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SUBJECT: Forwards safety evaluation & description of pressurizer auxiliary spray line design change, per request.

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 TITLE: Bulletin Response 88-08 - Thermal Stress in Piping to RCS.

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Southern California Edison Company

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February 9, 1990

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

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362
NRC Bulletin 88-08
San Onofre Nuclear Generating Station
Units 2 and 3

Reference: January 8, 1990 letter from F. R. Nandy (SCE) to Document Control
Desk (NRC); Subject: Same as above

In response to an NRC request, this letter provides (as Enclosure 1) a copy of the safety evaluation completed in support of a design change to the pressurizer auxiliary spray line for San Onofre Units 2 and 3. The design change, which replaced a piping section and relocated a check valve in the auxiliary spray line, was completed in response to NRC Bulletin 88-08, "Thermal Stresses in Piping Connected to Reactor Coolant Systems." Enclosure 1 also contains a description of the design change to facilitate NRC review of the safety evaluation.

Details of Southern California Edison's evaluation in response to Bulletin 88-08 are contained in the referenced letter. As discussed in that letter, the design change was implemented during the Unit 2 Cycle 5 refueling outage which ended in December 1989 and the same design change will be implemented during the Unit 3 Cycle 5 refueling outage currently scheduled to begin in April 1990.

If you need additional information or have questions on this safety evaluation, please let me know.

Very truly yours,



cc: J. B. Martin, Regional Administrator, NRC Region V
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units 1, 2 and 3

ENCLOSURE 1

SAFETY EVALUATION AND DESCRIPTION
OF PRESSURIZER AUXILIARY SPRAY
LINE DESIGN CHANGE

LCP 2-6759.OSM SAFETY EVALUATION
(10CFR 50.59 REVIEW)

This change and the construction activities associated with it do not involve an unreviewed safety question as defined by 10CFR 50.59.

A. BASIS FOR SAFETY EVALUATION

1. The modification serves to reduce the potential for high cycle thermal stress fatigue failure of the 2 inch pressurizer auxiliary spray line at the connection to the 4 inch main pressurizer spray line. The potential failure location is in an unisolable portion of the RCS and would result in leakage of RCS radioactive water into the containment. By implementing this modification, the probability of a LOCA is reduced. This modification satisfies the commitment made to the NRC in response to the issues of NRC Bulletin 88-08 (Reference 2).
2. The modification does not change the UFHA, Plant Technical Specifications, Plant Operating Procedures, or Maintenance Procedures.
3. No system P&ID changes are required, and no changes to any plant or system design bases are required.
4. The modification does extend the RCS unisolable boundary. By relocating check valve, MU019, to the new upstream location, approximately 10 feet of 2 inch piping are added to the RCS unisolable boundary. This extension of high energy piping does not create any new HELBA considerations not already evaluated. A change to the UFSAR Appendix 3.6A is required to show the high energy boundary location change as shown in Figure 3.6.A and the pipe break stress analysis table reflecting the results of the piping stress reanalysis being done under DCP 2-6683.2BP (Reference 3) for the Snubber Reduction Program.

B. EVALUATION AND BASIS FOR SAFETY FINDING

1. The probability of occurrence of an accident or malfunction of any equipment important to safety previously evaluated in the UFSAR will not be increased.

The modification results in a reduction in the potential for high thermal cyclic stresses associated with the issue of isolation valve leakage and check valve chattering identified in NRC Bulletin 88-08. This reduces the potential for a HELBA. The increase in the length of 2 inch unisolable piping codes does not measurably increase the potential for a HELBA because the piping has been reanalyzed and meets the ASME Section III Code allowables for Class I piping as part of DCP 2-6683.2BP, for the Snubber Reduction Program.

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No new equipment is added nor is the environment ^{and} loadings, ~~etc.~~ for any existing equipment important to safety affected by this modification. Also, since there are no system functional changes the probability of malfunction of any equipment does not increase and may be reduced by relocation of the check valve from a hot piping zone to a cold piping zone.

ED 7/31/89

2. The consequences of an accident or malfunction of any equipment important to safety evaluated in the UFSAR will not be increased.

No changes to any system design basis, function, P&ID, or equipment made as part of this modification; therefore, the consequences of an accident or malfunction of equipment previously evaluated do not change.

3. The possibility of an accident or malfunction of a different type than any previously evaluated in the UFSAR will not be created.

The current accident types as defined in the UFSAR bound the modifications that are being made. The relocation of the existing check valve does not create accidents of a different type since the relocation does not affect the relative location of any vents or drains or connecting piping and components and does not change the function of the system. The new break locations created by this change are bounded by the existing UFSAR accident analyses. No P&ID changes are needed.

4. The margin of safety as defined in the basis for any technical specification is not reduced.

The purpose of relocating the check valve is to reduce the potential for thermal cyclic stresses. No changes to the system function, system configuration, or equipment are being made and no Technical Specifications are changed. Therefore this change has no effect on any of the limiting conditions of operation or on the margin of safety defined in the basis for any technical specification.

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DESCRIPTION & ENGINEERING EVALUATION
PROPOSED LIMITED CHANGE PACKAGE (LCP)
NO. 2-6759.OSM, REV. 0

TITLE: Pressurizer Auxiliary Spray Line Modification
San Onofre Nuclear Generating Station, Unit 2

I

DESCRIPTION

This LCP covers the work necessary to implement modifications to the pressurizer auxiliary spray line, 1201-060-2", in accordance with the SCE evaluation of the potential for leakage induced thermal stresses in response to NRC Bulletin 88-08. The modifications include the relocation of check valve, 1208MU019, which is currently located in the horizontal run of the 2 inch auxiliary spray line, five inches upstream of the tee connection to the vertical run of the 4 inch main pressurizer spray line, 1201-012-4", Figures 1.1 and 1.2 show the existing line configuration and the relocation zone of check valve, MU019 respectively. In addition, a minor reroute of the auxiliary pressurizer spray line is necessary to accommodate the existing pipe supports and the revisions to the pipe supports as part of the snubber reduction program being done in DCP 2-6683.2BP. This routing change extends the piping in the north direction by 1'-8" as shown in Figure 1.3.

The support modifications on line 1201-060-2" to be implemented as part of DCP 2-6683.2BP include, changing one snubber to a rigid strut at supports RC-060-H051 and H052 in the vicinity of relocated check valve, MU019.

LCP 2-6759.OSM is to be done prior to DCP 2-6683.2BP changes to supports RC-060-H051 and H052. Both change packages must be implemented prior to plant operation.

The purpose for making this modification is to prevent high thermal cyclic stresses at the check valve due to cold water leakage through the single isolation valve, 1208MU130. As described in NRC Bulletin 88-08, this type of leakage, i.e., cold water leaking into a hot pipe through check valves, was found to cause high temperature transients just downstream of the check valves which resulted in pipe cracking due to high cyclic stresses. The changes proposed will relocate the check valve to a cold section of the line so that the high cyclic thermal stresses cannot occur. The change does not affect the current design basis, P&ID's, or operating procedures for the pressurizer spray system, or any other system.

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II

ENGINEERING EVALUATION

NRC Bulletin 88-08 identified a concern of potential pipe fatigue stress cracking associated with isolation valve leakage and the repeated opening and closing (chattering) of a check valve causing cyclic mixing of cold and hot water in a very localized area. In response to this bulletin, SCE performed a comprehensive evaluation to determine the potential for similar problems on SONGS 2&3 (Reference 1). The evaluation concluded that the pressurizer auxiliary spray line had a geometry which would make it susceptible to the same conditions described in the NRC bulletin. To solve this potential problem, it was recommended to relocate check valve, MU019, upstream, to provide a sufficiently long length of pipe to allow gradual mixing of hot and cold water without the cyclic thermal phenomenon associated with chattering check valves.

The report documenting the evaluation received an extensive review by Engineering, Station Technical, Nuclear Engineering, and Licensing. As a result, a commitment was made to the NRC to implement the change proposed in this LCP (Reference 2).

The relocation of the check valve ^{value R-131} does not result in any system changes. No P&ID changes are required, nor are any operating or maintenance procedures changes required. In summary, no change to the original plant design basis will result by implementing this LCP. The result is expected to minimize the potential for piping failure in the reactor coolant pressure boundary by reducing the potential for fatigue cracking due to a high number of cyclic thermal stresses.

This LCP has received a fire protection/Appendix R review. The modification does not affect the current design basis for the pressurizer spray system or UFHA commitments. The change modifies the auxiliary spray system piping, but does not impact the functional capability of the system; therefore it does not impact Fire Protection/Appendix "R". The changes proposed by this LCP do not add any electrical load nor affect the plant emergency battery load profile. Also, there are no EQ requirements applicable to this change.

The modification was reviewed for HELBA considerations. UFSAR change notice B-708 (copy is attached), which is part of DCP 2-6683.2BP, shows there is no new break locations on the unisolable piping between the tee connection to line 1201-ML-012 and the relocated check valve, MU019. Also, as part of the HELBA evaluation performed in Calculation N-4370-8 Supplement A, line 1201-ML-060 was evaluated under jet impingement loading and it was determined that failure of this line was acceptable. This conclusion is summarized in UFSAR change notice B-708.

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The modification does require modification to the ASME Section III, Class 1 piping of the RCS. This modification requires the appropriate construction considerations of opening the RCS boundary, including the necessary venting and draining of lines and control of water level in the pressurizer to prevent loss of primary coolant in the containment, and to satisfy ALARA radiation exposure requirements. Following construction, an inservice test of the new welds will be required to satisfy the appropriate ASME Code Section XI rules. In addition, this LCP will require changes to the Unit 2 ISI Program to incorporate new weld ID's and locations and changes to ISI Zone Drawings to reflect new plant configuration.

The changes proposed in this LCP have been reviewed by Station Technical and NEDO. Based on the above evaluations, the proposed plant modification is deemed necessary. The modification presented in this LCP has been reviewed, is complete, achieves its objective, is constructible, is operable, and is maintainable.

III

SIGNIFICANT CRITERIA AND ASSUMPTIONS

The piping modifications to the auxiliary spray line were designed to comply with the following criteria:

1. The piping system is Quality Class I, Seismic Class I, and Nuclear Service, and must comply with the ASME B&PV Code Section III design requirements for Code Class 1 piping. The project classification is, 11NA. Installation and inspection shall comply with the ASME Code Section XI 1977 Edition through Summer 1979 Addenda.
2. Stress reanalysis of the modified piping included thermal expansion, seismic, and any applicable dynamic loading effects and an assessment on the existing fatigue evaluation per Section III, NB 3600 Requirements for Code Class I piping. The Code in effect is the 1974 Edition through Summer 1974 Addenda. The stress reanalysis was performed as part of DCP 2-6683.2BP under the Snubber Reduction Program.
3. Pipe support modifications were made in compliance with ASME Code Subsection NF. Changes are being done under DCP 2-6683.2BP.
4. There are no P&ID changes required to implement this scope of work.
5. There is no impact to the UFSAR design basis due to this modification, however the UFSAR will need revision to show the extension of the high energy boundary for the relocation of the auxiliary spray line check valve and the results of the stress reanalysis and any changes in postulated break locations.

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6. The modification to the auxiliary spray line must be done during cold shutdown because an unisolable portion of piping in the RCS pressure boundary is affected.
7. No vibration or dynamic effects testing of this line is required because the change would significantly improve the flow characteristic upstream of the valve, hence the piping would not be susceptible to any kind of vibration. Test guidelines for thermal expansion are included in DCP 2-6683.2BP as part of snubber reduction program implementation.

IV

REFERENCES

1. NEDO report, Evaluation of Unisolable Piping from Reactor Coolant System with potential for Leakage Induced Thermal Stresses in response to NRC Bulletin 88-08, SONGS 2&3, dated September 1988.
2. Letter to the USNRC from M. O. Medford dated October 19, 1988; subject, Docket Nos. 50-361 and 50-362 NRC Bulletin No. 88-08 SONGS Units 2 and 3.
3. DCP 2-6683.2BP, Snubber Reduction Program, Phase III.

LCP# 2-6759.0SM REV 0 SHT 8

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LCP# 2-6759.0 SM REV 0 SHT 11

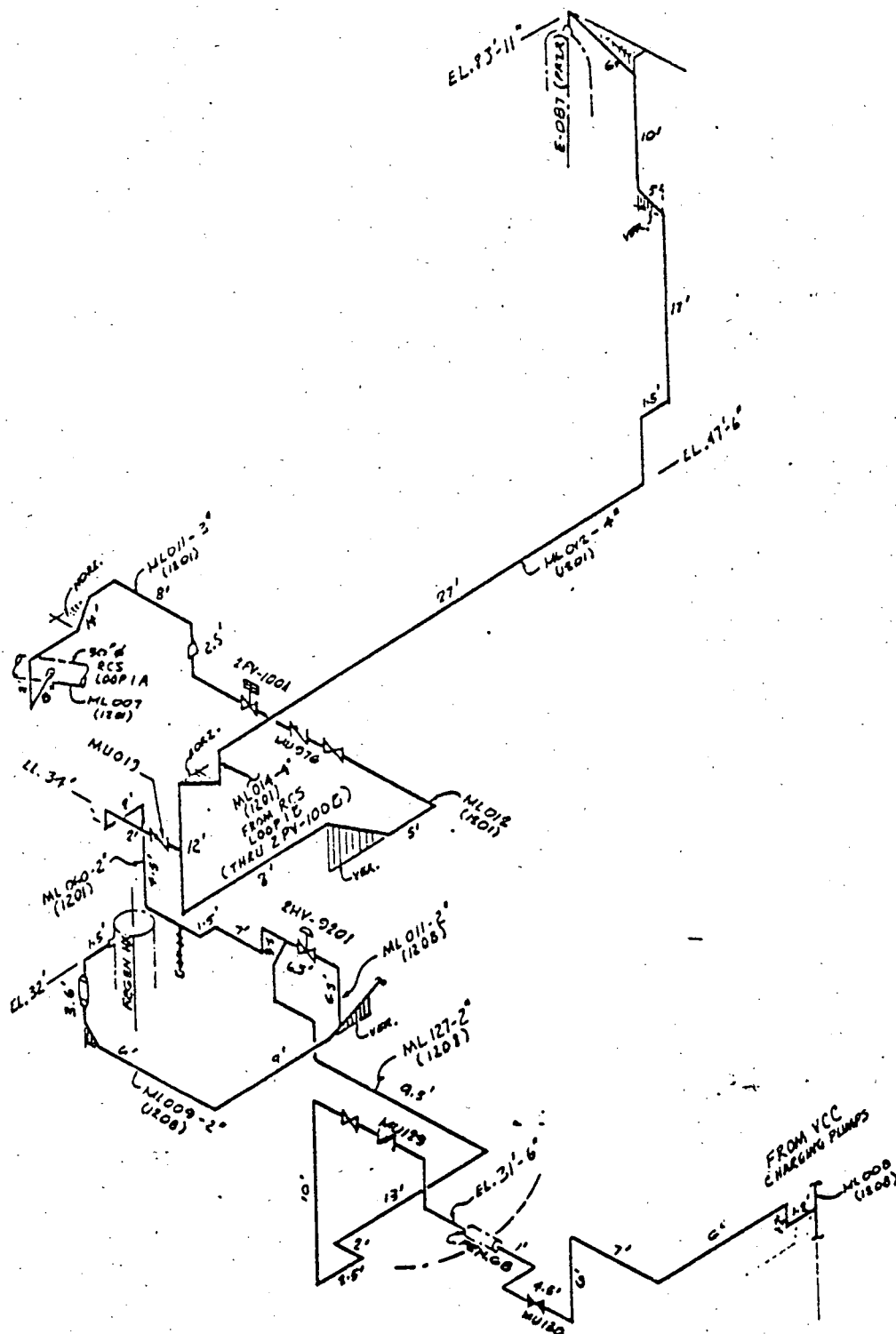


FIGURE 1.1
AUXILIARY SPRAY/PRESSURIZER SPRAY LINE

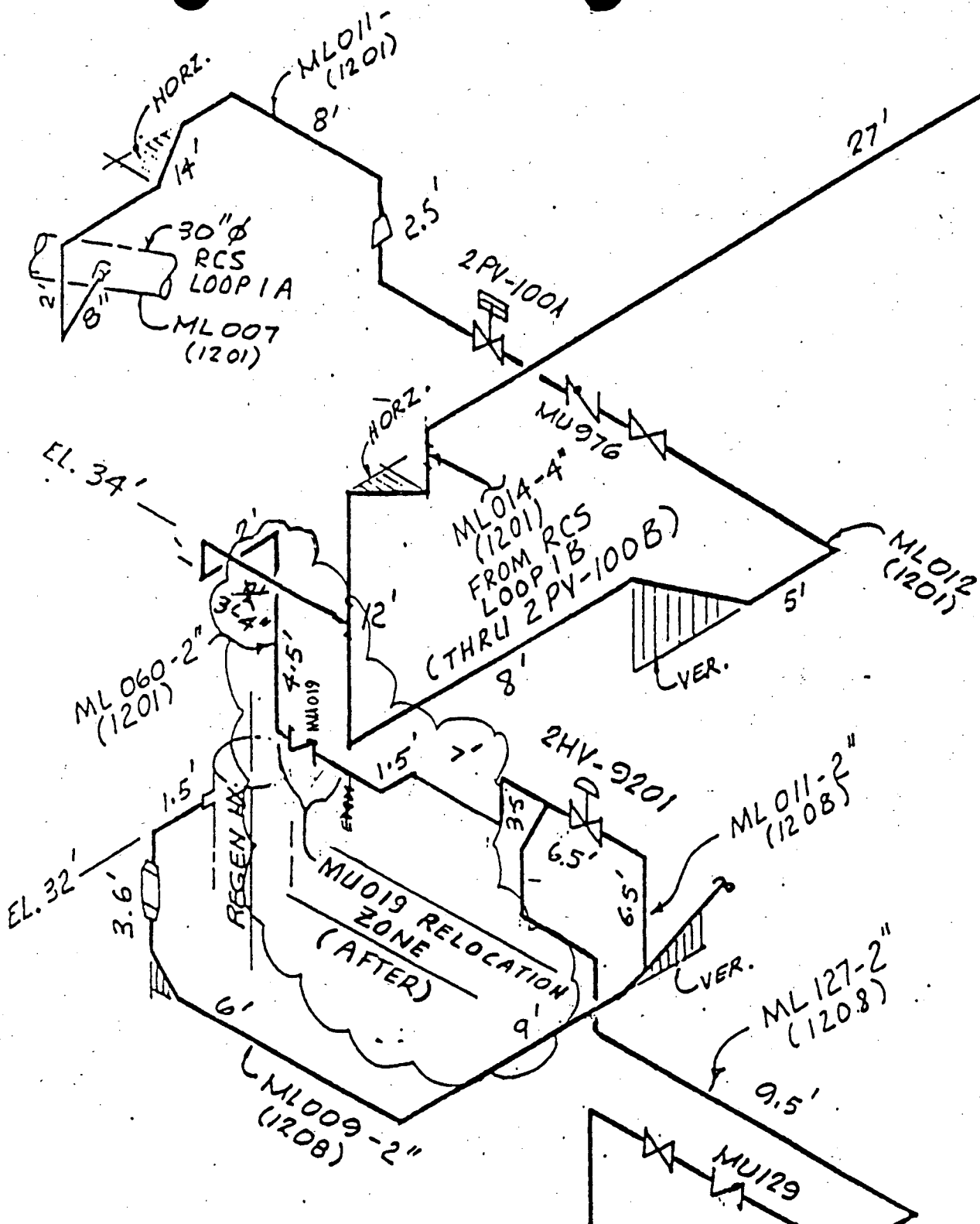


FIGURE 1.2
RELOCATION OF CHECK VALVE, MU019

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ISOMETRIC SKETCH SHEET

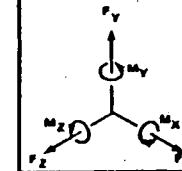
PIPE STRESS CALCULATION NO. _____

PROJECT _____

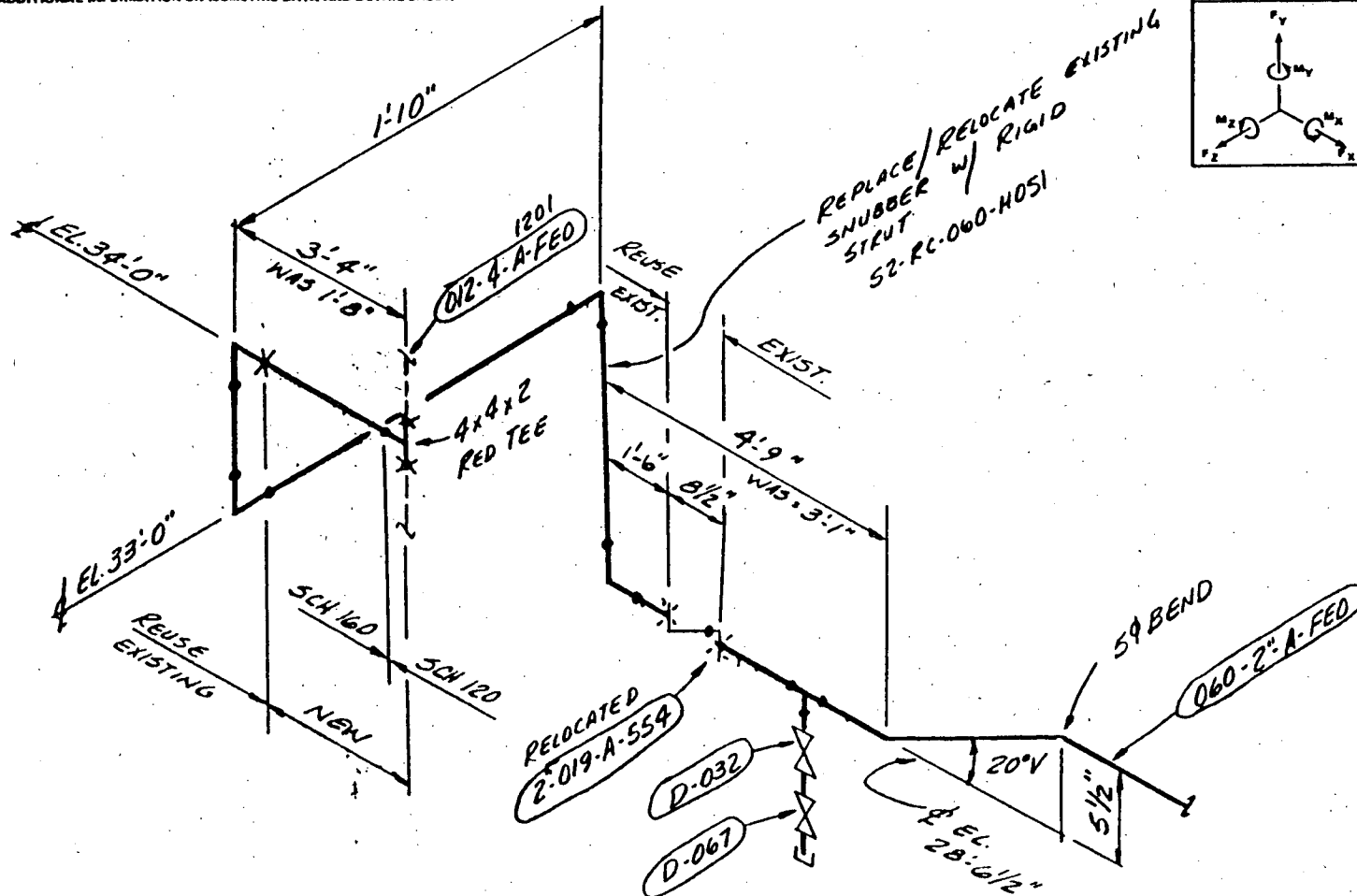
SUBJECT *AUX SPRAY*

(ADDITIONAL INFORMATION ON ISOMETRIC DATA AND DETAIL SHEET)

CONVENTION



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| COMP. SERV. NO. _____ | | |
| AREA(S) _____ | | |
| MAXIMUM STRESS | | |
| TYPE | PT | PSI |
| THERM'L | | |
| ANCH. MT | | |
| WEIGHT | | |
| SEISMIC | | |



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FIGURE 1.3
PIPING ROUTING CHANGE