11-C-1

INST. SERVICE	SYM.	TANK 1-1 & 2-2	TANK 1-2 & 2-1	TANK 1-3
F.O. BOOSTER PP. DISCH. RELIEF VALVES	RV	266	267	268
F.O. PRESS. CONTROL VALVES	PCV	83	82	80
F.O. TEMP. INDICATOR	TI	1027	1031	1033
F.O. PRESSURE INDICATOR BEFORE PRIM. FILTER	PI	602	624	642
F.O. PRESSURE INDICATOR AFTER PRIM. FILTER	PI	828	830	832
F.O. PRESSURE INDICATOR BEFORE SECOND. FILTER	PI	603	625	636
F.O. PRESSURE INDICATOR AFTER SECOND. FILTER	PI	829	831	833
F.O. PRESSURE INDICATOR	PI	604	626	637
HIGH F.O. LEVEL ALARM SW.	LS	201	205	209
LOW F.O. LEVEL ALARM SW.	LS	200	204	208
F.O. LEVEL INDICATOR DAY TK / PRIM. TK	LI	79 / 313	80 / 314	81 / 315
F.O. DAY TK. LEVEL TEST CONNECTION	LX	11	12	13
PRIMING TK F.O. SOLENOID VLV	SV	713	714	715
PRIMING TK F.O. FLOW INDICATOR	FI	313	314	315

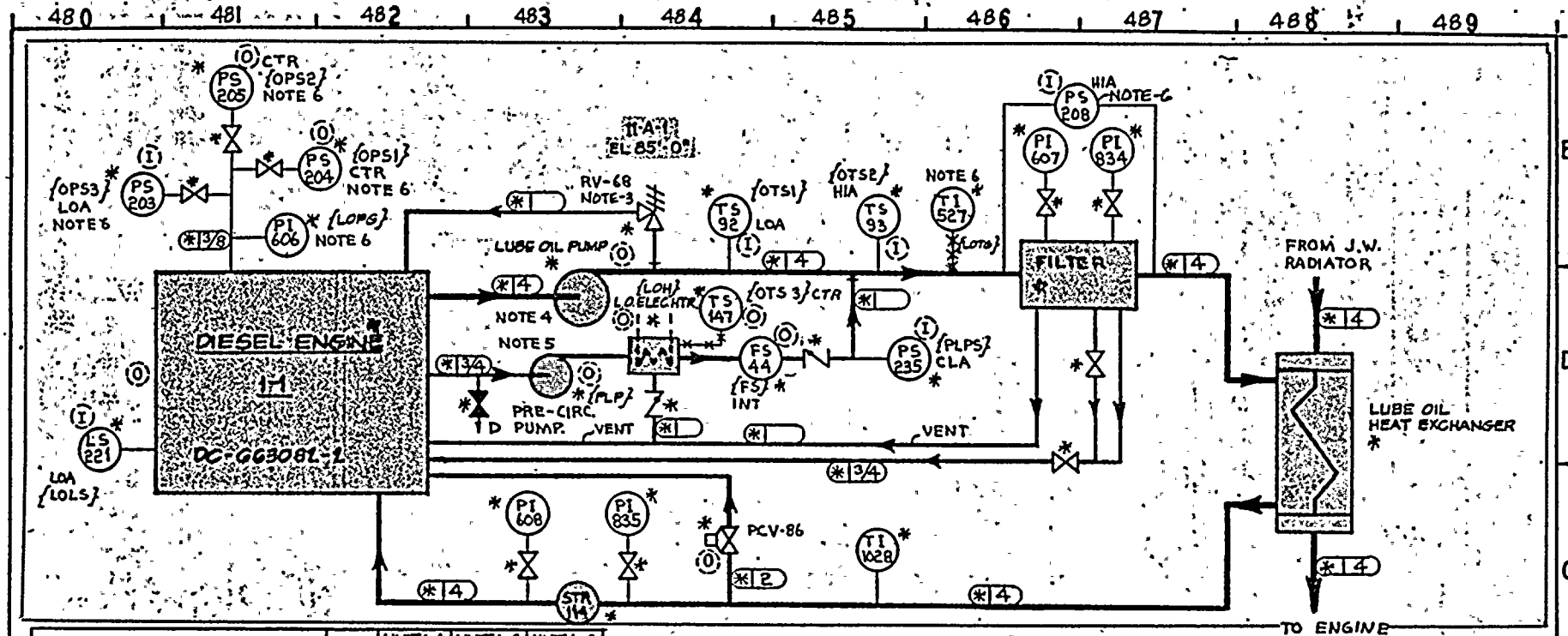
NOTES:

1. DELETED (19)
2. ( ) MANUFACTURER NO. IDENTIFICATION
3. MANUALLY OPERATED, USED ON INITIAL START ONLY (64-D)
4. SEE MFR. DWG. GG3081-4 (-C)
5. MOUNTED ON ENGINE CONTROL PANEL (-D)
6. MANUAL VALVES WITH ITEM NO. SHALL BE UNDER SPEC. 8729. (-C)
7. BY SUPPLIER UNDER SPEC 8735 WISNER & BECKER (-C) VALVE TAG 45VI SPECS ARE IN DWG. 0F3479 (-E)

SYSTEM NO. 24
REF. DWG
102021 REV 11 SH 6

P.G.&E.CO.

SHEET NO. 47 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1



INSTRUMENT SERVICE	SYM.	UNIT 1-1 & 1-2	UNIT 1-2 & 1-1	UNIT 1-3
LUBE OIL PP. RELIEF VALVE	RV	G8	G9	70
LOW L.O. PRESS. SHUTDOWN SW.	PS	204	213	223
LOW L.O. PRESS. SHUTDOWN SW.		205	214	224
LOW L.O. PRESS. ALARM SW.		203	215	225
PRE. CIRC. L.O. PP. FAILURE ALARM		235	236	237
HI ΔP. ACROSS L.O. FILTER ALARM SW.		208	216	226
L.O. PRESS. IND. BEFORE FILTER	PI	G07	G27	G38
L.O. — — AFTER FILTER		834	836	838
L.O. — — BEFORE STRAINER		835	837	839
L.O. — — AFTER STRAINER		G08	G28	G44
L.O. PRESS. IND.		G06	G29	G39
L.O. HEATER START SWITCH	TS	147	148	149
LOW L.O. TEMP. ALARM SWITCH		91	96	99
HIGH L.O. TEMP. ALARM SWITCH		93	97	100
L.O. COOLER DISCH. STRAINER	STR	114	115	116
L.O. HEATER START INTERLOCK SW.	FS	44	45	46
LOW L.O. LEVEL ALARM SWITCH	LS	221	227	228
LUBE OIL STRAINER BYPASS VALVE	PCV	86	87	88
LUBE OIL TEMP IND.	TI	527	504	505
L.O. HX DISCH TEMP INDICATOR		1028	1032	1034

LUBE OIL SYSTEM

TYPICAL FOR FIVE ENG-GEN. UNITS
REF. DWG. DC-GG30B2-1G

LUBE OIL SYS. FOR UNIT		ZONE
1-1	(AS SHOWN) (2-2)	11-A-1 (22-A-1)
1-2	(2-1)	11-B-1 (22-B-1)
1-3		11-C-1

NOTES:

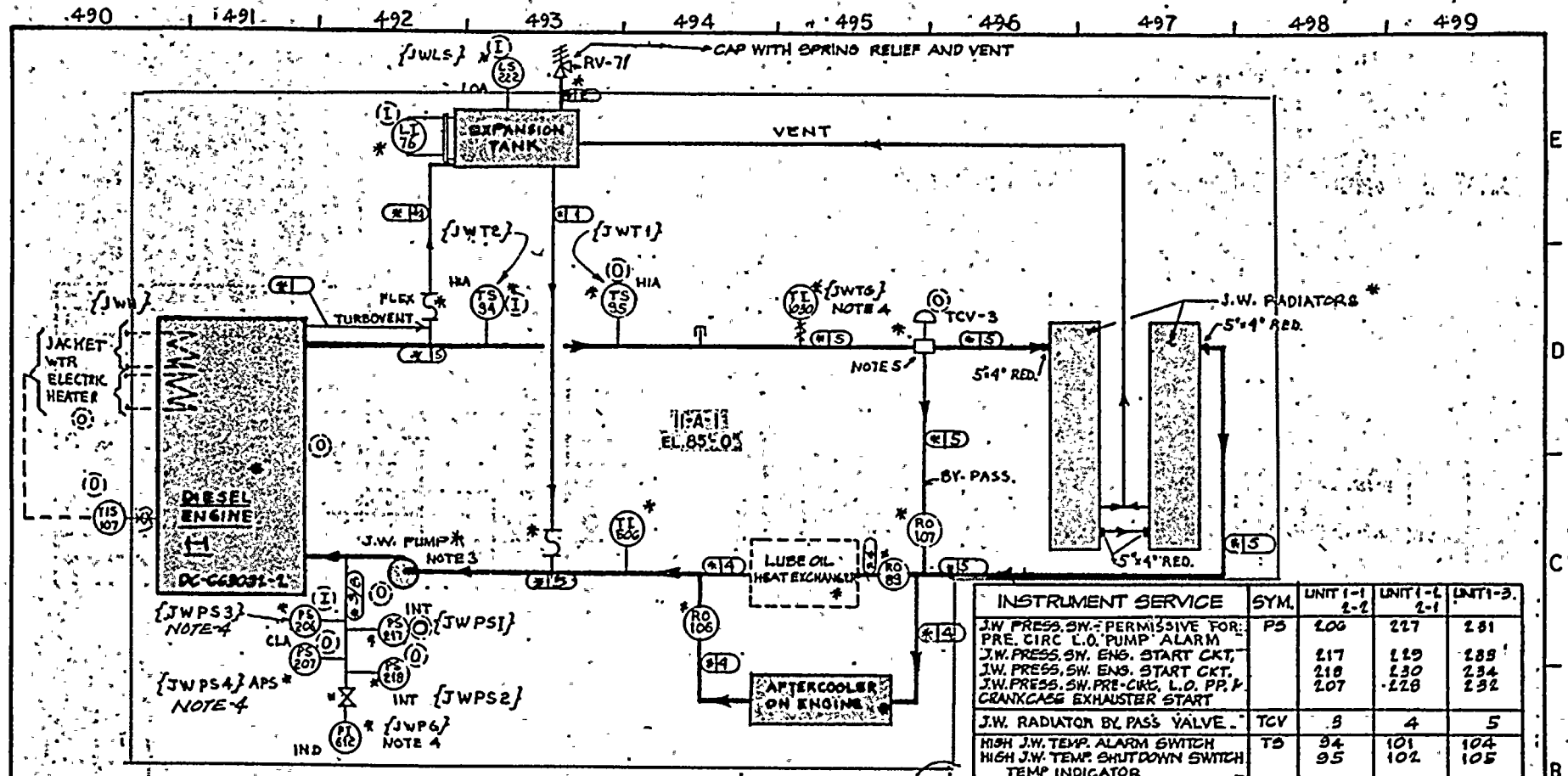
1. THIS SYSTEM PROVIDED COMPLETELY INSTALLED WITH ENGINE-GENERATOR UNITS
2. { } MANUFACTURER NO.
3. RELIEF VALVE BUILT IN TO PUMP
4. ENGINE DRIVEN LUBE OIL PUMP. -D
5. PRE-CIRC. L.O. PUMP IS ELECTRIC MOTOR DRIVEN. -D
6. MOUNTED ON ENGINE CONTROL PANEL. -E

SYSTEM NO. 24
REF. DWG.
106721 REV. 2 SH. 9
102021 REV. 10 SH. 7

ISSUED REV. —

P.G.&E.CO.	SHEET NO. 48 OF SHEETS	
	DRAWING NUMBER 107195	CHANGE 1

35 MM



ENGINE JACKET WATER COOLING SYSTEM

TYPICAL FOR FIVE ENG-GEN UNITS

REF. DWG: DC-663082-17

NOTES:

1. THIS SYSTEM PROVIDED COMPLETELY INSTALLED WITH ENGINE-GEN. UNITS.
2. { } MANUFACTURER NO.
3. ENGINE DRIVEN JACKET WATER PUMP. (—)
4. MOUNTED ON ENGINE CONTROL PANEL. (— —)
5. SELF-CONTAINED CONTROL VALVE, FOR OPERATION SEE MANUFACTURER TECHNICAL MANUAL DC-663082-60 (—)

ENGINE JACKET WTR. CLG. SYS. FOR		ZONE
1-1	(AS SHOWN) (2-2)	11-A-1 (22-A-1)
1-2	(2-1)	11-B-1 (22-B-1)
1-3		11-C-1

SYSTEM NO. 24
REF. DWG.
106721 REV. 2 SH. 10
102021 REV. 11 SH. 8

INSTRUMENT SERVICE	SYM.	UNIT 1-1 2-2	UNIT 1-2 2-1	UNIT 1-3
J.W. PRESS. SW. - PERMISSIVE FOR: PRE. CIRC L.O. PUMP ALARM	PS	206	211	281
J.W. PRESS. SW. ENG. START CKT.		217	229	288
J.W. PRESS. SW. ENG. START CKT.		218	230	234
J.W. PRESS. SW. PRE-CIRC. L.O. PP. & CRANKCASE EXHAUSTER START		207	228	232
J.W. RADIATOR BY PASS VALVE	TCV	3	4	5
HIGH J.W. TEMP. ALARM SWITCH	TS	94	101	104
HIGH J.W. TEMP. SHUTDOWN SWITCH		95	102	105
TEMP INDICATOR J.W. HEATER START SWITCH	TIS	107	108	109
J.W. FLOW BALANCING ORIFICE	RO	89	90	91
		106	108	110
		107	109	111
J.W. EXPANSION TK. PRESS. RELIEF CAP	RV	71	72	75
LOW J.W. EXPANSION TK LEVEL ALARM SW.	LS	222	229	290
J.W. PRESSURE INDICATOR	PI	612	643	648
J.W. EXPANSION TK. LEVEL IND.	LI	76	77	78
J.W. TEMP. INDICATOR	TI	606	607	608
J.W. TEMP INDICATOR		1090	1035	1036

P.G.&E.CO.

SHEET NO. 49 OF SHEETS

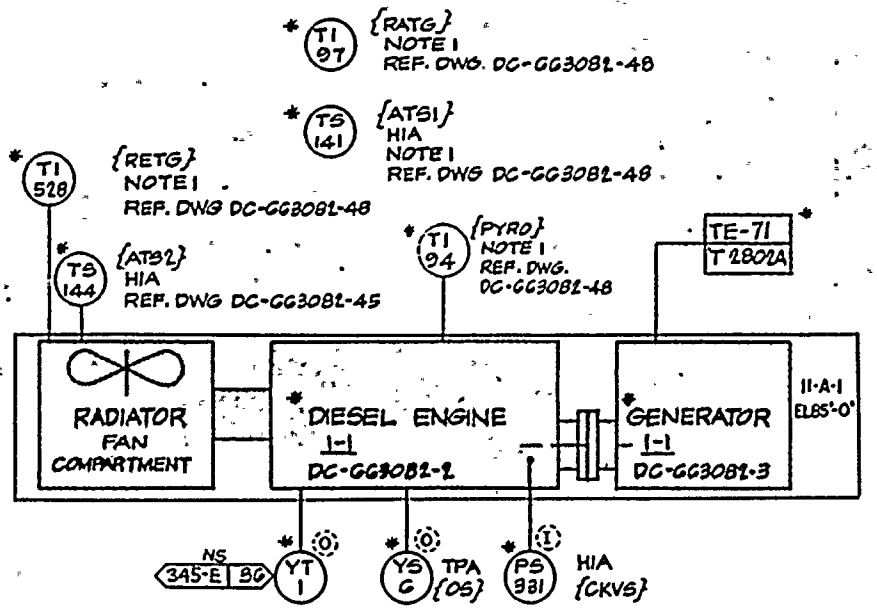
DRAWING NUMBER 107195

CHANGE 1

500 501 502 503 504 505 506 507 508 509

E D C B A

INSTRUMENT SERVICE	SYM.	UNIT 1-1 & 2-1	UNIT 1-2 & 2-1	UNIT 1-3
CRANKCASE VACUUM ALARM SWITCH	PS	331	332	333
DIESEL GEN. STATOR TEMP. ELEMENT	TE	71	72	73
	COMP	T-2802A T-2803A	T-2803A T-2803A	T2804A
ENGINE TACHOMETER TRANSMITTER	YT	1	2	3
ENGINE OVERSPEED TRIP	YS	6	7	8
RADIATOR DISCH. TEMP. INDICATOR	TI	528	529	540
HI ROOM AIR TEMP ALARM SWITCH	TS	141	142	143
HI RADIATOR DISCH. TEMP. ALARM SW.		144	145	146
PYROMETER-CYLINDER TEMP(3 PT)	TI	94	95	96
ROOM AIR TEMP. INDICATOR	TI	97	98	99



MISC. INSTR'S FOR ENG.-GEN UNIT	ZONE
1-1 (AS SHOWN) (2-2) (2-1)	11-A-1 (22-A-1)
1-2	11-B-1 (22-B-1)
1-3	11-C-1

NOTE:

1. MOUNTED ON ENGINE CONTROL PANEL ⬡

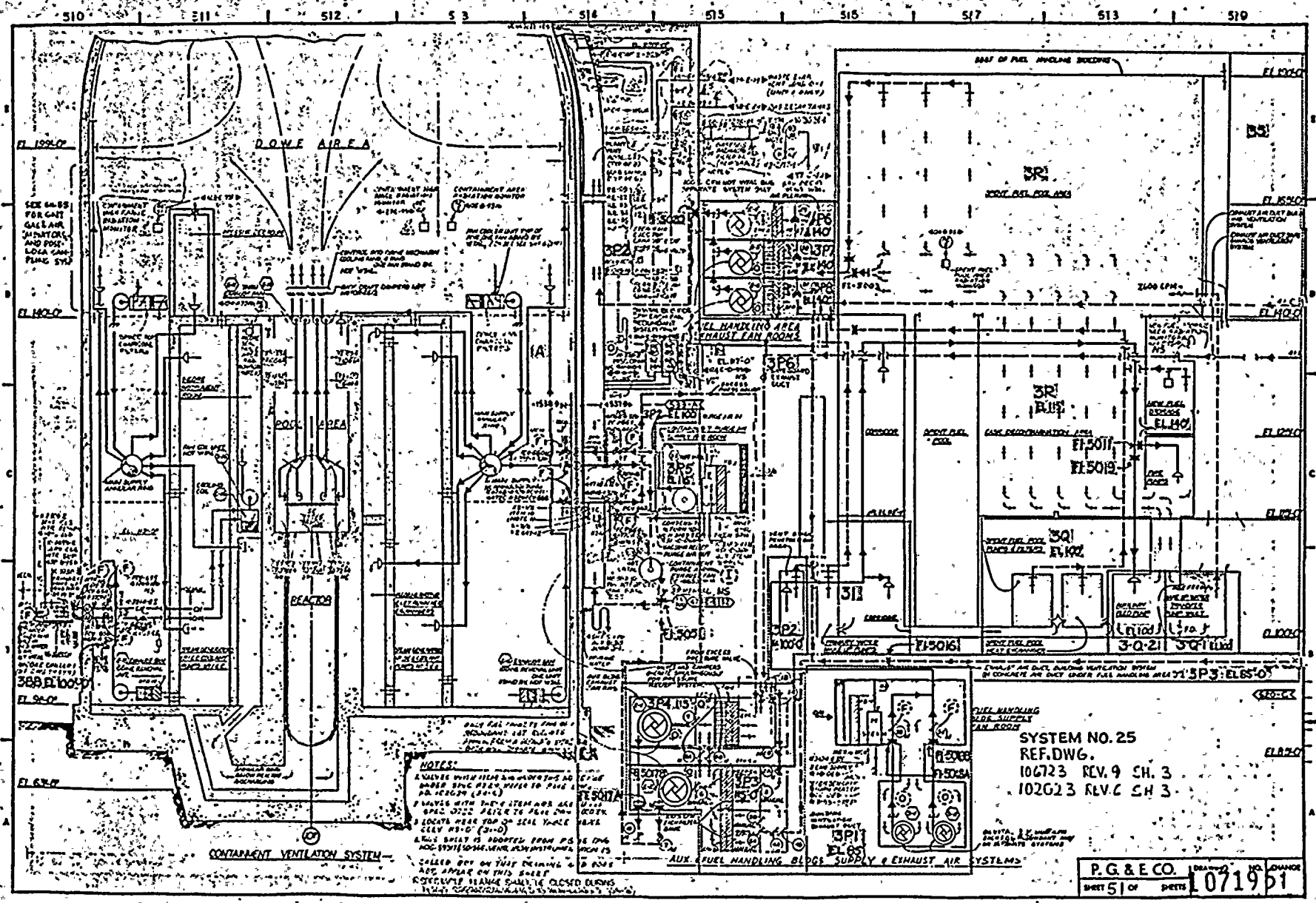
MISC. INSTRUMENTS FOR ENGINE GENERATOR UNITS
TYPICAL FOR FIVE ENG. GEN. UNITS

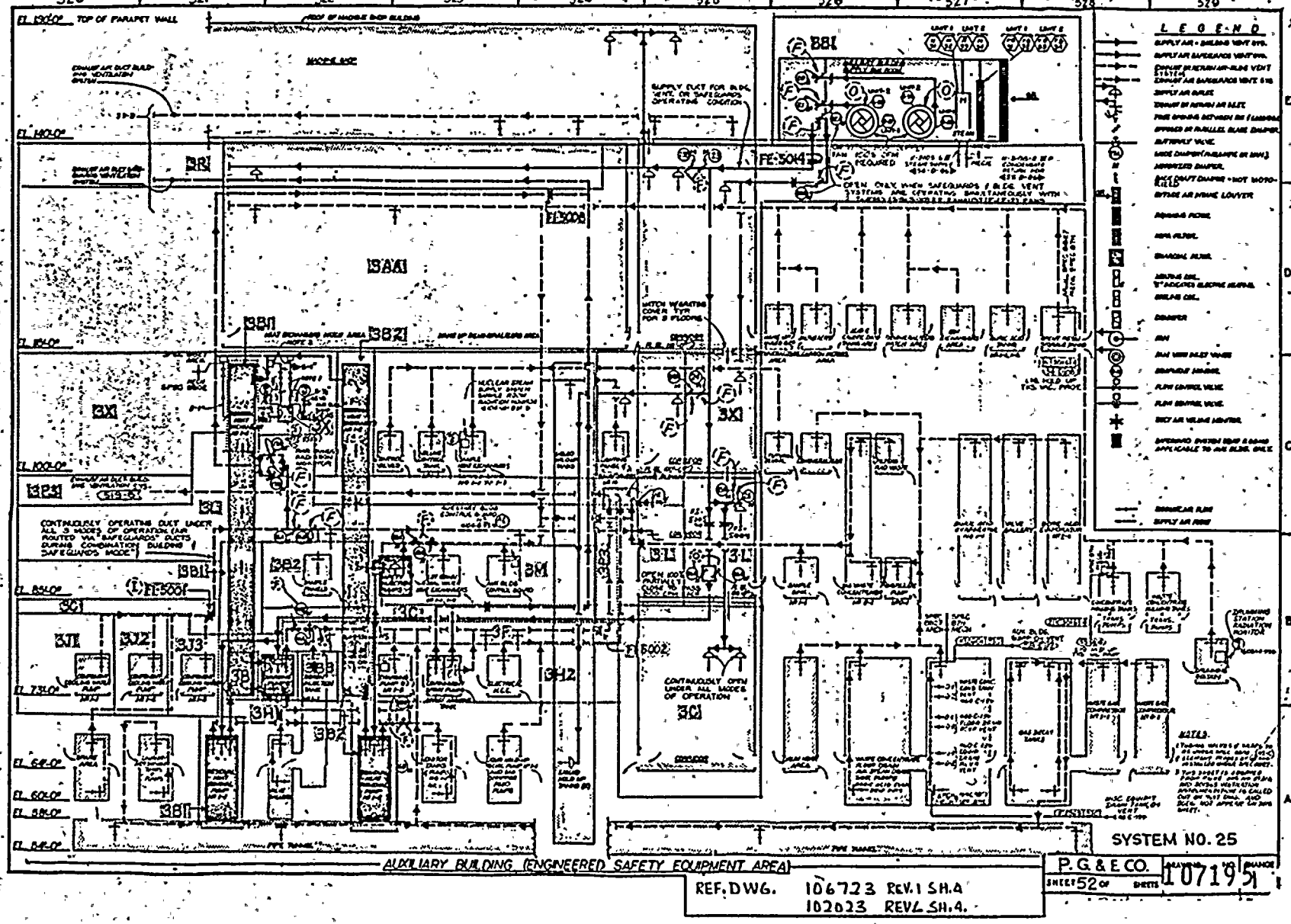
SYSTEM NO. 24
REF. DWG
106721 REV 2 SH. 11
102021 REV. 7 SH 9

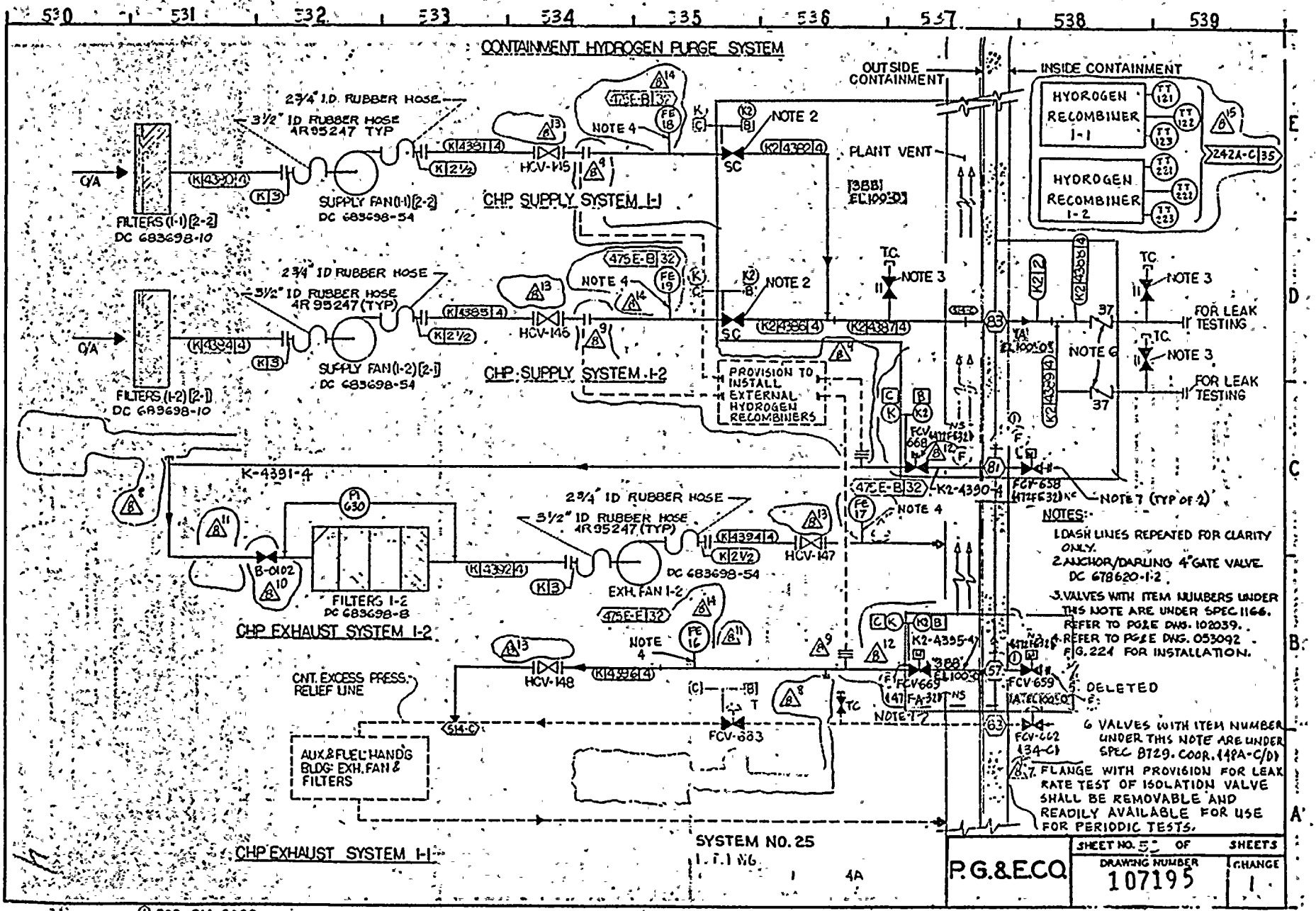
8" 18 3/4"

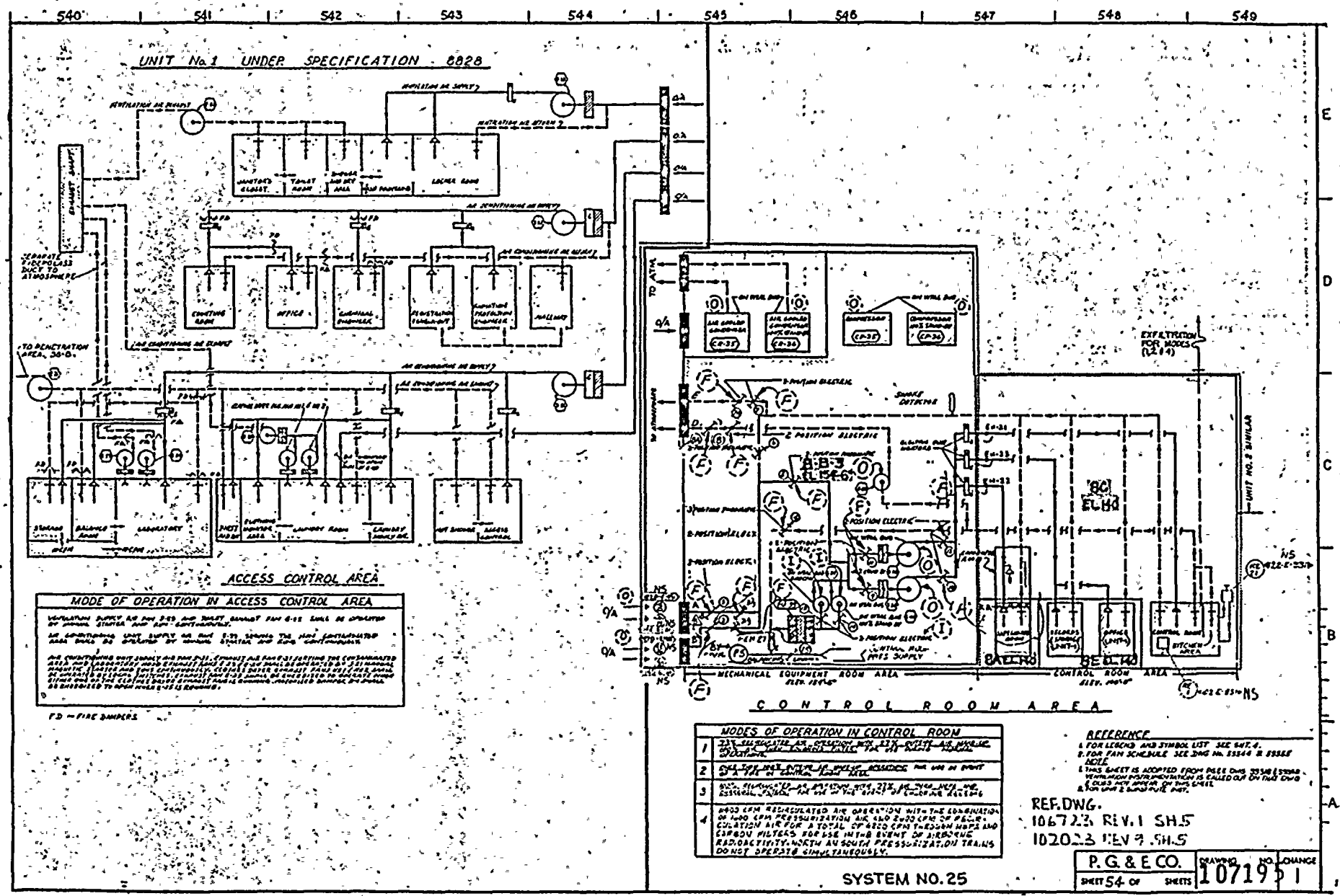
P.G.&E.CO.	SHEET NO. 59 OF SHEETS	CHANGE
	DRAWING NUMBER 107195	1

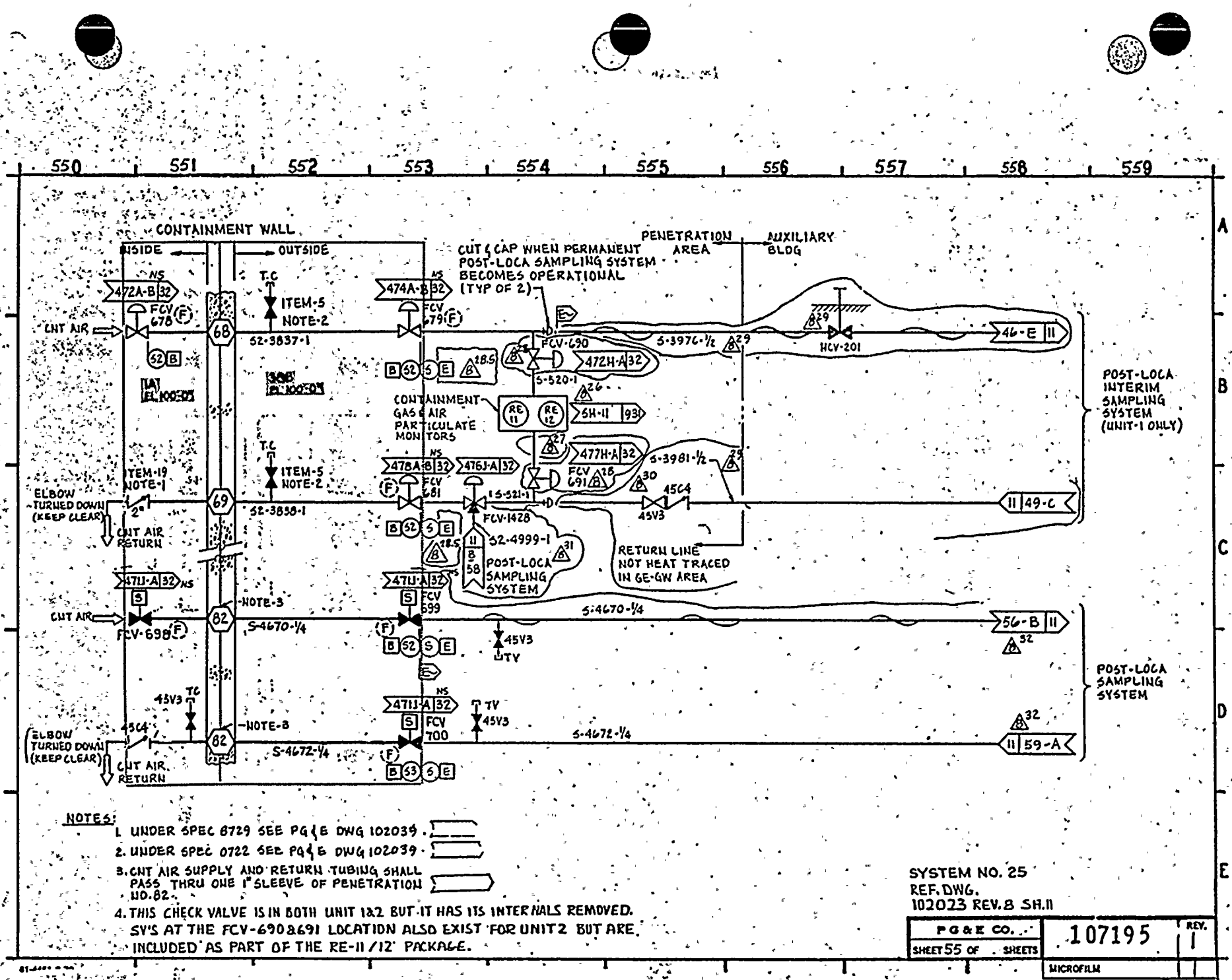
35 MM


DOME AREA
REACTOR
POOL AREA
CONTAINMENT VENTILATION SYSTEM
AUX. & FUEL HANDLING BLDG. SUPPLY & EXHAUST AIR SYSTEMS
SYSTEM NO. 25
REF. DWG.
106723 REV. 9 SH. 3
102023 REV. 6 SH. 3
P. G. & E. CO.
SHEET 51 OF SHEETS
DRAWING NO. 107195
CHANGE
INDEXED REV.


520
521
522
523
524
525
526
527
528
529
EL 130'-0" TOP OF PARAPET WALL
EL 140'-0"
EL 85'-0"
EL 100'-0"
EL 85'-0"
EL 73'-0"
EL 64'-0"
EL 60'-0"
EL 58'-0"
EL 48'-0"
FE-5004
FE-5005
FE-5001
FE-5002
3A1
3B1
3B2
3X
3C1
3C2
3H
3M
3L
3P1
3P2
3T
3T1
3T2
3T3
3V1
3V2
CONTINUOUSLY OPERATING DUCT LINER ALL 3 MODE OPERATION. AIR ROUTED VIA SAFEGUARDS DUCTS DURING COMBINATION SAFEGUARDS MODE
CONTINUOUSLY OPEN UNDER ALL MODES OF OPERATION
OPEN ONLY WHEN SAFEGUARDS F.B.D.E. VENT SYSTEMS ARE OPERATING SIMULTANEOUSLY WITH
SUPPLY DUCT FOR B.D.E. VENT. OR SAFEGUARDS OPERATING CONDITION
LEGEND
NOTES:
AUXILIARY BUILDING (ENGINEERED SAFETY EQUIPMENT AREA)
SYSTEM NO. 25
P.G.&E.CO.
SHEET 52 OF SHEETS
REF. DWG. 106723 REV. 1 SH. 4
102023 REV. 2 SH. 4.
107195


CONTAINMENT HYDROGEN PURGE SYSTEM
OUTSIDE CONTAINMENT
INSIDE CONTAINMENT
HYDROGEN RECOMBINER 1-1
HYDROGEN RECOMBINER 1-2
2¾" I.D. RUBBER HOSE
3½" ID RUBBER HOSE 4R95247 TYP
SUPPLY FAN(1-1)[2-2] DC 683698-54
FILTERS (1-1)[2-2] DC 683698-10
CHP SUPPLY SYSTEM 1-1
PLANT VENT
SUPPLY FAN(1-2)[2-1] DC 683698-54
FILTERS (1-2)[2-1] DC 683698-10
CHP SUPPLY SYSTEM 1-2
PROVISION TO INSTALL EXTERNAL HYDROGEN RECOMBINERS
FOR LEAK TESTING
K-4391-4
FILTERS 1-2 DC 683698-8
CHP EXHAUST SYSTEM 1-2
EXH. FAN 1-2 DC 683698-54
CNT. EXCESS PRESS. RELIEF LINE
AUX & FUEL HANDG BLDG: EXH. FAN & FILTERS
CHP EXHAUST SYSTEM 1-1
SYSTEM NO. 25
NOTES:
1. DASH LINES REPEATED FOR CLARITY ONLY.
2. ANCHOR/DARLING 4" GATE VALVE DC 678620-1-2.
3. VALVES WITH ITEM NUMBERS UNDER THIS NOTE ARE UNDER SPEC 1166. REFER TO PG&E DWG. 102039.
4. REFER TO PG&E DWG. 053092 FIG. 224 FOR INSTALLATION.
5. DELETED
6. VALVES WITH ITEM NUMBER UNDER THIS NOTE ARE UNDER SPEC B129. COOR. (48A-C/D)
7. FLANGE WITH PROVISION FOR LEAK RATE TEST OF ISOLATION VALVE SHALL BE REMOVABLE AND READILY AVAILABLE FOR USE FOR PERIODIC TESTS.
P.G.&E.CO.
SHEET NO. 5 OF SHEETS
DRAWING NUMBER 107195
CHANGE 1
RM INDEXED REV. 1
DCO-GM-2409


UNIT No. 1 UNDER SPECIFICATION 8828
ACCESS CONTROL AREA
MODE OF OPERATION IN ACCESS CONTROL AREA
F.D. = FIRE DAMPERS
CONTROL ROOM AREA
MODES OF OPERATION IN CONTROL ROOM
REFERENCE
REF. DWG.
106723 REV. 1 SH. 5
102023 REV. 9 SH. 5
SYSTEM NO. 25
P. G. & E. CO.
SHEET 54 OF SHEETS
DRAWING NO. 107195
CHANGE 1

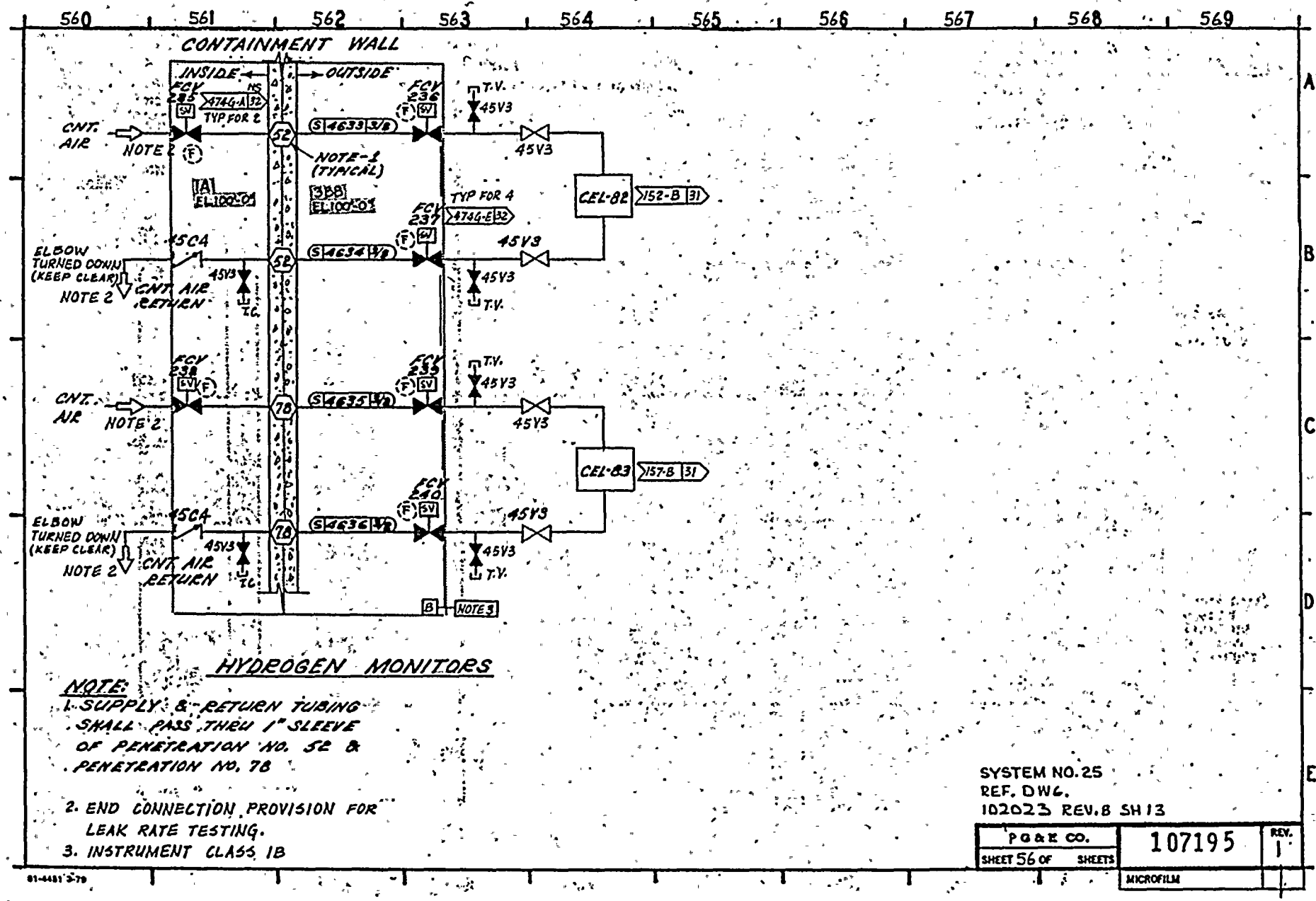


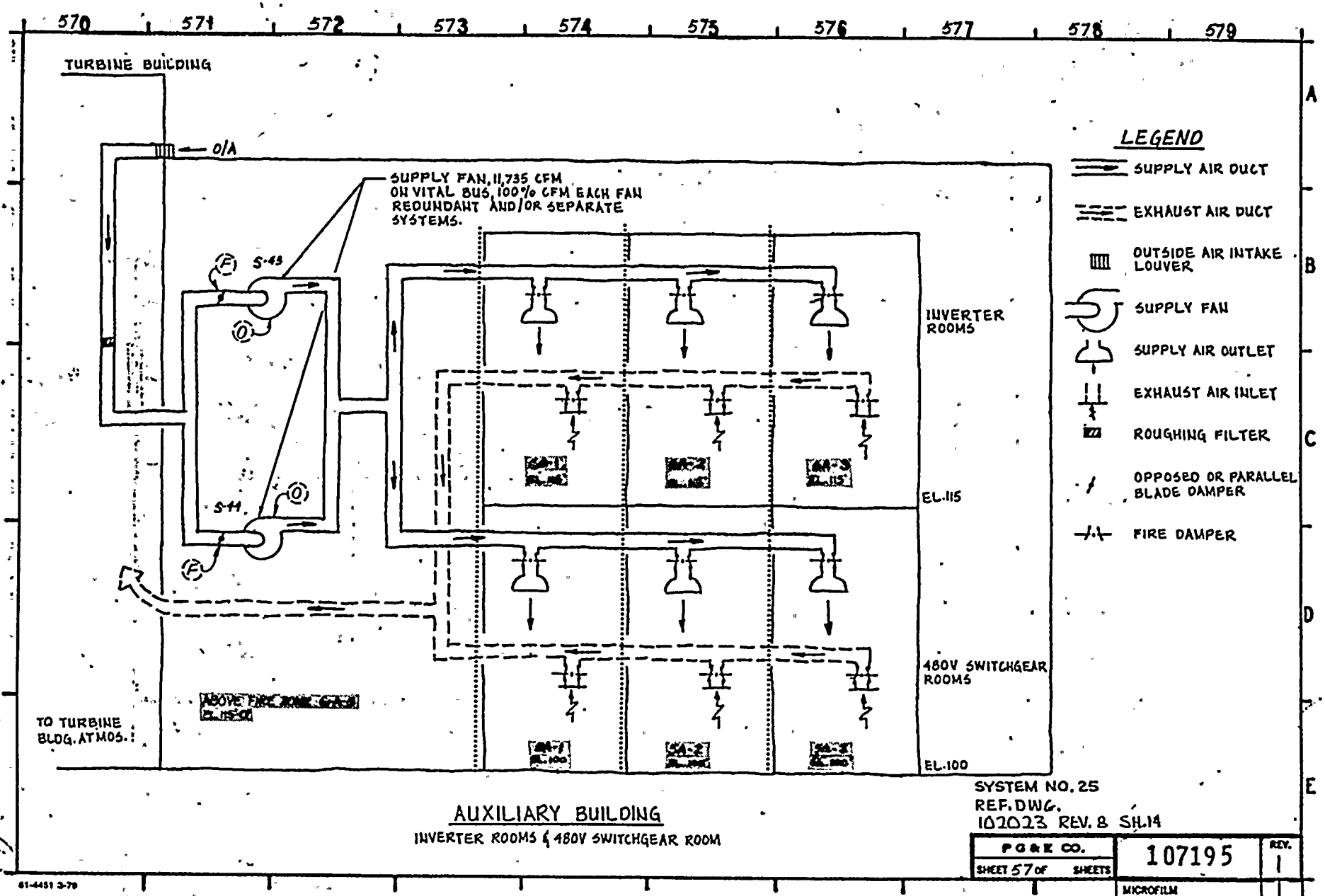
NOTES:

1. UNDER SPEC 8729 SEE PG&E DWG 102039.
2. UNDER SPEC 0722 SEE PG&E DWG 102039.
3. CNT AIR SUPPLY AND RETURN TUBING SHALL PASS THRU ONE 1" SLEEVE OF PENETRATION NO. 82.
4. THIS CHECK VALVE IS IN BOTH UNIT 1&2 BUT IT HAS ITS INTERNALS REMOVED. SV'S AT THE FCV-690&691 LOCATION ALSO EXIST FOR UNIT 2 BUT ARE INCLUDED AS PART OF THE RE-11/12 PACKAGE.

SYSTEM NO. 25
REF. DWG.
102023 REV. 8 SH. 11

PG&E CO.	107195	REV. 1
SHEET 55 OF SHEETS	MICROFILM	


560
561
562
563
564
565
566
567
568
569
CONTAINMENT WALL
INSIDE
OUTSIDE
FCV 235
FCV 236
FCV 237
FCV 238
FCV 240
CNT. AIR
NOTE 2
NOTE-1 (TYPICAL)
TYP FOR 2
TYP FOR 4
T.V.
45V3
CEL-82
152-B 31
CEL-83
157-B 31
ELBOW TURNED DOWN (KEEP CLEAR)
CNT. AIR RETURN
NOTE 3
HYDROGEN MONITORS
NOTE:
1. SUPPLY & RETURN TUBING SHALL PASS THRU 1" SLEEVE OF PENETRATION NO. 52 & PENETRATION NO. 78
2. END CONNECTION PROVISION FOR LEAK RATE TESTING.
3. INSTRUMENT CLASS 1B
SYSTEM NO. 25
REF. DWG.
102023 REV. 8 SH 13
PG&E CO.
SHEET 56 OF SHEETS
107195
REV. 1
MICROFILM
RM INDEXED REV.



AUXILIARY BUILDING

INVERTER ROOMS & 480V SWITCHGEAR ROOM

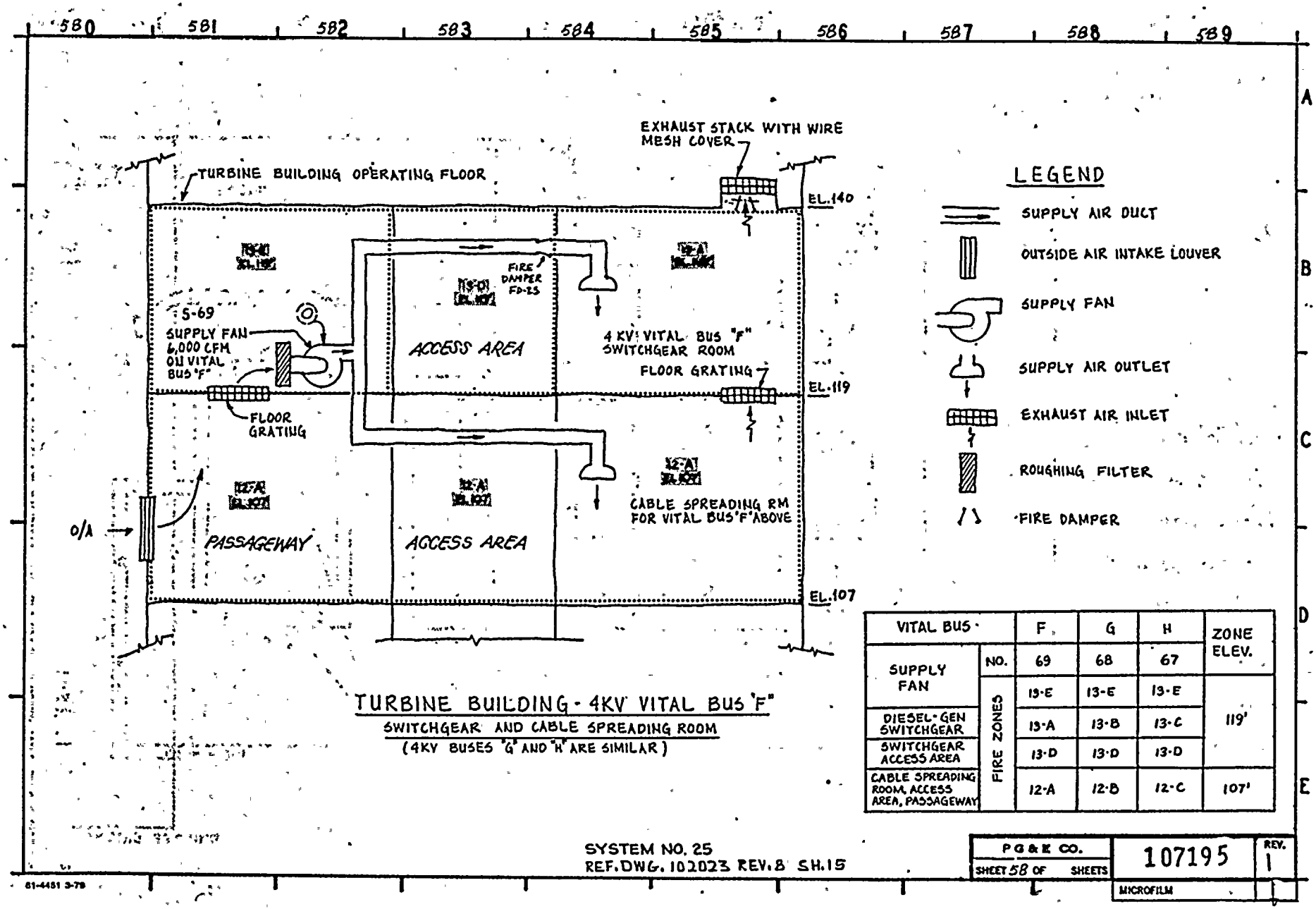
SYSTEM NO. 25

REF. DWG. 102023 REV. 8 SH. 14

PG&E CO.	107195	REV.
SHEET 57 OF SHEETS	MICROFILM	1

RM INDEXED REV. ____

81-4451 3-79



TURBINE BUILDING - 4KV VITAL BUS 'F'

SWITCHGEAR AND CABLE SPREADING ROOM

(4KV BUSES 'G' AND 'H' ARE SIMILAR)

VITAL BUS		F	G	H	ZONE ELEV.
SUPPLY FAN	NO.	69	68	67	
DIESEL-GEN SWITCHGEAR	FIRE ZONES	13-E	13-E	13-E	119'
SWITCHGEAR ACCESS AREA		13-A	13-B	13-C	
CABLE SPREADING ROOM, ACCESS AREA, PASSAGEWAY		13-D	13-D	13-D	
		12-A	12-B	12-C	107'

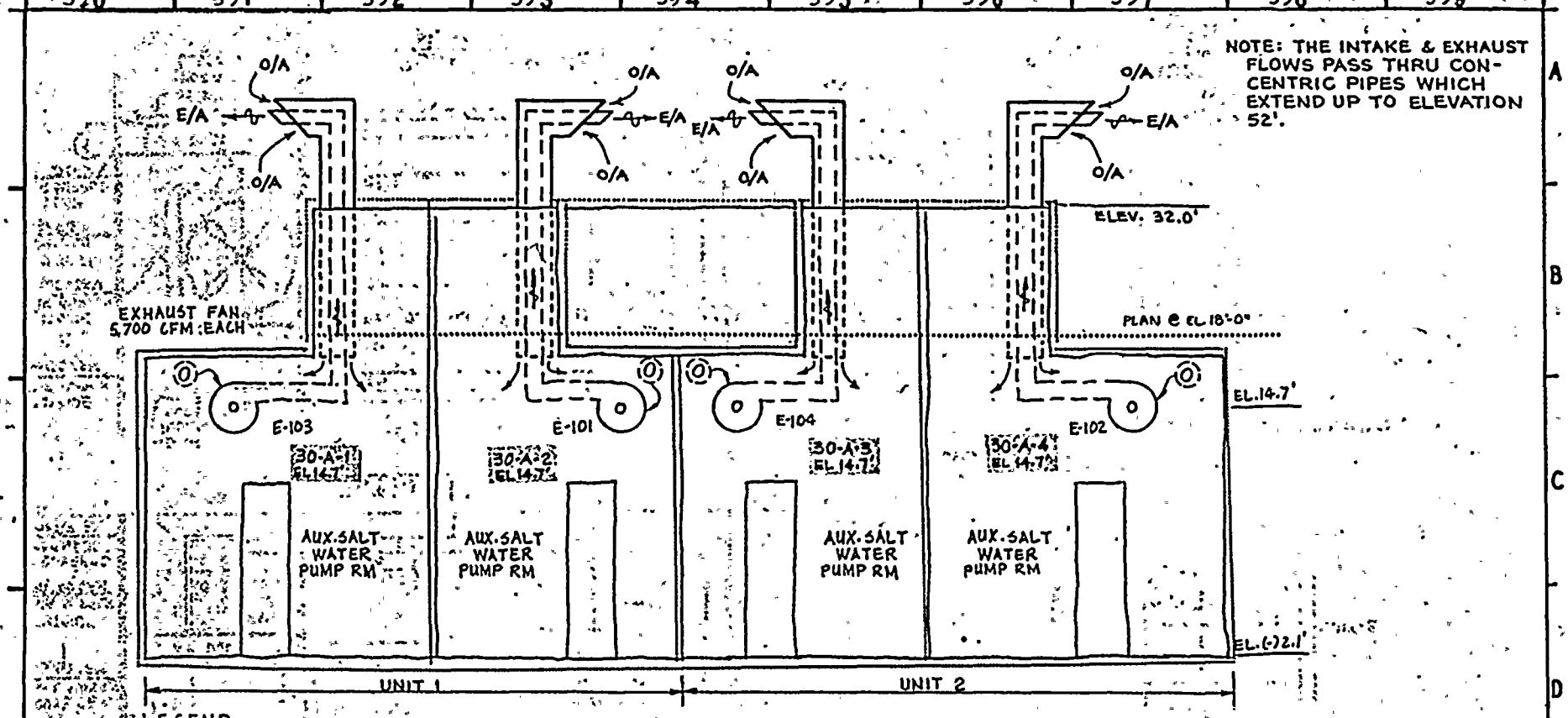
SYSTEM NO. 25

REF. DWG. 102023 REV. 8 SH. 15

P G & E CO.	107195	REV.
SHEET 58 OF SHEETS		1
	MICROFILM	

INDEXED REV.

61-4451 3-79



INTAKE STRUCTURE
AUXILIARY SALTWATER PUMP ROOM

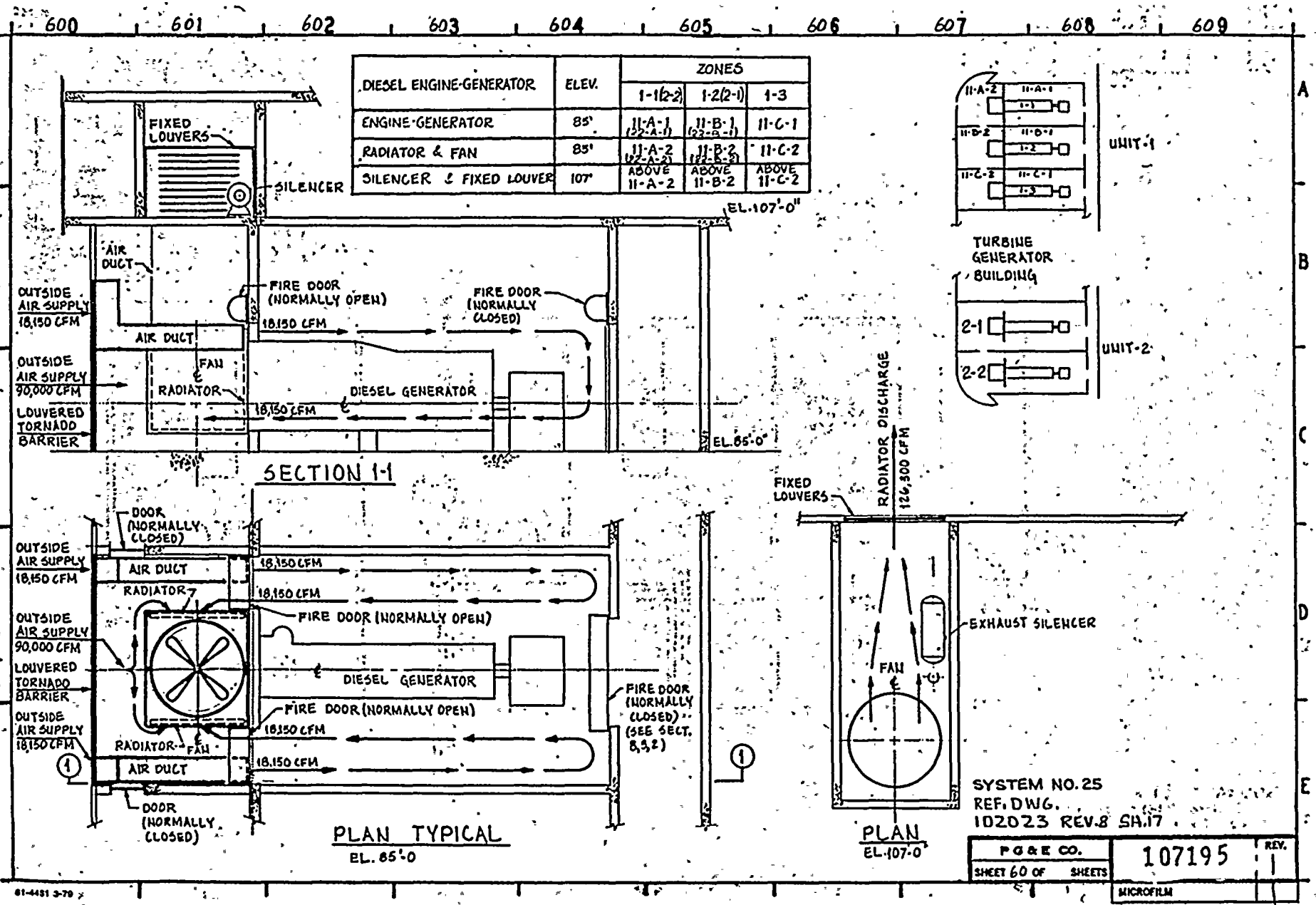
SYSTEM NO. 25
REF. DWG.
102023 REV. 8 SH. 16

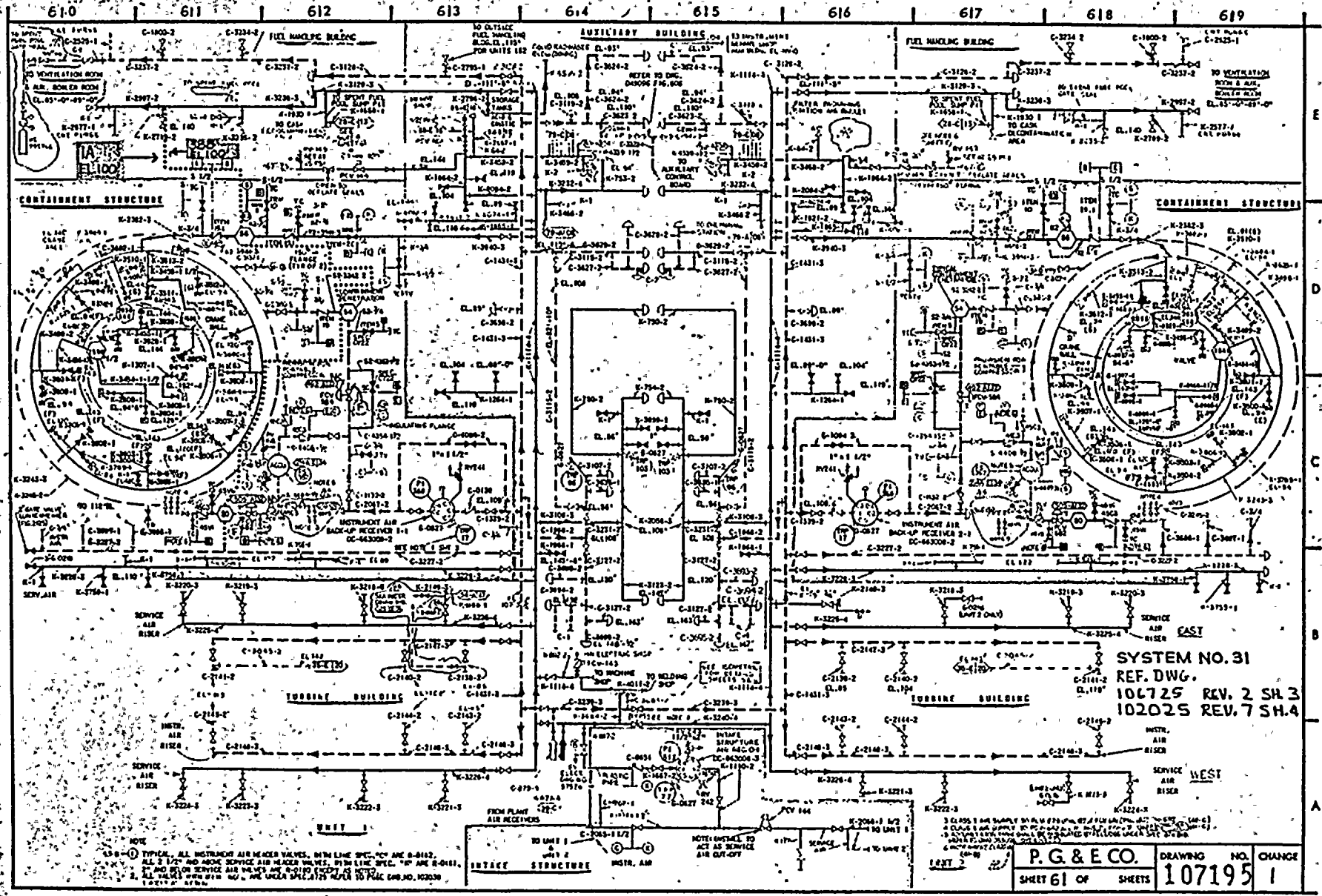
PG&E CO.	107195	REV.
SHEET 53 OF SHEETS	MICROFILM	1

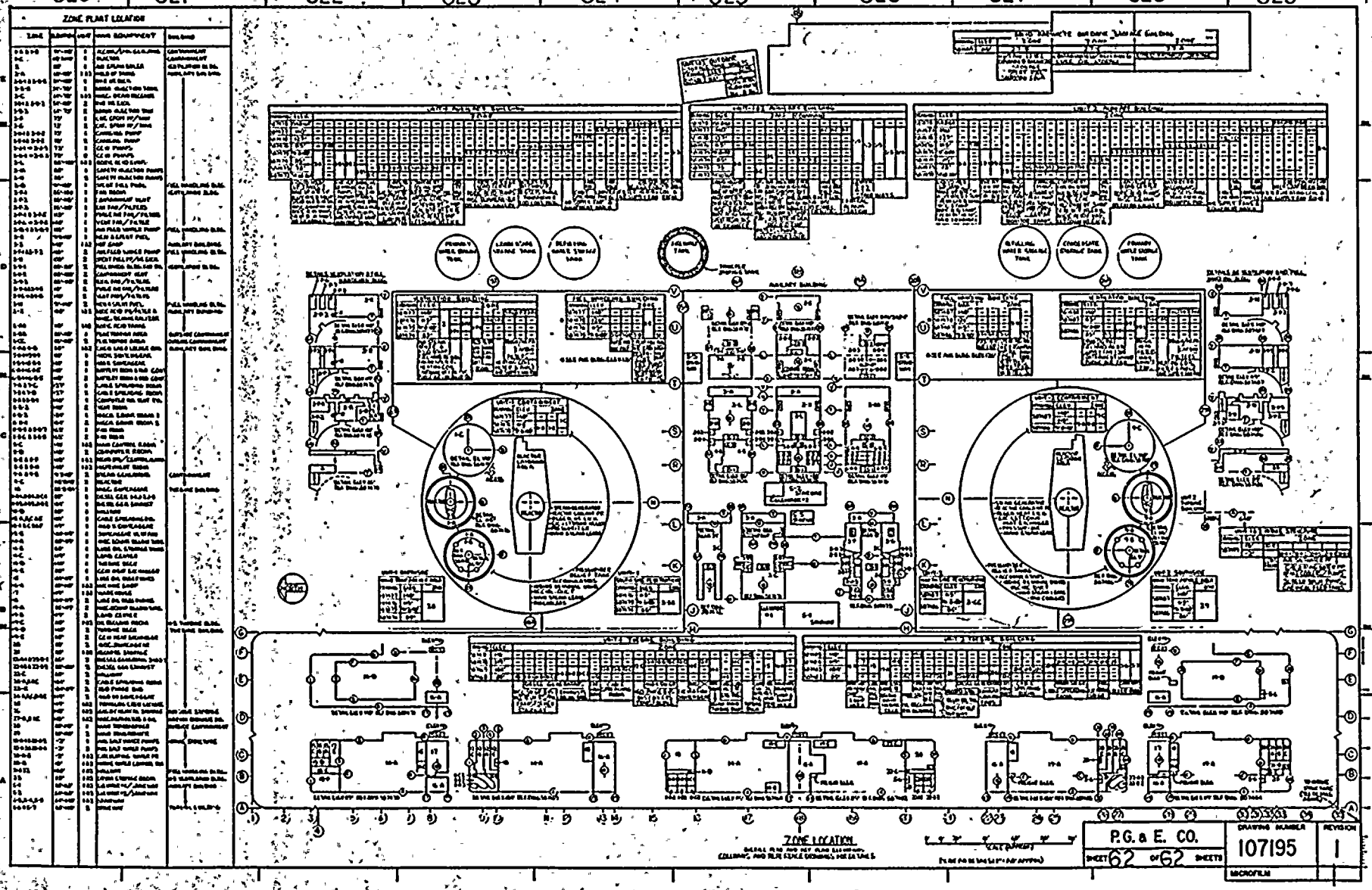
INDEXED REV.

01-4451 3-79 ▪ 59614

DIESEL ENGINE-GENERATOR	ELEV.	ZONES		
		1-1(2-2)	1-2(2-1)	1-3
ENGINE-GENERATOR	85'	11-A-1 (22-A-1)	11-B-1 (22-B-1)	11-C-1
RADIATOR & FAN	85'	11-A-2 (22-A-2)	11-B-2 (22-B-2)	11-C-2
SILENCER & FIXED LOUVER	107'	ABOVE 11-A-2	ABOVE 11-B-2	ABOVE 11-C-2




610
611
612
613
614
615
616
617
618
619
E
D
C
B
A
FUEL HANDLING BUILDING
AUXILIARY BUILDING
CONTAINMENT STRUCTURE
TURBINE BUILDING
INTAKE STRUCTURE
UNIT 1
UNIT 2
SERVICE AIR RISER
SERVICE AIR RISER EAST
SERVICE AIR RISER WEST
INSTR. AIR RISER
INSTRUMENT AIR BACK-UP RECEIVER 1-1
INSTRUMENT AIR BACK-UP RECEIVER 2-1
FROM PLANT AIR RECEIVERS
TO UNIT 1 & UNIT 2
TO AUXILIARY CONTROL BOARD
TO VENTILATION ROOM
TO OUTSIDE FUEL HANDLING BLDG. 115' FOR UNITS 1&2
SYSTEM NO. 31
REF. DWG.
107195 REV. 2 SH. 3
102025 REV. 7 SH. 4
P. G. & E. CO.
SHEET 61 OF SHEETS
DRAWING NO. 107195
CHANGE 1


620
621
622
623
624
625
626
627
628
629
ZONE PLANT LOCATION
ZONE LOCATION
P.G. & E. CO.
SHEET 62 OF 62 SHEETS
DRAWING NUMBER
107195
REVISION
1
MICROFILM

APPENDIX A2

SYSTEMS INTERACTION PROGRAM

INSTRUMENTATION REQUIRED TO BE OPERABLE
WITHIN TARGET SCOPE

I. INSTRUMENTS PROVIDING SSPS INPUT SIGNALS

LT-517, 518, 519	Steam Generator 1 Level
LT-527, 528, 529	Steam Generator 2 Level
LT-537, 538, 539	Steam Generator 3 Level
LT-547, 548, 549	Steam Generator 4 Level
PT-514, 515, 516	Steam Generator 1 Pressure
PT-524, 525, 526	Steam Generator 2 Pressure
PT-534, 535, 536	Steam Generator 3 Pressure
PT 544, 545, 546	Steam Generator 4 Pressure
FT-512, 513	Steam Generator 1 Flow
FT-522, 523	Steam Generator 2 Flow
FT-532, 533	Steam Generator 3 Flow
FT-542, 543	Steam Generator 4 Flow
FT 414, 415, 416	Reactor Coolant Loop 1 Flow
FT 424, 425, 426	Reactor Coolant Loop 2 Flow
FT 434, 435, 436	Reactor Coolant Loop 3 Flow
FT 444, 445, 446	Reactor Coolant Loop 4 Flow
LT-459, 460, 461	Pressurizer Level
PT-455, 456, 457, 474	Pressurizer Pressure
TE-411A, B	Reactor Coolant Loop 1 Temperature
TE-421A, B	Reactor Coolant Loop 2 Temperature
TE-431A, B	Reactor Coolant Loop 3 Temperature
TE-441A, B	Reactor Coolant Loop 4 Temperature
PT-934, 935, 936, 937	Containment Pressure
RE-14A, B	Plant Vent Gas Monitor
RE-28A, B	Plant Vent Particulate Monitor

[GP03J/16]

II. INSTRUMENTS PROVIDING REQUIRED INDICATIONS

TE-413A, B	Reactor Coolant Loop 1 Temperature
TE-423A, B	Reactor Coolant Loop 2 Temperature
TE-433A, B	Reactor Coolant Loop 3 Temperature
TE-443A, B	Reactor Coolant Loop 4 Temperature
LT-102, 106	Boric Acid Tank Level

III. INSTRUMENTS PROVIDING REQUIRED CONTROL FUNCTIONS

PT-433, 434	Motor Driven Auxiliary Feedwater
PS-293, 294 295, 296	Centrifugal Charging Pump Lube Oil Pressure Interlocks(allows/prevents pump start)
LS-202, 203, 206, 207, 210, 211	Emergency Diesel Generator fuel oil day tank level switches (maintain day tank level)
YS-1, 2, 3	Emergency Diesel Generator tachometer (speed control)
YS-6, 7, 8	Emergency Diesel Generator overspeed trip

IV. INSTRUMENTS REQUIRED FOR PRE-PLANNED MANUAL ACTIONS

LT-940, 941	Containment Recirculation Sump Level
LT-920, LIT-921, LT-922	Refueling Water Storage Tank Level

[GP03J/17]

APPENDIX A3

SYSTEMS INTERACTION PROGRAM

ELECTRICAL EQUIPMENT AND CIRCUITRY WITHIN TARGET SCOPE

1) 4.16 KV Vital Buses & Switchgear

2) 480V Vital Buses & Switchgear

3) 120V Instrument AC Distribution Panels

4) 125V DC Vital Buses, Batteries and Chargers

5) 125V DC Distribution Panels

6) Fuse Panels on Main Control Boards

7) Reactor Protection System Panels (Hagan Racks)

8) Power and Control Circuitry Associated With All Mechanical Equipment, Valves, and Instrumentation Designated as "F" or "O" Devices

9) Miscellaneous Safety-Related Electrical Equipment (found on a case-by-case basis from the electrical schematics)

10) Control Room & Local Control Panels, Boards and Racks Containing Target Components

[GP03J/18]

APPENDIX A4

SYSTEMS INTERACTION PROGRAM

STRUCTURES WITHIN TARGET SCOPE

1) Containment Structures including airlocks, penetrations, liner plate, flued heads

2) Containment Interior Concrete and Steel Annulus Structure

3) Fuel Transfer Tube

4) Auxiliary Building Main Concrete Slabs and Shear Walls; Control Room

5) Fuel Handling Building Main Structural Frame

6) Spent Fuel Pool Concrete and Storage Racks

7) Turbine Building Main Structural Frame, Shear Walls, Principal Slabs, Buttress Walls

8) Intake Structure - Auxiliary Salt Water Pump Enclosure and Watertight Doors

9) Class I Platforms Supporting Target Components

10) Class II Platforms Supporting Target Components

11) Other Support Structures for Target Components

[G003J/19]

APPENDIX A5

SYSTEMS INTERACTION PROGRAM

STRUCTURES, SYSTEMS AND COMPONENTS REQUIRED DURING INITIAL FUELING AND REFUELING OPERATIONS WITHIN TARGET SCOPE

1. Centrifugal Charging Pumps and Flowpath to Charge/Borate the Reactor Coolant System
2. Refueling Water Storage Tank
3. Emergency Power System (Including Emergency Diesel Generators, 4.16 KV Vital Buses, 480 V Vital Buses, 120 V Vital Instrument AC, 125 V DC Buses , 125 V Vital Batteries and Chargers)
4. Residual Heat Removal System and Associated Component Cooling Water and Auxiliary Saltwater Systems
5. Reactor Coolant Pressure Boundary Components
6. Spent Fuel Pool
7. Reactor Cavity, Refueling Canal and Fuel Transfer Tube
8. Spent Fuel Assemblies in storage and in transit within the buildings
9. Containment Structure and Pressure Boundary
10. HVAC Systems to Provide Cooling Air for the Above-Mentioned Electrical and Mechanical Components
11. Control Room HVAC System

SYSTEMS INTERACTION PROGRAM

APPENDIX B – SOURCE ACCEPTANCE CRITERIA

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

APPENDIX B

B.1 FUNDAMENTAL CRITERION

When subjected to seismic events of severity up to and including the postulated 7.5M Hosgri earthquake, the Systems Interaction Program will demonstrate that the capability of Diablo Canyon Nuclear Power Plant structures, systems, and components important to safety shall not be prevented from carrying out their required safety function by physical interaction with nonsafety-related structures, systems, or components. Nor shall these safety-related systems lose the required redundancy to compensate for single failures because of such physical interactions.

The preceding paragraph embodies the spirit and intent of the Systems Interaction Program. Several clarifications follow to aid in understanding.

Seismically-induced physical interactions include credible failures or adverse behavior of nonsafety-related structures, systems, or components. The credibility of an interaction is based on conservative technical judgment of experienced engineers.

B.2 INTERACTION CRITERIA

An assessment is made of the possible seismic behavior of the sources. An interaction is identified whenever the seismically-induced behavior of a source could lead to physical effects on a nearby target. Pairing of targets

and sources are based on physical proximity or direct system connection. An interaction is not identified by the Site Evaluation Team if it can be established by inspection that no credible source failure modes can be induced by earthquakes up to and including the postulated 7.5M Hosgri event.

The Site Evaluation Team identifies interactions which may or may not require further office evaluation. In general, identified interactions can be classified in one or more of the following categories:

a. Contact between a source and a target that would compromise the operability or pressure boundary of the target component

b. Fluid leakage from one or more sources that would degrade the environment of the target component

c. Contact between a missile generated by a source and a target that would compromise the operability or pressure boundary of the target component

d. Secondary or chain interactions caused by any of the above interactions.

B.3 EVALUATION CRITERIA

The evaluation of seismically-induced systems interactions and their effects on plant safety rests heavily on the judgment of experienced engineers. It is this judgment, together with onsite inspections of all safety systems by the interaction team, which permits the Systems Interaction Program to be

accomplished with great confidence that no credible physical interaction will occur between safety-related and nonsafety-related components during the postulated 7.5M Hosgri earthquake.

The following criteria serve as guidelines for the Site Evaluation Team and to subsequent engineering teams to determine the credibility of interactions and their effects. These criteria supplement and exemplify the elements of the Systems Interaction Program used to analyze or evaluate interactions as described in Section B.3.1.

B.3.1 Evaluation of Sources

Potential sources are evaluated as part of the Systems Interaction Program to determine if seismic events can credibly lead to physical interaction with safety-related structures, systems, and components. Three possible conclusions from the evaluation are:

a. Seismic events will not lead to interaction because of defensible seismic qualification of the sources by analysis, test, or experience with the same or similar items. In other words, the source will not fail.

b. Seismic events may lead to damage or failure of the sources, but the credible source failure modes are no threat to the safety function of the target.

c. Seismic events may lead to a credible failure mode of the source which has the potential to cause an adverse interaction with one or more target components.

The following criteria provide minimum guidance for evaluation of the seismic behavior of sources. They are tabulated by discipline using the generic code listing of the Program data base.

B.3.1.1 Structural Source Evaluation

All structural sources are evaluated by the single criterion:

CF1 - Any nonsafety-related structural or architectural element determined to be a potential source is assumed to fail, unless seismic qualification by analysis, test, or comparison to similar previously qualified elements has been performed to ensure integrity.

B.3.1.2 Mechanical Source Evaluation

The following criteria, a set of failure modes for mechanical equipment, must be considered when evaluating potential sources in this category.

In addition to the specific failures below, complete loss of power for all source equipment and control has been postulated. Relative motion between the source and target are considered during the site inspection.

MF1 – Overturning of tanks, pumps, filters, or other unsupported equipment where the distance to the center of gravity as measured from the base is longer than one-half the base width in all directions. Each direction in which the equipment may overturn is evaluated independently. Overturning is not considered where the distance from the base to the center of gravity is small. Further conservatism is obtained because mechanical equipment is held down by bolting, brackets, etc.

MF2 – Failure of valve or vertical pump motor and/or operator upper structure to body junction is assumed for the following cases:

a. All motor and air-operated valves

b. All pumps and gear-operated valves with upper structure lengths greater than 12 inches

c. All handwheel-operated valves with upper structure masses greater than the body/bonnet mass

A sizable number of valves with heavy upper structures have been uniquely qualified by testing or bracing for Class I service, even though not classified as Class I, due to the fact that many identical valves are used in both Class I and Class II services.

Evaluations are performed for situations in which valves with significant upper structures could violate the fundamental criterion if they fail structurally.

All power-operated valve upper structures are assumed to fail. Upper structure failure of gear and handwheel-operated valves, as well as vertical pumps, is assumed.

MF3 - Lateral deflection at the top of tanks and vessels of one inch per foot of tank or vessel height is assumed as a result of fluid sloshing. This failure mode involves tank movement only. Fluid loss or structural failure is not considered in this criterion but is considered in Criterion MF4.

MF4 - Support failure for tanks and vessels of total mass greater than 100 pounds, resulting in toppling of the structure and loss of fluid, for the following cases:

a. Vessels and tanks are supported in a variety of ways, typically on legs, cylindrical skirts, or saddles. Whereas shell buckling

results in tank deflection (Criterion MF3), support failure could violate the fundamental criterion by allowing tanks to topple. Support failure is restricted to thin section skirts or saddles.

b. All leg supports. Heat exchangers with attached piping are treated as a special situation and are addressed in Criterion MF6 as such. Anchor bolt integrity is generally not compromised; however, suspect configurations are also treated as special situations using MF6.

MF5 – All pump anchorages are assumed to fail for all nonbedplate mounted pumps, resulting in displacement of the pump.

Most pump assemblies are securely mounted to bedplates. This failure mode is listed for completeness. Operability of Class II pumps is not an issue.

Pump support bolting is assumed adequate for bedplate-mounted pumps. All nonbedplate-mounted pump supports, such as pedestals, cases, brackets, etc., are assumed to fail. Motor drivers will topple if support failure is postulated. The possible consequences of pump or motor displacements due to support failure are also evaluated.

MF6 – Extraordinary or unusual situations not otherwise covered that require resolution by analysis, test, or other suitable means. Postulated failures of other miscellaneous mechanical equipment are treated on a case-by-case basis using MF6.

B.3.1.3 Electrical Source Evaluation

Several categories of failure types must be considered with regard to seismic effects on electrical sources (equipment and cabling). They are discussed briefly in the following section:

a. Electrical Equipment

EF1 – Overturning of cabinets, transformers, switchgear, or other unsupported equipment where the distance to the center of gravity as measured from the base is longer than one-half the base width in all directions. Each direction in which the equipment may overturn is evaluated independently.

EF2 – Support failure, resulting in overturning of the structure, is assumed for all floor-mounted electrical equipment greater than 100 pounds total mass. In many cases, qualification of such equipment can be accomplished by similarity to Class I equipment.

EF3 – Failure of equipment mounting for wall-mounted electrical equipment with unsupported structures extending more than 12 inches from the wall and exceeding 50 pounds total mass.

EF4 – Extraordinary or unusual situations, not otherwise covered above, related to electrical equipment use this code, EF4, in the data base. These failures are treated on a case-by-case basis.

b. Raceways

RF1 – Failure of supports and collapse of cable trays having vertical supports with a spacing that exceeds eight feet.

This criterion requires that a failure of vertical supports be assumed if the specified spacing requirements are not met. If the spacing requirements are met, no failure need be assumed. Any postulated failure of a nonqualified conduit is treated as a special situation, using Criterion RF4.

RF2 – Longitudinal displacement (in direction of tray) equal to five percent of the length of the vertical support for all cable trays that do not have one longitudinal support every 20 feet.

The support standard provides for longitudinal support spacing of 20 feet. This is a conservative requirement, and when followed, will support the trays adequately in the longitudinal direction. This criterion conservatively accounts for possible interactions due to longitudinal motion of cable trays. The most widely used longitudinal support is a rigidly welded 4 x 4 x 3/8-inch angle iron bracket.

RF3 – Lateral displacement (perpendicular to direction of tray) equal to five percent of the length of the vertical support for all cable trays with support systems that have no lateral bracing.

It is unnecessary to consider lateral displacements of the cable trays for those trays with suitably spaced supports that are laterally braced. If lateral bracing is absent, the RF3 lateral displacement must be considered.

RF4 – Extraordinary or unusual situations with raceways not covered above are treated on a case-by-case-basis. Examples of these special situations are unusual conduit or cable tray support failures and cases where cable severance appears possible due to seismic effects.

Interactions due to unwanted energization or short circuits will be minimized because all Class I power cable is encased within protective conduit and the entire assembly is qualified for seismic loads.

B.3.1.4 Heating, Ventilating, and Air Conditioning (HVAC) Source Evaluation

Five generic failure mode categories are considered for HVAC sources. The following is a brief discussion of each of these categories.

HF1 – Ducts supported vertically at spacings exceeding the following are assumed to fail thusly:

Ducts	Support Spacing
Rectangular ducts with the larger dimension less than or equal to 60 inches	8 feet – 0 inches
Rectangular ducts with the larger dimension greater than 60 inches	4 feet – 0 inches
Round ducts with a diameter less than or equal to 60 inches	6 feet – 0 inches
Round ducts with a diameter greater than 60 inches	4 feet – 0 inches
Vertical ducts – any size	6 feet – 0 inches

HF2 – Ducts supported laterally at spacings exceeding the identified acceptable values are assumed to fail. Lateral bracing resulting from duct geometry, i.e., 90-degree bends or similar, will be considered as acceptable lateral support. The spacing is as follows:

Ducts	Support Spacing
Rectangular ducts with the larger dimension less than or equal to 60 inches	25 feet – 0 inches
Rectangular ducts with the larger dimension greater than 60 inches	45 feet – 0 inches
Round ducts with a diameter less than or equal to 60 inches	35 feet – 0 inches
Round ducts with a diameter greater than 60 inches	50 feet – 0 inches

HF3 – Ducts having longitudinal supports exceeding the following spacing are assumed to fail as follows:

Ducts	Support Spacing
Ducts with a total perimeter less than 62 inches	82 feet – 0 inches
Ducts with a perimeter greater than or equal to 62 inches and less than 100 inches	38 feet – 6 inches

Ducts	Support Spacing
Ducts with a perimeter greater than or equal to 100 inches and less than 150 inches	25 feet – 0 inches
Ducts with a perimeter greater than or equal to 150 inches and less than 190 inches	15 feet – 0 inches

HF4 – Ducts which are supported so that failure is not possible (evaluation with respect to Criteria HF1, HF2, and HF3) can deflect per the amounts identified. Safety-related equipment located closer to the ducts than the following distances are assumed to physically interact thusly:

Ducts	Deflection
All rectangular ducts	2 inches
Round ducts with a diameter less than 60 inches	1–1/2 inches
Round ducts with a diameter greater than or equal to 60 inches	2–1/2 inches

HF5 – Failure of in-line HVAC equipment follows the source evaluation criteria for mechanical equipment. Support failure resulting in tipping, falling, sliding, or overturning may occur. Overturning is assumed possible when the distance as measured from the base to the center of gravity is more than one-half the width of the base. Each direction in which the equipment may overturn is evaluated independently.

HF6 – Extraordinary or unusual situations regarding HVAC sources not otherwise covered above are treated on a case-by-case basis using Criterion HF6.

During the site evaluation effort, extraordinary or unusual situations may arise. Resolutions of special situations are conducted as necessary on a case-by-case basis.

B.3.1.5 Piping System Source Evaluation

Non-Class I piping at Diablo Canyon was designed to meet the requirements of the ANSI/ASME B31.1 Power Piping Code.

The following criteria serve to guide the Site Evaluation Team in their evaluation of whether failure is assumed for piping, piping components, and pipe support hardware. These failure modes establish the seismic behavior of the source of an interaction. Each of these

failure modes must be considered to determine the probability of a source/target interaction. A discussion of each failure mode follows, to evaluate the potential for failure.

PF1 – Circumferential breaks are assumed for threaded pipe (greater than or equal to 4 inches NPS) and mechanically coupled pipe (all sizes).

Threaded pipe is more susceptible to seismic failure than welded pipe. Threaded pipe cannot withstand the same amount of pipe deformation as welded joints, especially in the pipe sizes 4 inches NPS and larger. Complete pipe severance is assumed for pipe sizes 4 inches NPS and larger.

In the case of pipe sizes smaller than 4 inches, the need to evaluate for complete severance is not required. Small pipe is more flexible relative to its heavier fittings, has less strain in the pipe wall for a given deflection, and has less inertial force relative to the cross-sectional area of larger pipe.

All mechanically coupled pipes such as plain end victaulic couplings are susceptible to seismic failure. Excessive deformations and seismic loads are assumed to cause complete severance at the coupling; the consequences are then considered.

PF2 – Bolted flange separation is assumed due to flange bolt strain resulting in fluid leakage at:

a. Fixed locations such as pipe restraints and equipment nozzles

b. Flange locations which deflect excessively (see Criterion PF5).

Excessive deformation or seismic loads can cause flange bolts to stretch. Also, a small permanent strain in the flange bolt can permit a disproportionately large lateral displacement of the piping system.

It is therefore assumed that a properly designed flanged joint will separate; consideration is given for leakage and pipe deflections resulting from flange separation.

PF3 – Failure of fixed-end rod pipe supports is assumed due to lateral displacement of the piping.

PF4 – Failure of vertical supports (rods, spring hangers, clamps, U-bolts, etc.) is assumed for piping support systems that do not meet the vertical pipe support spacing requirements as shown in Table B-3-2, Maximum Vertical Pipe Support Spacing per B31.1 Recommended Spacing.

The vertical pipe support spacing requirements shown in Table B-3-2 are the recommended spacing for dead weight given in B31.1, Power Piping Code. Failure of pipe support components is assumed with support spacing in excess of the recommended spacing, and consideration is given to the pipe deflection caused by the pipe support failure.

When concentrated masses are included in a piping system, supports as designed are provided with extra strength, unsupported spans are shortened, or both. It is verified during site evaluations that support systems are strengthened at least in proportion to the additional mass; otherwise the supports are assumed to fail.

PF5 - Lateral displacement of pipe is assumed in the amount given in Table B-3-1, Assumed Lateral Displacements for Given Spans of Simply Supported Pipe, for pipe with lateral support spans equal to or less than the amount also given in Table B-3-1. The entire pipe span is assumed to deflect by the amount shown in Table B-3-1.

Consideration is given to lateral pipe displacements in the amount shown in Table B-3-1, which provides an envelope of pipe displacements to guide the engineer in anticipating interactions by pipe contact. The location of pipe restraints on the source piping with respect to the target will serve to reduce the lateral displacement only when sound judgment can reasonably permit.

Criterion PF5 specifies lateral displacements for given pipe spans. Spans greater than those shown in Table B-3-1 are treated as a special situation using Criterion PF8.

PF6 - Lateral displacement of pipe is assumed in the amount given in Table B-3-1 for pipe spans with concentrated masses (except flanges and flow elements). This applies if both the following conditions are met:

a. Concentrated mass located within the middle 50 percent of the span,

-and-

b. Concentrated mass greater than the equivalent weight of three diameters of attached pipe.

Concentrated masses such as valves located within a pipe span lower the span resonant frequencies and raise the resultant deflections. Additional restraints are usually located near concentrated masses to limit deflection. Concentrated mass situations where the span length exceeds the amount specified in Table B-3-2 are treated as a special situation using Criterion PF8.

PF7 - Leakage area equal to one flow area is assumed to develop gradually at all threaded (greater than or equal to 4 inches NPS) and mechanically coupled (all pipe sizes) joints.

Leakage is assumed to occur. Previous analyses* have been performed regarding the capability of the plant to cope with a flooding situation. Special flooding scenarios encountered which were not covered by the flooding analyses will be addressed as special cases using Criterion PF8. Sudden pipe breaks resulting in pipe whip are not expected. A high energy line break protection program has been implemented.

PF8 – Extraordinary or unusual piping situations not otherwise covered above are treated on a case-by-case basis using Criterion PF8.

It is expected that the experienced engineers carrying out this Program may identify some cases which do not fit the other generic categories or represent combinations of failure modes. Such cases are evaluated as the circumstances dictate. For example, the longitudinal (axial) displacement of pipe is treated on a case-by-case basis.

*Diablo Canyon Power Plant FSAR Subsections 3.6, 8.3.2, 9.2.1, 10.4.5, and 10.4.6; "Seismic Evaluation for Postulated 7.5M Hosgri Earthquake," Subsection 5.1.2; Letters of December 28, 1979, and September 14, 1979, from Phillip A. Crane to John F. Stoltz, Light Water Reactors Branch No. 1.

B.3.1.6 Instrumentation and Control Source Evaluation

The capability of instrumentation and control equipment to physically interact with and inflict damage upon other power plant equipment is limited because of the size of the Instrumentation and Control (I&C) equipment relative to potential targets. The only two categories defined for direct physical interaction potential from I&C sources are discussed below.

IF1 - Failure of instrument-extended proportions greater than 10 inches in extension which exceed 45 pounds total mass.

Instruments in the plant with mass greater than 45 pounds and an extension greater than 10 inches are assumed to fail and are evaluated for potential interactions. Any other instruments discovered with mounts judged less substantial are covered under Criterion IF2.

IF2 - Extraordinary or unusual I&C situations not otherwise covered above are treated on a case-by-case basis using Criterion IF2. Any other structural failures of instruments such as support failures, large deflections, etc., are treated on a case-by-case basis.

B.3.2 Interaction Effects Evaluation Criteria

Once a postulated interaction is identified as requiring more evaluation than can be done from field inspection, it must be resolved in an

acceptable manner and the resolution documented. Interactions considered are direct physical interactions such as target impact from a falling or moving source. Some typical interactions are listed below:

Mechanical

a. Impact from vibrating bodies

b. Impact from falling bodies

c. Pipe whip

d. Missiles

Electrical

a. Unwanted open circuit (loss of power control)

b. Unwanted closed circuit

c. Unwanted energization

Pneumatic

a. Loss of pressure (loss of control)

b. Unwanted pressurization

c. Jet impingement

d. Hostile gas

Hydraulic

a. Loss of pressure

1) Loss of control

2) Loss of lubrication

b. Unwanted pressurization

c. Jet impingement

d. Flooding

e. Hostile fluids

Environmental

a. Elevated temperatures

b. Steam

c. Radiation

Environmental effects related to any pipe break condition, including temperature, pressure, jet impingement and flooding have been included in previous studies and referenced in the Diablo Canyon Power Plant FSAR.

The interactions may also be indirect, as where a source may fail and damage another piece of nonsafety-related equipment, which then and only then could interact physically with a target.

Interactions are evaluated for their impact on the required safety functions and redundancy of identified targets. The results of the evaluation determine the method of resolution. In order of preference, the following methods are acceptable means by which identified interactions are resolved:

a. Target Operability Evaluation

The first approach to identifying a resolution is to show that the target's safety function is not impaired. This may be accomplished by studying how impairment occurs and the possible extent of the impairment. For example, a pneumatically operated valve may be required to close during shutdown, but falling equipment could sever the air line so the air supply to the operator is lost. If the valve is a "fail safe" type, shutdown capability is not compromised even though the air supply is lost. If the valve is an "operate" type, shutdown capability is compromised. In this example, it is also necessary to consider the consequences of crimping the air line, as well as the effect of a lost air supply line.

This example is typical of the reasoning process that is necessary in the evaluation of each interaction. A substantial degree of engineering judgment is expected to be used. Decisions based on judgment, along with the rationale behind it, are documented.

b. Source Behavior Evaluation

The second approach to identifying a resolution is to perform a technical evaluation of the source under seismic excitation. If tests, analysis, or applicable experiences can be developed to demonstrate that the source item in question is able to withstand the postulated 7.5M Hosgri event, the interaction can be resolved on the basis that it will not credibly occur. Tests and analyses are performed using the methods and criteria employed for safety-related equipment in the Hosgri Report.

Sources of interactions are identified and resolved individually. Identification and resolution of indirect or chain interactions use individual failure criteria for each source component.

c. Modification

If resolution is not possible by analysis or by test, the Site Evaluation Team recommends physical plant modifications to prevent postulated detrimental interactions. The range of possible

modifications includes guard structures, protective covers, restraining structures, and seismic stops. The criterion is to prevent impairment of function. If a modification is necessary, the most appropriate method and design is chosen.

d. Change of Procedures

The last method of resolution is by reordering the operating procedures or defining alternate means of providing the required safety functions. This option, although an unlikely choice, is still a possible solution.

Except for those interactions that require more complex analysis, the evaluation and resolution of the postulated interaction will be made at the site by the Site Evaluation Team. The evaluation and resolution methods are discussed below in more detail.

B.3.2.1 Evaluation of Direct Interaction Effects

When evaluation is directed to show that the safety function of a target is not impaired by an identified direct interaction, the guidance procedures listed below are followed. For cases not covered, criteria are developed and documented to provide an analogous level of rigor to the guidance provided herein.

a. Direct impact of missiles or falling objects on structures and components are evaluated when necessary using the criteria of Sections 3.3.2 and 3.5 of the Diablo Canyon Power Plant FSAR and ANSI Standard N660, Plant Design Against Missiles. In cases of small low energy objects impacting large, steel-encased equipment, it may be possible to show that no damage results from the interaction by inspection. Care must be taken to consider such appurtenances as instruments and power connections, cooling, and lubrication connections.

b. Direct impact of falling objects on HVAC ducts can be evaluated using the values in Table B-3-3, Allowable Kinetic Energy Values for Class I Ducts as Targets. If the maximum impact energy is less than the tabulated value of kinetic energy, no loss of function need be assumed.

c. Dynamic effects of pipe breaks can be evaluated using the criteria in Section 3.6 of the Diablo Canyon Power Plant FSAR. One criterion to be used states that no damage will result if both the target pipe size and its wall thickness are at least equal in size to the interacting pipe.

d. Flooding effects of broken or leaking pipes are evaluated using the criteria of Appendix 3.6A of the Diablo Canyon Power Plant FSAR.

e. Environmental effects of broken or leaking piping, tanks, etc., are evaluated by comparing the estimated environment with the target's qualification profiles. Helpful criteria and data are contained in Section 3.11 of the Diablo Canyon Power Plant FSAR.

B.3.2.2 Evaluation of Indirect Interaction Effects

Two types of indirect interactions are considered: chain-reaction failures and degraded operation.

For the chain-reaction events, the criteria for evaluation are the same as for the direct interactions and are successively applied to each source member of the chain. It must be remembered that each step in the chain has an associated probability of less than one and that judgment must be applied to eliminate very unlikely sequences.

In order for the plant to safely shut down, it is necessary for the required safe shutdown valves and drive elements to operate in the required manner or fail in the required position. For this to occur, their control systems must remain intact after a seismic event, or be damaged only as to fail in the design failure mode. For example, if an air-operated valve is required to fail in a certain mode, it is designed to go to that failure mode upon air loss. If, however, the air line between the control device and the valve is impacted during a seismic event, the line might be crimped. This condition could prevent the venting of air, thereby preventing the valve from failing in its proper mode.

Electrically operated devices may be adversely affected by a nonqualified component impacting a signal cable, thereby causing damage which would adversely affect proper device operation.

The site evaluation assures that process tubing, instrumentation, and electrical cables up to the cable trays will be protected from the following:

a. Damage due to inadequate support

b. Damage due to postulated interactions.

Evaluation of this type of indirect interaction is handled by considereing the above as targets.

The following, considered in the original design, are therefore not considered in this review:

a. Failure of the supports for safety-related electrical conduits

b. Failure of safety-related instruments due to inadequate seismic qualification of the instruments themselves.

In the event that postulated indirect interactions are identified which are not readily evaluated to be acceptable, the resolution then

becomes one of modification. This might involve redesign or replacement of the source equipment, or the rerouting or upgrading of control and electrical wiring, and/or process and air tubing.

B.4 MODIFICATION CRITERIA

Modifications may be required to resolve identified seismically-induced systems interactions. These modifications may be any of the following:

a. Modification of the source to eliminate the adverse seismic behavior by bracing, supporting, or reinforcing the source component

b. Shielding or relocating the target to preclude physical interaction

c. Modification of the target to permit retention of the safety function despite the interaction

For relocation or modification of nonsafety-related equipment, the criterion for acceptability is that the modified configuration, when reevaluated for interactions using the evaluation criteria previously given, is found to have resolved the original interactions and not have created any new ones.

TABLE B-3-1

ASSUMED LATERAL DISPLACEMENTS FOR GIVEN SPANS OF SIMPLY SUPPORTED PIPE

Pipe Size and Schedule	OD (in)	t (in)	Span Length (ft)	Displacement (in)
1" Sch. 80	1.315	.179	22.7	23.7
1-1/2" Sch. 80	1.900	.200	27.3	23.7
2" Sch. 80	2.375	.218	30.5	23.5
3" Sch. 40	3.500	.216	35.8	22.0
4" Sch. 40	4.500	.237	39.7	21.1
6" Sch. 40	6.625	.280	46.5	19.6
8" Sch. 40	8.625	.322	51.7	18.7
10" Sch. 40	10.750	.365	56.6	17.9
12" Sch. Wt.	12.750	.375	59.6	16.8
14" Std. Wt.	14.000	.375	61.0	16.0
16" Std. Wt.	16.000	.375	63.0	14.9

TABLE B-3-2

MAXIMUM VERTICAL PIPE SUPPORT SPACING PER ANSI B31.1 RECOMMENDED SPACING

Nominal Pipe Size (inches)	Maximum Pipe Span (ft.)	
	Water Service	Steam, Gas, or Air Service
up to 1	7	9
2	10	13
3	12	15
4	14	17
6	17	21
8	19	24
12	23	30
16	27	35
20	30	39
24	32	42

Note: For immediate pipe sizes, interpolate between tabulated values.

TABLE B-3-3

ALLOWABLE KINETIC ENERGY VALUES FOR CLASS I DUCTS AS TARGETS

Duct Size Diameter	Span 12"	24"	36"	48"	60"
4"	0.8 in-lb	1.4	1.8	1.8	1.5
6	1.2	2.2	3.0	3.4	3.3
8	0.9	1.8	2.3	2.6	2.6
10	1.7	3.4	4.7	5.7	6.3
12	1.4	2.8	3.9	4.8	5.2
14	1.2	2.4	3.4	4.1	4.5
16	1.1	2.1	2.9	3.6	3.9
18	1.0	1.9	2.6	3.2	3.5
20	0.9	1.7	2.4	2.9	3.1
22	0.8	1.5	2.1	2.6	2.9
24	1.4	2.8	4.0	5.0	5.7
26	1.3	2.6	3.7	4.6	5.3
28	2.1	2.4	3.4	4.3	4.9
30	1.1	2.2	3.2	4.0	4.6
32	1.1	2.1	3.0	3.7	4.3
34	1.0	2.0	2.8	3.5	4.0
36	1.0	1.8	2.6	3.3	3.8

TABLE B-3-3 (Continued)

ALLOWABLE KINETIC ENERGY VALUES FOR CLASS I DUCTS AS TARGETS

Duct Size Diameter	Span 12"	24"	36"	48"	60"
38	1.5	2.9	4.2	5.2	6.1
40	1.4	2.7	4.0	5.0	5.8
42	1.3	2.6	3.8	4.7	5.6
44	1.3	2.5	3.6	4.5	5.3
46	1.2	2.4	3.4	4.3	5.1
48	1.2	2.3	3.3	4.2	4.9
50	1.1	2.2	3.1	4.0	4.7
52	2.7	5.3	7.8	10.0	12.0
54	2.6	5.1	7.4	9.6	11.5
56	2.5	4.9	7.2	9.3	11.2
58	2.4	4.7	6.9	9.0	10.8
60	2.3	4.6	6.7	8.6	10.4

Note: An allowable bending stress of 10 ksi has been used in accordance with the SMACNA Code (Sheet Metal and Air Conditioning Contractors National Association, Inc.).