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MIDDLE SOUTH UTILITIES SYSTEM

March 16, 1984

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Director of Nuclear Reactor Regulation
Attention: Mr. G.W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford SES Unit 3
Docket No. 50-382
Technical Specifications: 10CFR50
Appendix J Leak Rate Testing and Containment Isolation Valves

ATTACHMENTS: (1) Justification for exemption from Type C Testing
(2) List of isolation valves within essential system
(3) Penetration Isometric Drawings

Dear Mr. Knighton:

Louisiana Power and Light is currently finalizing and making plant-specific the Technical Specifications in preparation for an operating license. The development and review process has generally proceeded in a very productive manner, however we have reached an impasse on three critical issues under Containment Systems Branch cognizance. These issues potentially impact the fuel loading schedule and subsequent power operation of Waterford 3 if not satisfactorily resolved.

TYPE C TESTING

The first issue concerns Type C leakage testing pursuant to 10CFR50, Appendix J. During the Technical Specification Proof and Review phase, the Containment Systems Branch (CSB) indicated that penetrations subject to Appendix J Type B and C testing should be explicitly identified in the Technical Specifications. Consequently, LP&L proposed an update to the Technical Specifications that added applicable penetrations for Type B and C testing as previously identified in the FSAR. However, the CSB has indicated that additional penetrations should be subject to Type C testing. There are two points which we believe are relevant to this issue.

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First, apparently the CSB is maintaining a position requiring nine (9) additional penetrations to be Type C tested. None of these penetrations are required to be Type C tested in accordance with the definition of "Type C Tests" included in Appendix J of 10CFR Part 50. In addition, all of these penetrations are normally water filled and most are in operation under post accident conditions. In order to postulate leakage from the containment atmosphere to the outside atmosphere, multiple failures or single failures plus leakage through multiple barriers would have to be assumed in addition to the postulated LOCA. The penetrations identified in the FSAR for Type C testing adequately ensure that post-accident containment leakage is less than that assumed in the accident analyses. However, notwithstanding LP&L's firm position that these penetrations do not fit the criteria of Appendix J or applicable NRC guidelines for requiring leak tests, we have performed calculations which demonstrate that, even in the event of any single-active-failure, a water seal will be present on each penetration thereby preventing containment leakage. A discussion of the results of these calculations is provided in Enclosure 1.

Second, it had been LP&L's understanding that the testing requirements of Appendix J of 10 CFR Part 50 had been satisfactorily resolved during the FSAR review. Evidence of this resolution is contained in the Waterford-3 Safety Evaluation Report (NUREG-0787) Subsection 6.2.6. LP&L does recognize that the determination of Containment bypass leakage paths remained open to be resolved as part of the Technical Specification review process as stated in SER Subsection 6.2.3. However final determination of bypass leakage paths should not have identified additional penetrations for Type C testing since bypass leakage penetrations are a subset of Type B and C penetrations.

The nine (9) penetrations at issue are not designed with provisions to conduct leak rate testing in accordance with Appendix J. It is extremely late in the licensing process for the Containment Systems Branch to reopen design questions that had previously been accepted, and it is inappropriate that the Technical Specification process be used as a mechanism for reinterpreting leak testing regulations. Being that the CSB's concerns do not seem plant-specific to Waterford-3, LP&L believes that these concerns, including their inconsistency with Appendix J, may be more appropriately addressed in accordance with the Commission's Backfit Policy.

Technical Specification 3/4.6.3 and General Design Criteria (GDC) 57 Systems

The second issue of concern to LP&L is the Containment Isolation Valve Technical Specification. LP&L's concern deals with the applicability of the Limiting Condition for Operation (LCO) toward GDC 57 systems (closed systems penetrating containment) and the appropriateness of including isolation valves within essential systems under the jurisdiction of this Technical Specification.

LP&L's position is that the LCO/Action requirement of this specification is inappropriate for penetrations designed in accordance with General Design Criteria (GDC) 57 of Appendix A of 10CFR Part 50. GDC 57 penetrations are neither part of the reactor coolant pressure boundary nor open to containment atmosphere, but are connected to a closed seismic Category I system inside containment and are provided with a containment isolation valve outside the containment. Hence, the two operable isolation barriers are an active isolation valve and a passive closed piping system. LP&L's concern with the Action requirements of Specification 3.6.3 is that an inoperable isolation valve in a GDC 57 penetration would require immediate action to initiate plant shutdown because the action statements do not take credit for the second isolation barrier, i.e., closed systems inside containment. However, an inoperable isolation barrier (valve) in a typical GDC 55 and 56 penetration is allowed 4 hours before initiation of plant shutdown is required. This allows expected and unexpected maintenance activities to be performed on containment isolation systems. Prior to revision 3 (Fall/1981) of the Standard Technical Specifications, the bases for this specification never explicitly included GDC 57. It is LP&L's position that Specification 3.6.3 should not decrease potential plant availability without a corresponding increase in safety. Consequently, it is requested that Specification 3.6.3 be revised to allow credit for the containment isolation boundary intrinsic to a GDC 57 penetration (i.e., a closed system), or the valves in these penetrations be deleted from the specification.

Technical Specification 3/4.6.3 and Essential Systems

An additional concern with Technical Specification 3/4.6.3 is the inclusion into this specification of valves in essential systems. Placing these valves into this Technical Specification can degrade the overall safety of the plant as well as limit operations. Inclusion of essential system valves forces the plant to isolate these penetrations within four hours if a valve is inoperable in order to meet the action statements of Specification 3.6.3. Isolation of these valves is not the required post-accident position nor the position of greater importance to plant safety. These penetrations are designed to be open and operating post-LOCA and usually get ESFAS Signals (SIAS, CSAS, EFAS) to open in the event of an accident. The operability of these valves/systems is ensured by other means including: separate Technical Specifications for each system (Safety Injection, Containment Spray, etc.); the provisions and requirements of ASME Section XI; and actuation during ESFAS subgroup relay testing (Technical Specification Table 4.3-2). Inclusion of these valves does not seem to be in the best interest of plant safety or operation and is inconsistent with the requirements placed on previously licensed plants. LP&L's position is that the operability of the essential system containment isolation valves is ensured by other requirements and that the level of safety being verified by the Technical Specifications should be consistent among all the Engineered Safety Feature Systems. Enclosure (2) lists those isolation valves that LP&L feels are better validated by other Technical Specifications and requirements.

Your assistance in ensuring that these matters receive the appropriate high level reviews will be greatly appreciated. Should you have any questions or comments, please do not hesitate to contact us. We are prepared to meet with the NRC staff to respond in detail to any questions.

Very truly yours,

K W Cook

K. W. Cook
Nuclear Support & Licensing Manager

KWC/RMF/WW/ch
Attachments

cc: W.M. Stevenson, E.L. Blake, D.M. Crutchfield, W. Butler, J. Wilson, D. Hoffman, J. Huang, G.L. Constable

Enclosure (1)

Justification for Exemption from Type C Testing

The following penetrations have not been resolved:

1. #23, #24 CCW for Reactor Coolant Pumps and CEDM Coolers
2. #27 CVCS Charging Line
3. #34, #35 Containment Spray
4. #40, #41 Shutdown Cooling
5. #69, #70 Hot Leg Injection

For penetrations 23 and 24, the Containment Systems Branch at a meeting on 1/17/84 indicated that an exemption from leak testing until the first refueling could be granted due to lack of testing provisions. This is acceptable at present to LP&L, however further effort is planned to support a permanent exemption and to fully address CSB concerns.

In regard to the other penetrations, Appendix J to 10CFR Part 50 states:

"Type C Tests" means tests intended to measure containment isolation valve leakage rates. The containment isolation valves included are those that:

1. Provide a direct connection between the inside and the outside atmosphere of the primary reactor containment under normal operation, such as purge and ventilation, vacuum relief, and instrument valves;

2. Are required to close automatically upon receipt of a containment isolation signal in response to controls intended to effect containment isolation;

3. Are required to operate intermittently under post accident conditions; and

4. Are in main steam and feedwater piping and other systems which penetrate containment of direct-cycle boiling water power reactors.

The NRC staff conclusions reached in Section 6.2.6 (Containment Leakage Testing Program) in the Waterford 3 SER (NUREG-0787 dated 7/81) state:

"The proposed reactor containment leakage test program complies with the requirements of Appendix J to 10 CFR Part 50. Such compliance provides adequate assurance that containment leak-tight integrity can be verified periodically throughout service lifetime on a timely basis to maintain such leakage within the limits of the technical specifications.

Maintaining containment leakage rates within such limits provides reasonable assurance that, in the event of any radioactivity releases within the containment, the loss of the containment atmosphere through the leak paths will not be in excess of acceptable limits specified for the site. Compliance with the requirements of Appendix J constitutes an acceptable basis for satisfying the requirements of GDC 52, 53, and 54."

None of the disputed valves fit any of the above categories and therefore should not require testing. In addition, all of these penetrations are normally water filled and most are in operation under post accident conditions. In order to postulate leakage from the containment atmosphere to the outside atmosphere, multiple failures or single failures plus leakage through multiple barriers against a water seal would have to be assumed in addition to the LOCA. This enclosure contains a discussion of each penetration in question.

Penetrations 34, 35, 40, 41, 69, and 70 form closed, seismic Category I, Safety Class 2 Systems outside containment, have design temperature and pressure greater than the post-LOCA containment environment, and are protected from the effects of pipe rupture and missiles. These systems are maintained full of water during normal plant operation and due to their Post Accident operation are subject to a system leak reduction program including periodic leak testing (with fluid) in accordance with Technical Specification 6.8.4.a and NUREG 0737 Item III.D.1.1. These leak tests are performed at system operating pressures which are much greater than the containment post accident pressure; therefore, leakage due to containment pressure for postulated system failures will be minimal. The discovery of any significant leakage identified during testing requires appropriate maintenance to reduce the leak rate. Leakage from these systems occurs within the Controlled Ventilation Area and the worst-case effects are accounted for in the analysis of LOCA Dose Consequences (See SER 15.4.7).

In addition to the above arguments, the following provides specific details (penetration isometric drawings are included as Attachment (3)) for each penetration supporting LP&L's position that post LOCA containment leakage paths are not credible for these penetrations and that it is unnecessary to perform Type C tests.

Penetration 27 CVCS Charging Line

The charging system receives an automatic SIAS signal to start two charging pumps, align the system to take a suction on the Boric Acid Makeup Tanks and inject borated water into the Reactor Coolant System. Flow through this penetration is guaranteed in this line under post-LOCA conditions, and credit is taken for flow in the small break LOCA analysis. Technical Specification 4.1.2.2.b verifies the flowpath at least every 31 days.

During the subsequent post-LOCA period, the water in the Boric Acid Makeup Tanks may be depleted. When this happens, charging will be secured and the charging isolation valves will be shut. For most RCS break locations, the charging line will not be exposed to the containment atmosphere, since flow from the Safety Injection system keeps the piping covered with fluid. In the event the break was in the RCS Cold Leg at a position which caused the charging line to be exposed to the containment atmosphere, there are still several barriers available. Inside containment there are 2 valves in series in each charging path and outside containment there are check valves on each charging pump discharge in addition to the containment isolation valve. The charging pumps are positive displacement pumps further minimizing any backflow in the system. All of the piping is of high pressure design, and the valves are subject to ASME section XI testing.

A conservative calculation was performed assuming seat leakage of the outboard isolation valve, neglecting the resistance of the other valves and the positive displacement pumps. The outside isolation valve is a gate valve, thus only seat leakage has the potential to become stem leakage. The result shows that a water barrier can be maintained on the isolation valve for greater than 30 days even if one and one-half times the valve's design leakage is assumed. This calculation and the design leakage specification are based on system design pressure which is much higher than the relatively low Containment Post Accident Pressure.

LP&L finds it highly unlikely that a credible leakage path from the Containment atmosphere to the outside atmosphere exists in this penetration.

Penetrations 34 and 35, Containment Spray

The Containment Spray System is an ESF system that is required to be in operation following a LOCA. During normal plant operation the system is maintained full of water from the RWSP through the pump discharge header (riser) up to a level of 149.5 ft. MSL (See Technical Specification 3/4 6.2). After the LOCA, the system is automatically placed in operation, supplying water from the RWSP or the Safety Injection System Sump inside containment. The outer isolation valve is located at the system lowpoint (-32 ft. MSL) and thus water is maintained around the valve even if the Containment Spray pump fails to start. That is, a head of water will be applied against this valve from the RWSP (minimum water level: -2 ft. MSL) and/or the Safety Injection Sump (bottom at -16 ft. MSL plus post-accident containment pressure) due to their higher elevation, irrespective of what single-failures are applied. In order for leakage to occur a check valve inside the containment and an isolation valve outside containment would have to leak through the seats under the small differential pressure across the valve. A leakage calculation was performed, which neglected the check valve completely. The outside containment isolation valve is a gate valve, thus only seat leakage has the potential to become valve stem leakage. The calculation conservatively assumed all seat leakage as stem leakage. The results show that a water barrier can be maintained for greater than 30 days even if 45 times the design seat leakage is assumed.

LP&L finds it highly unlikely that leakage can occur through these penetrations.

Penetrations 40 and 41, Shutdown Cooling

The SDC lines connect the RCS hot legs to the LPSI Pump Suction through three normally closed isolation valves. Two of these valves are interlocked such that they cannot be opened until the RCS pressure is reduced below the SDC entry pressure (377 psig). Inside the Reactor Auxiliary Building, this closed system piping descends to the -35 ft. MSL elevation where it connects to the LPSI Pump Suction. This system lowpoint will be maintained under a head of water due to the higher elevation of the RWSP and/or the Safety Injection Sump. The SI Sump, due to the water level in the sump and containment atmospheric pressure will always exert a higher pressure on the RAB side of the low point piping than the piping from containment will if exposed to the containment atmosphere. Should the SI Sump isolation valve fail to open, the RWSP at the minimum level achieved upon RAS (-2 ft. MSL) will exert approximately 13 psi on this piping. A higher pressure (44 psi peak) can exist inside the Containment, but this is reduced to

less than 22 psi within 24 hours (See SER 6.2.1), and then is further reduced. In order for leakage to occur, these three in-series valves must leak by the seats. The containment isolation valves are gate valves, thus only seat leakage has the potential to become valve stem leakage. The two valves inside Containment are RCS boundary valves and tested for leakage in accordance with Technical Specification 4.4.5.2.2 at 2250 psia. A calculation was performed assuming seat leakage of the outboard isolation valve, neglecting the isolation provided by the two in series RCPB valves inside Containment. The results show that a water barrier can be maintained on the valve for greater than 30 days even if 9 times the design leakage occurred. Both the calculation and the design leakage specifications are based on system design pressure which is much greater than the relatively low Containment Post Accident Pressure.

LP&L finds it highly unlikely that post accident containment atmosphere eakage will occur in this penetration.

Penetrations 69 and 70 Hot Leg Injection

The Hot Leg Injection headers are an integral part of the ECCS system and will be placed in operation post-LOCA. Prior to initiation of hot leg injection, the isolation valves outside containment are closed with HPSI pump discharge pressure applied against the outermost valve. Even if a HPSI pump failed during post-accident conditions, pressure is still applied to the RAB side of the outermost isolation valve due to the head of water from the RWSP and/or the Safety Injection Sump. Due to the dual considerations of the water level in the SI sump in addition to the ambient containment pressure, a higher pressure will always exist on the RAB side of the isolation valve than on the containment side, thus ensuring that any leakage will be <u>into</u> containment, and that in any event a water seal is maintained on the containment side of the valve. Should the sump isolation valve fail to open (a <u>second</u> single-active-failure), the minimum RWSP level will still exert at least an approximate 13 psi against the outermost isolation valve. Although a higher ambient pressure may exist for a short time inside containment, 2 check valves (RCS boundry valves) and the isolation valve outside containment all present barriers against leakage. The check valves are tested for leakage (intersystem LOCA bases; Technical Specification 4.4.5.2.2) at 2250 psia, far greater than the small post-accident differential pressure which may exist across the isolation valve (less than approximately 31 psi).

A calculation was performed assuming seat leakage and stem leakage of the outboard isolation valve and neglecting the isolation provided by the series check valves completely. The results show that a water barrier can be maintained for greater than 30 days even if double the design leakage occurred. This calculation included stem leakage that will be detected and corrected under the leak reduction program. Both the calculation and the design leakage specifications are based on system design pressure which is much higher than the relatively low containment post-accident pressure.

LP&L finds it highly unlikely that a credible leakage path from the containment atmosphere to the outside atmosphere exists in these penetrations.

Enclosure (2)

Proposed Valves to be Deleted from

Technical Specification Table 3.6-2*

1. Containment Isolation
   Acceptable as is

2. Containment Purge
   Acceptable as is

3. Safety Injection Actuation Signal (SIAS)**
   ° Penetration 26 - CVCS Letdown (Already listed under (CIAS))
   ° Penetration 32 and 33 - SI Sump Isolation

4. Main Steam Isolation Signal (MSIS)**
   ° Penetration 32 and 33 - Emergency Isolation

5. Manual/Remote Manual

   Essential Systems:
   a. Penetration 1 and 2 - 2MS - V611A, 2MS - PM629A, 2MS - V612B, 2MS - PM630B
   b. Penetration 15 through 22 - CCW to Containment Fan Coolers
   c. Penetration 27 CVCS - Charging
   d. Penetration 34 and 35 - Containment Spray
   e. Penetrations 36 through 39 - LPSI
   f. Penetrations 40 and 41 - Shutdown Cooling
   g. Penetrations 55 through 58 - HPSI
   h. Penetrations 69 and 70 - Hot Leg Injection

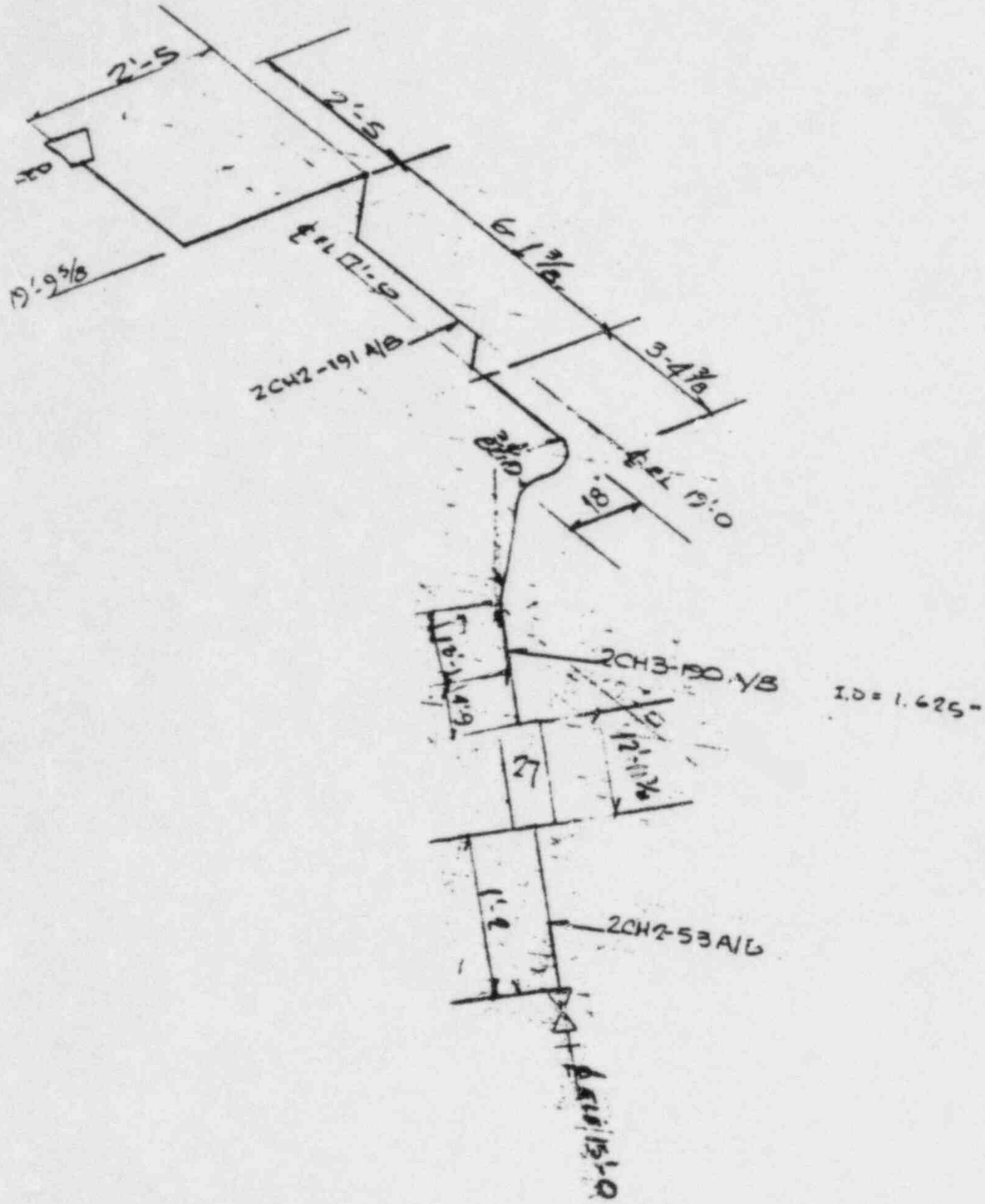
6. Other
   a. Essential Systems: Penetrations 27, 34, 35, 36-39, 55-58, 69 and 70
   b. Penetration 1 and 2. These valves are not required for containment isolation in accordance with GDC 57 (See revised FSAR Table 6.2-32, and 33).

* This list is broken down into Subsections as shown in the February 16, 1984 Draft version of Technical Specifications.

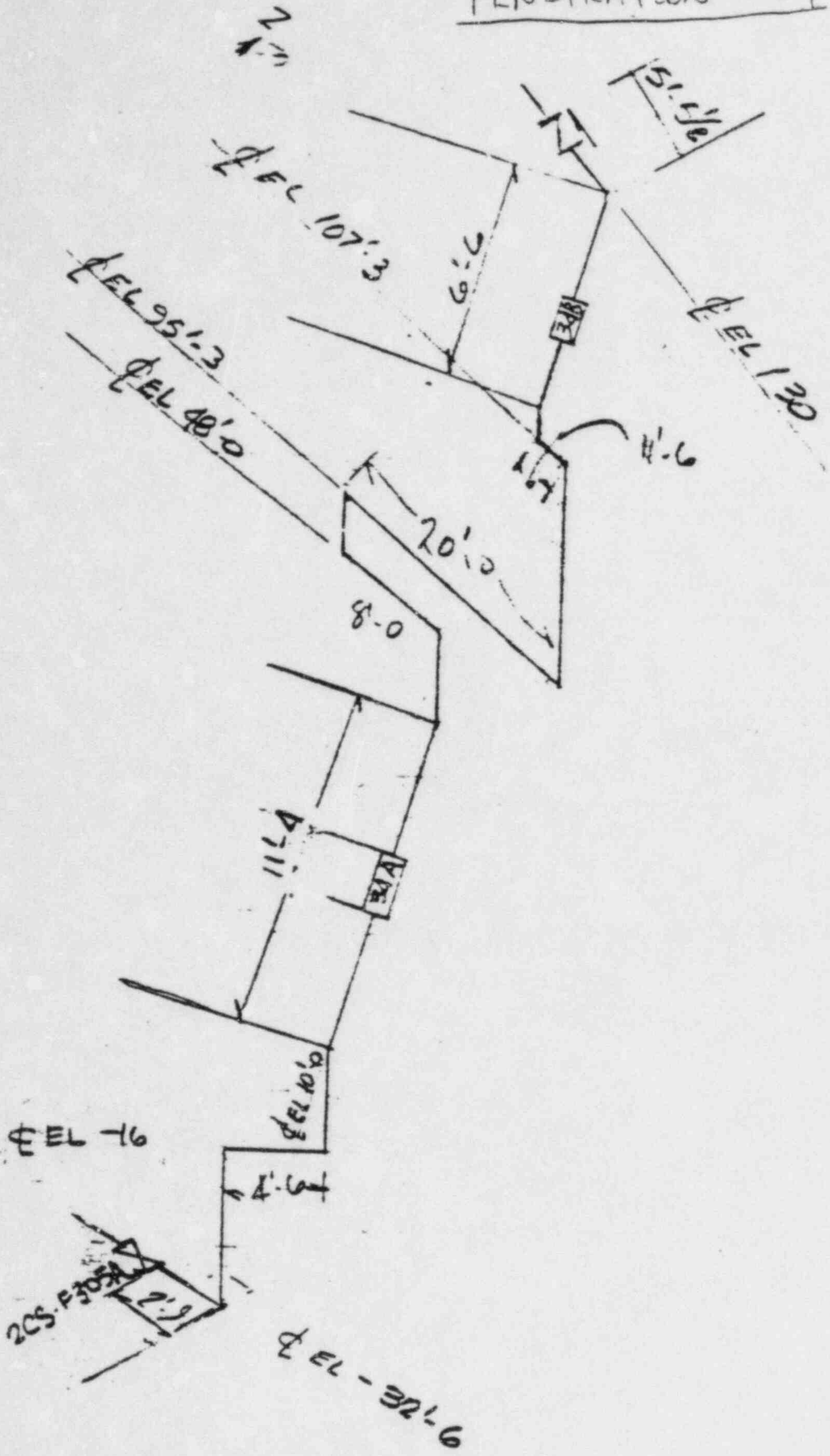
** LP&L's position is that these Subsections should not be included in this Technical Specification.

Enclosure (3)

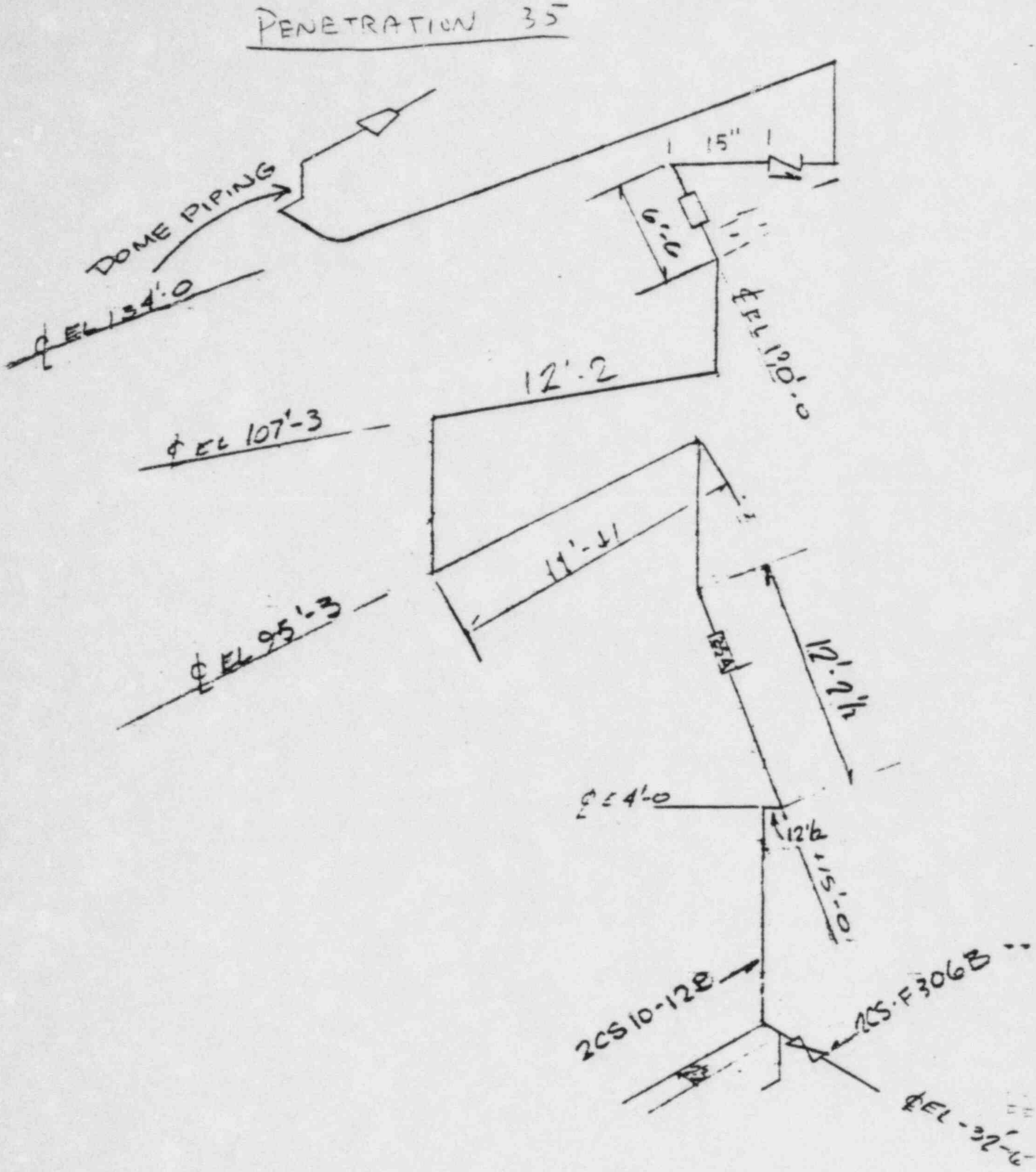
PENETRATION 27



PENETRATION 34



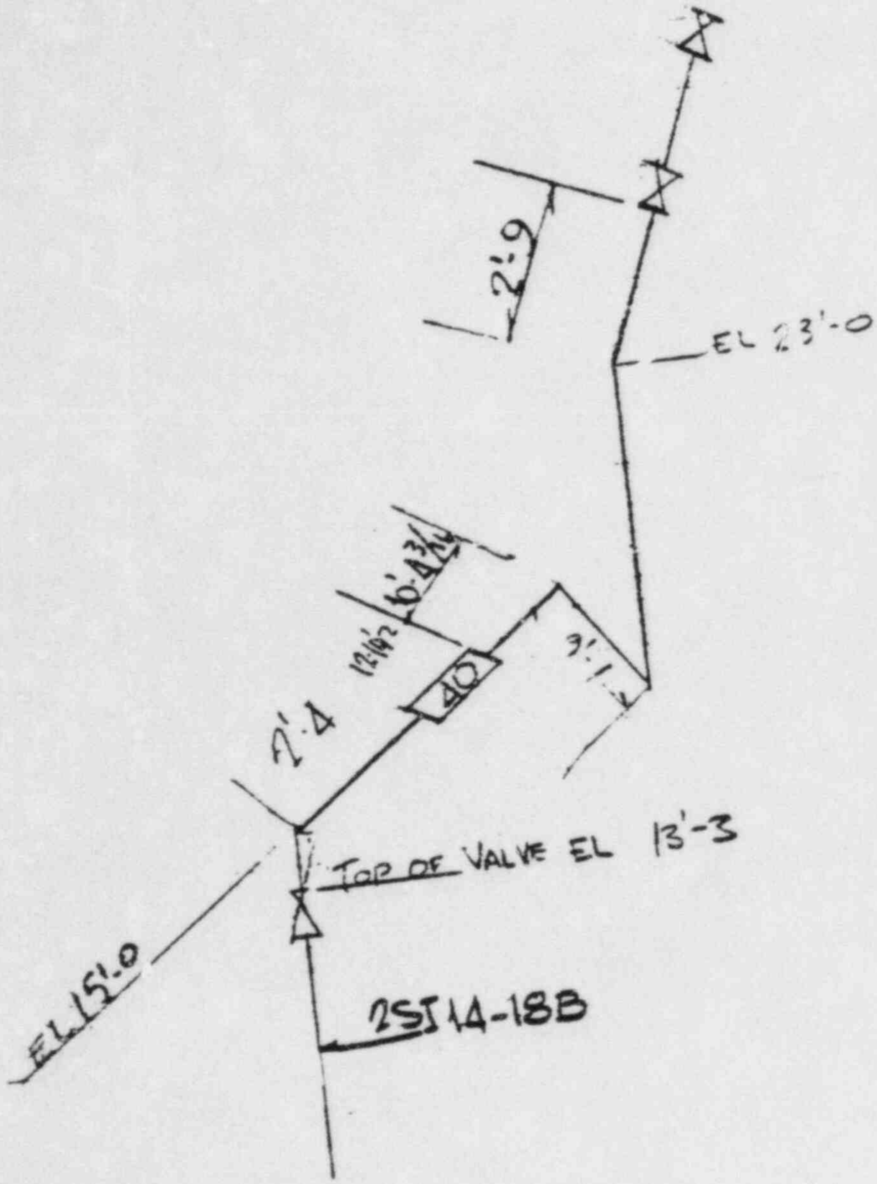
Enclosure (3)



PENETRATION 35
DOME PIPING
15"
6'-0
℄ EL 134'-0
℄ EL 120'-0
12'-2
℄ EL 107'-3
11'-11
℄ EL 95'-3
12'-7½
℄ EL 4'-0
12'½
15'-0
2CS10-12B
2CS-F306B
℄ EL -32'-6

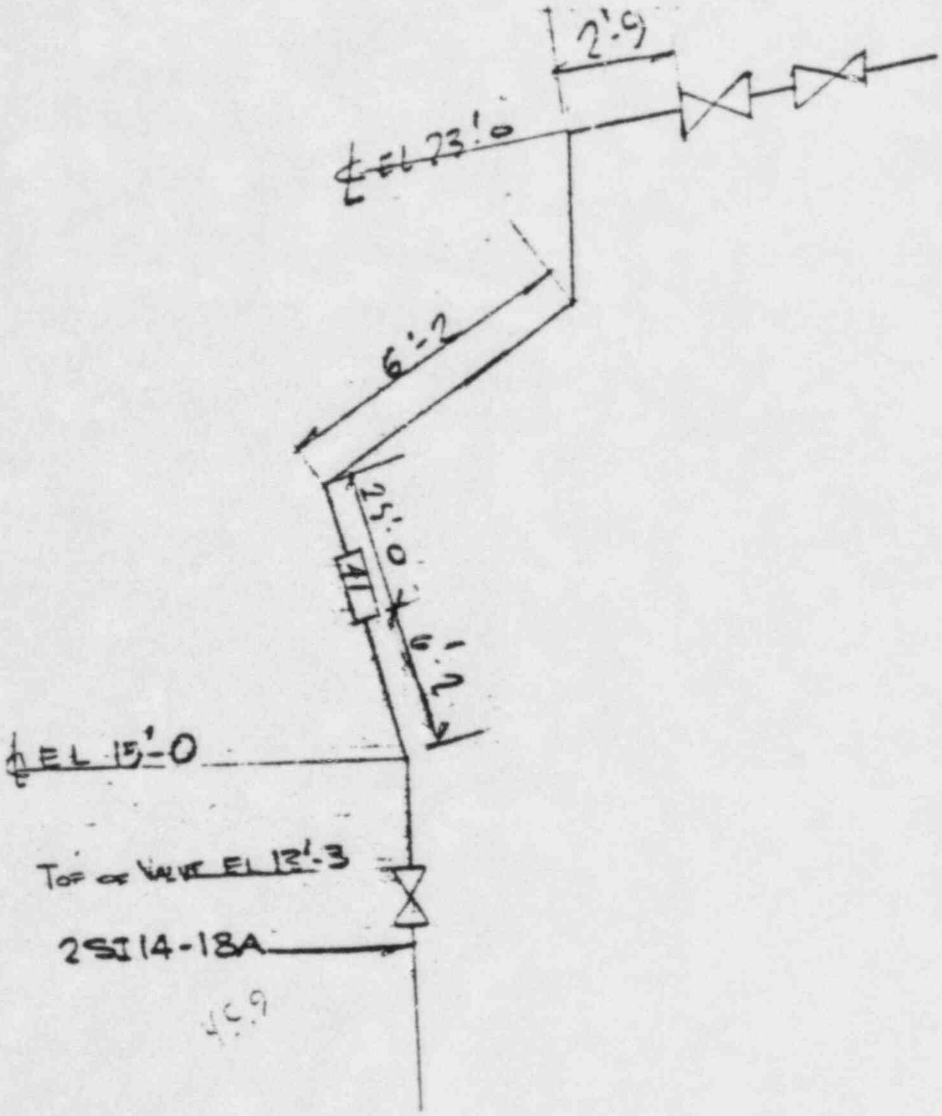
Enclosure (3)

PENETRATION 40



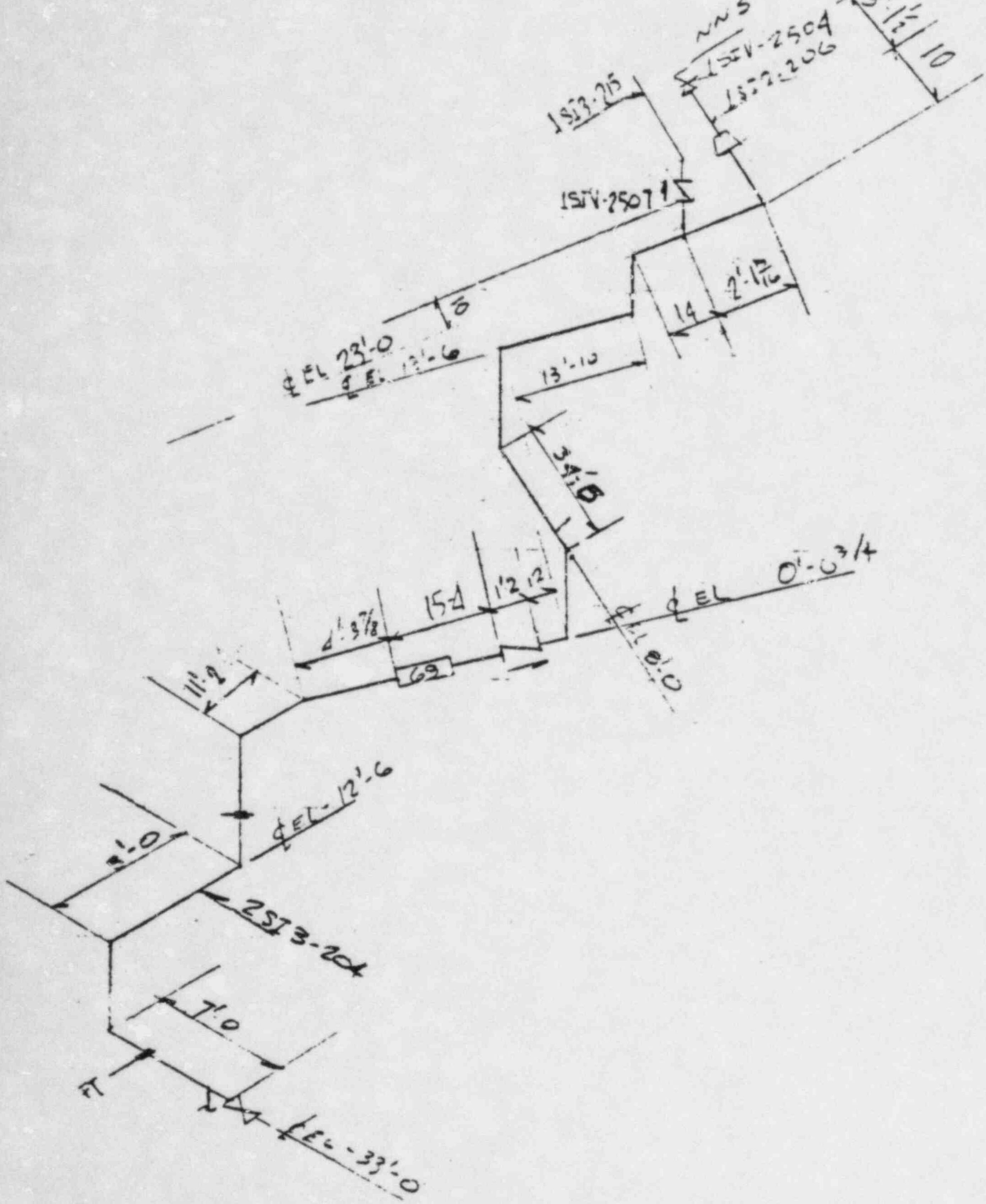
Enclosure (3)

PENETRATION 41



Enclosure (3)

PENETRATION 69



Enclosure (3)

PENETRATION 70