FINAL REPORT

MAIN STEAM ISOLATION VALVE

3-WAY DUAL SOLENOID VALVE FAILURES

December 30, 1987

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Executive Summary

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This report summarizes the findings and conclusions resulting from investigations following Main Steam Isolation Valve (MSIV) failures on October 29, November 3 and November 29, 1987.

Initial Event

On October 29, 1987 the Perry Nuclear Power Plant was completing the final stages of the Startup Test Program. One of these tests involved fast closing a Main Steam Isolation Valve (MSIV). During this test, the valve (1B21-F022D) failed to stroke closed within the required time. All other MSIVs (7) were cycled in order to verify adequate stroke times. Two of the other MSIVs failed to satisfy the required stroke time (1B21-F028D, 1B21-F028B).

The three valves that initially failed were stroked satisfactorily upon subsequent demand. The problem was attributed to a one time deposit of debris in the respective solenoids which was exhausted as shown by the subsequent successful strokes. The debris was believed to have caused a delay in the solenoid responses. Based upon a satisfactory stroke, the valves were considered Operable and startup testing resumed. Plant management decided to perform the MSIV stroke tests again prior to the last startup test, the full MSIV isolation scram. This approach was discussed with NRC Region III.

On November 3, in preparation for the final startup test, additional stroke timing tests of MSIVs were performed. During the first stroke attempt, two of the same MSIVs (1B21-F022D, 1B21-F028D) that previously stroked slowly, again failed to close within the required time. The valves were subsequently recycled satisfactorily within minutes of their first tests. However, because the valves again failed to meet the required closure time on the first attempt, the basis for an isolated failure was no longer considered valid. NRC Region III was informed of the problem. The decision was made to shutdown the plant and troubleshoot the problem.

On November 4, an NRC Augmented Inspection Team (AIT) arrived on site. A troubleshooting plan was established and implemented. The air actuators of the three valves which had exhibited slow closing times were disassembled and the inspection results documented. The conclusion drawn is that the dual solenoids exhibited sluggish action after operating in localized high temperature conditions. It is believed that steam leaks caused an elevated temperature environment in the vicinity of the solenoids. The elevated temperatures degraded the Ethylene Propylene Diene Monomer (EPDM) material causing the solenoid to stick or to be sluggish. Corrective actions included replacing or rebuilding all 8 MSIV dual solenoids and implementing additional testing. Repair work and necessary retests were completed satisfactorily and plant startup conducted on November 13.

Second Event

On November 29, the plant was conducting periodic stroke tests of the MSIV in accordance with commitments originating from the previous event. The tests were performed by fully closing each MSIV individually utilizing the test solenoid, followed by placing the control switch to the "close" position. Performance of this test verifies proper operation of the MSIV dual solenoid, since the MSIV will only remain closed if the dual solenoid de-energizes and properly repositions.

During this test, the 1B21-F022B valve failed to remain closed after two separate attempts using the sequence described above. In accordance with commitments documented in our letter, PY-CEI/OIE-0289 L dated November 13, 1987, the plant was shutdown and notifications made to the NRC Operations Center and Senior Resident Inspector. The remaining seven MSIVs satisfactorily passed the test requirements.

On November 29 and 30, an NRC Augmented Inspection Team (AIT) arrived onsite. A troubleshooting plan was established and implemented. The plan included various MSIV solenoid valve disassemblies, visual inspection of valve parts, chemical analysis of as found materials, Instrument Air System analysis and microscopic examinations. The root cause analysis conclusion is that a sliver of foreign material, discovered in the 1B21-F022B solenoid valve body, caused mechanical binding of the valve.

This binding caused the solenoid to remain in the normally energized position, after it was verified that the solenoid was deenergized, which then prevented air bleed off from the MSIV actuator and valve (MSIV) closure. The foreign material was Ethylene Propylene Diene Monomer (EPDM) which was demonstrated to have come loose during previous valve rebuild activity. Corrective actions included complete replacement of all MSIV solenoid valves with new valves. Replacement work and necessary retests were completed satisfactorily and plant startup performed on December 9.

Introduction

Introduction

A. Brief Description of Applicable Systems

Perry Nuclear Power Plant is a boiling water reactor supplied by the General Electric Company and designated BWR/6 with a Mark III containment. The main steam system consists of four main steam lines (A, B, C, and D) each consisting of a flow restrictor and two redundant Main Steam Isolation Valves (MSIVs) (see Diagram 3). The combination of two MSIVs in each steam line provides a highly reliable means of isolating the reactor vessel to minimize the loss of reactor coolant inventory and to limit the release of radioactive materials. The inboard valves are labeled 1B21-F022A-D and the outboard valves 1B21-F028A-D. The upper end of each valve's stem is attached to an actuator with a combination air cylinder/dashpot. The cylinder provides the motive force to open and close the valve, while the dashpot controls the speed of valve operation. The hydraulic dashpot consists of an oil filled cylinder, hydraulic piston, two external speed control valves and piping. The valve actuator also contains helical springs which provide valve closing force.

The MSIVs are opened by air pressure supplied by the Instrument Air System. Air pressure is directed to the bottom of the air cylinder in the opening operation by the positioning of various control valves. To close an MSIV, air pressure is applied to the top of the air cylinder piston while air is bled off the bottom of the piston.

The solenoid valve which directs air pressure to and from the MSIV actuator during fast closure is an ASCO 3-way dual solenoid (Model NP8323A20E; see Diagrams 1 and 2). When deenergized, the core assembly and seat of solenoid A are held against the inlet port orifice by the core spring. The core assembly also forces the disc holder subassembly down, compressing the disc holder spring of solenoid B and unseating the disc from the exhaust port orifice. This allows air to pass from the cylinder through the exhaust port orifice to the atmosphere. When energized, the solenoid A core assembly is lifted from its seat on the inlet port orifice.

This allows the solenoid "B" disc spring to lift the disc-holder subassembly and seat against the exhaust port orifice. Air then passes through the inlet port orifice and pressurizes the process cylinder. When solenoid B is energized, the core is forced upwards, pushing the stem against the bottom of the disc-holder subassembly. The disc-holder subassembly forces the solenoid A core assembly to its energized position, unseating the core assembly from the process pilot orifice and seating the disc-holder subassembly against the exhaust pilot orifice.

In the event of a failure of the air supply, the helical closing springs along with an air accumulator provide sufficient forces to close the valve. In addition, steam flow through the valve assists in valve closure. The closing speed can be adjusted over a required range of 3 to 5 seconds which is fast enough to provide sufficient protection in the event of a main steam line rupture, but slow enough to prevent imposing an excessive pressure transient on the reactor vessel.

The Instrument Air System provides clean, dry, oil free air for control purposes throughout the plant. The system meets the guidelines of ANSI Standard MC-11-1 (ISA-S7.3) with the exception (as documented in FSAR Section 9.3.1.2) that the maximum allowable particle size for air to safety related equipment is 40 microns. The normal supply of air pressure to the instrument air system is from one of four air compressors (2 service and 2 instrument air compressors). The instrument air (from any of the sources) passes through an after cooler, a receiver tank, a pre-filter, an air dryer, an after-filter and a piping network prior to distribution to various plant components. The instrument air system has no safety-related function. Depressurization of this system will not compromise any safety-related systems or component and will not prevent safe reactor shutdown.

B. Purpose and Scope of the Recovery Effort

The purpose of the followup effort was to (1) conduct a timely, thorough and systematic investigation of the events surrounding the MSIV failures; (2) collect, analyze and document the factual information and evidence sufficient to determine the probable root and contributing causes to the failures; and (3) review the actions taken at the time of the events and assess their compliance with applicable requirements.

The scope of this effort included conditions preceding the events (e.g. maintenance histories, past surveillance tests), event chronology, system response, human factors considerations, equipment performance, possible precursors to the events, previous industry experiences, the shifts response to the events, the safety significance (including radiological considerations), and whether proper regulatory guidelines and/or requirements were followed.

C. Brief Description of Report's Contents

A summary is provided for each of the two events, October 29-November 3 and November 29, documenting the significant evidence, analyses and conclusions identified from the initial MSIV failures through the final determination and restart action items. Briefly, the following is included:

- A chronology of events
- An assessment of the actions taken
- Equipment performances/failures
- Relationship to previous similar events
- An assessment of the safety significance
- Corrective actions
- Plans for restart

October 29 and November 3 Event Description

October 29 and November 3 Event Description

A. Chronology of Events

On October 29, at 1837 Startup Test Instruction (STI)-B21-025A, "MSIV Functional Test" was being performed on 1B21-F022D, inboard MSIV. The D Main Steam Line (MSL) inboard MSIV closed in 22.14 seconds, in excess of the required closure time of Technical Specifications 3.4.7 and 3.6.4.. At 2103 and 2106 the D inboard MSIV was satisfactorily cycled twice with closure times of 3.24 and 2.94 seconds. All other MSIVs were then cycled to verify closure time. The B and D outboard MSIVs closed in 11.9 and 77 seconds respectively, and each was recycled with satisfactory results. The cause of the slow closures was thought to be a one time deposit of debris in the respective solenoid valves causing a delay in their response. Once the valves were cycled and the stroke times passed, the debris was assumed to be exhausted. Since initial conditions causing MSIV slow closure could not be repeated, all MSIVs were declared Operable and plant startup testing continued.

On November 3 at 1150, MSIV stroke timing commenced in preparation for performing a full MSIV closure scram as part of the startup test program. At 1157 the D inboard MSIV closed in 18 seconds but recycled satisfactorily at 1159. At 1208 the D outboard MSIV failed to close. A second attempt was satisfactory at 1213 with a closure time of 3.4 seconds. Based on repeat failures a plant shutdown was commenced at 1330. The Reactor Recirculation (RRC) Pumps were shifted to slow speed at 1630, resulting in a reactor power decrease from 32 percent to 23 percent of rated. With reactor power below the Low Power Set Point (LPSP)(26 percent), the Rod Pattern Controller (RPC) generated control rod insert and withdrawal blocks. Preparations were made and the reactor was manually scrammed by placing the Mode Switch in "Shutdown" at 1819.

On November 4, the Nuclear Regulatory Commission (NRC) issued a Confirmatory Action Letter (CAL) detailing various actions to take in preparation for an NRC Augmented Inspection Team (AIT). The team arrived onsite November 4.

B. Troubleshooting Activities

Prior to performing any work in the field, a troubleshooting plan was written. Based on the symptoms shown on October 29 and November 3, it was felt that the component with the highest probability of causing the slow closures was the ASCO model number NP-8323A20E dual solenoid found on each MSIV air actuator. The troubleshooting plan was set up to determine what the root cause was and whether any secondary problems had an impact.

On November 5 "As Found" conditions were documented wherein a more detailed troubleshooting plan was developed to establish the root cause of the MSIV failures and corrective actions necessary to restore the valves to operable condition. The revised plan was agreed to by the NRC AIT. On November 5 through November 8 various troubleshooting activities were carried out.

(1) Tests conducted on the 1B21-F022D, F028D and F028B solenoids included the following:

a. Solenoid voltages and solenoid air exhaust port samples were taken as the valves were cycled and all results were satisfactory. Next, the field wiring and air lines were disconnected from the air actuator or air pack. All connections and pipe openings were inspected. The air pack was then removed from the valve actuator and taken to the I&C hotshop for disassembly. The 1B21-F022D single (slow close) solenoid was inspected and no problems were found. Any discrepancy no matter how small was documented for further evaluation. Whenever possible, pictures were taken of what was found.

Results:

a. All dual solenoids disassembled had impact marks on the star shaped disk subassembly and a deep depression (dimple) on the disc holder seal (EPDM), with the solenoids of the B21-F028D valve indicating the most degradation (see Appendix A).

b. Many of the EPDM Body Assembly O-Rings were hard, flattened, and adhering to metal valve body surfaces.

c. In the 1B21-F028D valve rust was found inside the solenoid housing cover and the B solenoid coil was badly corroded. (This was incorrectly identified as 1B21-F022D in our letter PY-CEI/OIE-0288 L dated November 13, 1987).

(2) In addition to the component disassembly, other analyses were performed to determine what contribution, if any, instrument air quality may have had in the failure of the MSIV valves. Instrument air dew point temperature was measured in the supply to both the inboard and outboard MSIV's. Air supply particle size distribution was measured. Various unknown substances observed in or collected from internal component surfaces were analyzed using infrared spectroscopy to determine the origin of the material. Grab samples of the air supply were analyzed by gas chromatography for hydrocarbon content, and quantification of organic contaminants, if present in significant quantities.

Results:

The measured dew point temperatures were well below the maximum -40°F allowable. Initially a particle counter was used to measure air particle size distribution. Due to a recent change in vendor calibration standards, the maximum range of

quantification was greater than 15 microns. Testing did indicate a small number of particles in the greater than 15 micron range. In an effort to quantify those particles, an alternate sampling method using filter paper was attempted. Samples were taken and particle sizes measured using a microscope. This did indicate a few particles in the greater than 40 micron range, but this sampling method is susceptible to contamination from the sampling environment which may have been the reason for the greater than 40 micron particles measured. Analyses of the substances collected during disassembly identified the presence of thread sealant and silicone lubricant, both of which are normally used during assembly of solenoid valves and air lines. Air supply grab samples revealed no detectable condensable hydrocarbons greater than 0.1 PPM.

Based on the information and analysis conducted it appears that the EPDM material used in various parts of the solenoid was interfering with solenoid valve movement. Thus, the decision was made to remove the dual solenoids on all 8 MSIVs, and replace/refurbish as necessary.

C. Root Cause of Failures

The cause of the MSIV delayed closures has been isolated to a failure of the ASCO dual solenoid valves. This failure is attributed to EPDM elastomer degradation due to elevated temperatures in the vicinity of the air packs resulting from steam leaks. This condition caused the disc holder assembly to intermittently wedge in place and the solenoid valve to stick in the normally energized position. The observed hardened dimples on the disc holder assembly and core assembly hardened elastomer seals is consistent with high temperature conditions. Other evidence of localized steam effects include degradation of the solenoid valve O-rings and observed rust/moisture contamination of the 1B21-F028D solenoid.

Localized high temperature conditions existed during the plant cycle due to steam leakage as evidenced by elevated area temperature indications. Steam leakage is known to have occurred in MSIV 1B21-F022B packing and the MSIV leakage control system isolation valves. This leakage was in the direct vicinity of those MSIV's which exhibited slow closure. Steam is suspected of leaking in the direct location of the subject MSIV air packs based upon the degradation of the EPDM.

D. Corrective Actions

As a result of the findings and conclusions identified subsequent to the October 29 and November 3 events, the following evaluations and corrective actions have been or will be completed:

(1) For the dual (fast closure) solenoids, the total 1B21-F028D air pack, including a new solenoid unit, has been replaced and a new dual solenoid was installed on the 1B21-F022D valve. Additionally, the 1B21-F022A dual solenoid valve was replaced due to a frayed wire at the termination. No other dual solenoids showed significant degradation or required replacement. All of the remaining MSIV dual solenoids were rebuilt.

(2) The single (slow closure) test solenoid was replaced on the 1B21-F028D valve since the whole air pack was replaced. Additionally, the 1B21-F028B single solenoid valve was replaced due to a frayed wire at the termination. Based on the inspection results above, no other replacements were necessary.

(3) An evaluation has been performed of other ASCO solenoid valves required for Class 1E harsh environment applications in the plant, including those which may have been subject to the steam leak environment which affected the MSIV solenoids. The review identified two normally deenergized solenoids which were subject to the same conditions as the MSIV solenoids. Since the solenoids are normally deenergized no further action was considered necessary because in this state, the suspected failure modes were not expected to occur.

The two solenoids were 1B21-F0451 (solenoid for valve 1B21-F0069) and 1M14-F0063A (solenoid for valve 1M14-F0060A). A work history review of all other applications has shown no solenoid failures, indicating the ASCO solenoid degradation appears to be limited to the MSIV solenoid valves. Further reviews are described in Item 11 below.

The 1M14-F0060A valve is a normally closed valve and has no safety function to mitigate an accident. It is associated with a drywell purge system damper that is closed during normal operation with a water seal in place for shielding purposes. This valve was satisfactorily cycled during the recent shutdown. The 1B21-F0069 valve is a one inch "before" seat drain valve that is closed at greater than 50% main steam flow (at which time the solenoid is deenergized). The valve was subsequently cycled on November 7, 1987 with no deficiencies identified. In addition, this valve was satisfactorily cycled again during the November 13 plant startup.

(4) An evaluation has been performed of other equipment in the vicinity of the 1B21-F022D, 1B21-F028D, and 1B21-F028B valves, to assess any impact that the steam leaks may have had on these components. This evaluation revealed that there were six valve operators in the steam tunnel and two in the drywell that were in close proximity to the known steam leaks. These actuators were inspected and no steam/heat degradation was observed.

Wiring, terminal blocks, torque switches, limit switches, splices, gaskets, and limit switch gear box lubricants were inspected by a team that included EQ personnel. There was no evidence of a thermal degradation from a steam environment that would affect valve operability. It should be noted that the Limitorque actuators do not contain EPDM material. In addition, a further review for qualified life adjustment has been completed (described in Item (11) below). There is no concern of Limitorque motor operators qualified life in the drywell or steam tunnel areas.

(5) Following the November 13 startup, temperatures in the vicinity of the MSIVs were initially monitored using permanently installed plant instrumentation. Monitoring was later accomplished using additional temporary instrumentation. The historical readings of the existing permanent steam tunnel and drywell temperature elements in the vicinity of the MSIVs were reviewed, and a baseline was determined for each element.

Until the temporary temperature monitoring baseline values were determined, the existing permanent temperature elements were used. It was determined that a 10% rise above these baseline values may be indicative of a localized steam leak and would require investigation. This value was conservatively selected since it is approximately one half of the temperature rise expected for the Technical Specification trip value for leak detection. It was sufficiently conservative for the interim period until the MSIV area and surface temporary temperature element readings were fully baselined. This temperature rise would have indicated the steam leaks which impacted the inboard MSIV (24 degrees F differential temperature). A lower threshold temperature rise could have resulted in unnecessary actions or reduction in power operation due to minor temperature fluctuations.

A procedure was established specifying necessary actions to be taken upon exceeding the interim temperature values. The interim temperature thresholds were established and based on area temperature plus a 10% rise or a selected 225 degrees F for the temporary temperature elements in the area surrounding the MSIVs in the steam tunnel and drywell. The NRC Senior Resident Inspector will be notified if any of the following corrective actions are to be taken:

- Reduce power, as necessary, to perform a visual inspection to determine the equipment affected.

- Immediately repair the leakage or shield the adjacent Class 1E components to limit the impact until a repair is possible.

- Note components being affected and assess the thermal impact (EQ). Evaluate and determine the necessary time frame for taking additional action, such as increasing surveillance frequency or changing replacement interval.

- At least 1 temporary temperature element in the area of each MSIV will be maintained in service in Operating Conditions 1, 2 and 3. If all temporary temperature elements fail for a specific MSIV, the adjacent temperature elements will be utilized in an interim period not to exceed 7 days. In the interim a correlation will be established between the adjacent temperature elements and the specific MSIV without individual monitoring. After 7 days, reactor power will be reduced in order to repair/replace the failed element within 24 hours or the plant will be placed in Hot Shutdown within 12 hours and Cold Shutdown within the following 24 hours.

- o If the local temperature monitoring in the area of an MSIV exceeds 284 degrees F, the affected MSIV will be declared inoperable in accordance with Technical Specification 3.6.4.a or cycled daily consistent with the EQ test parameters. This remains in effect until the additional environmental testing is completed (see Appendix B).

The temporary steam tunnel and drywell temperature monitoring equipment was installed at preselected locations in the MSIV area. In the steam tunnel, this included placement on the dual and the single solenoid bodies, and in the vicinity of the MSIVs to monitor ambient air temperatures. The drywell temperature elements were located on the dual solenoid bodies, along with ambient air monitoring.

(6) The temporary temperature elements installed in the drywell and steam tunnel were monitored during full power operation until baseline temperatures were established (see Appendix E). The procedure outlined in Item (5) was then revised to monitor the temporary temperature elements in lieu of the permanent elements. A temperature rise of 10% above the baseline was determined and included in the procedure. The actions to be taken upon exceeding this temperature limit were the same as outlined in Item (5).

The temporary temperature monitoring program will continue until the final analysis results of the environmental testing (see Appendix B) are fully evaluated. At this time, possible design improvements will be evaluated and a determination will be made on future actions, including replacement frequencies or correlation to permanent area temperature elements. The NRC will be notified prior to removal of the temporary temperature elements.

(7) A test has been performed which shows that air does not flow between the instrument air compressor reduction gear vents and the air compressor intake. Consequently, it was determined that there was no need for any equipment modification.

(8) To further substantiate the high temperature root cause, laboratory analyses will be performed to confirm the failure mechanism of the EPDM degradation. A review of industry experiences and discussions with various industry sources will continue to be conducted in order to input into our analysis plan. The preliminary analysis plan, which included these industry contacts, is completed, with a summary provided in Appendix B.

We have completed an initial evaluation of industry experience. The initial industry review did not change our preliminary conclusion that the root cause of the problem was primarily localized elevated temperatures near the ASCO solenoid valves. The visual inspection of the EPDM did not exhibit the normal signs of hydrocarbon degradation (stickiness, sponginess, or swelling), however, we have not eliminated the potential of hydrocarbons having a deleterious effect. We plan to use data obtained from other plant experiences as described in IEN 86-57, along with our own analysis, to confirm the root cause.

Our preliminary schedule is to have initial infrared analysis for hydrocarbon degradation by the end of January 1988 with the remaining results and analyses by end of the first quarter 1988. Any further analyses required will be determined at that time. We plan to use a local research laboratory, as our primary analyses contractor. Results will be provided to the NRC. With respect to environmental testing, a test plan has been provided to the NRC (CEI/OIE-0292 L, dated November 23, 1987). Interim test results will be provided to the NRC as they become available during the 92 day test duration.

Following completion of the analysis program, possible design improvements will be evaluated and a determination will be made on future actions, including replacement frequencies.

(9) Presently, in order to minimize the potential for introducing hydrocarbons to the air system, a preventive maintenance requirement has been established for periodic replacement of the instrument air system prefilters. The maintenance frequency is consistent with replacement of the instrument air system after filters. Additionally, a generic precaution will be added to all work orders requiring piping/tubing systems to be opened regarding the use of thread sealants and lubricants. If the outcome of the chemical analyses indicates the presence of hydrocarbons, we will immediately implement an appropriate hydrocarbon sample and analysis program for the instrument air system. This will include weekly sampling of the supply lines to the MSIV's at the containment penetration connection as well as other main J-headers throughout the air supply system. The Senior NRC Resident Inspector will be notified upon implementation of this action.

Dew point and particulate sampling of the instrument air system will continue in accordance with the existing plant administrative procedure. Any unacceptable results will be evaluated and system blowdowns will be conducted until satisfactory results are obtained.

(10) Until the first refueling outage, the fast closure dual solenoids will be checked for proper operation during the monthly slow closure check. The existing monthly surveillance instructions were revised to reflect the following test procedure. The test will be performed by fully closing each MSIV individually utilizing the test solenoid, followed by placing the control switch to the "close" position.

Performance of this test will verify the proper operation of the dual solenoid, since the MSIV will remain closed only if the dual solenoid deenergizes and properly repositions. If any MSIV should reopen during the test, indicating failure of a dual solenoid, the associated MSIV will be declared inoperable and the plant will be placed in Hot Shutdown within 12 hours and Cold Shutdown within the following 24 hours. The NRC will be notified upon discovery of such a failure.

Also during this time frame (until the first refueling outage) the MSIVs will be cycled individually on a quarterly basis regardless of plant operating conditions, and the fast closure time verified. If a failure is detected during this quarterly test due to a temperature related problem with a dual solenoid, or associated air pack components, the plant will be shutdown and the NRC will be notified as described above. The monthly slow closure test described above will not be performed during those months when the quarterly fast closure test is performed.

Prior to exceeding a six month period an inspection will be performed during an outage of opportunity, on the dual solenoid experiencing the highest temperature profile. This inspection will visually verify no degradation of the solenoid valve internals. If accelerated heat degradation is observed, a complete investigation will be initiated and the NRC notified.

(11) A review has been completed of all known steam leaks in the plant which could have affected Class 1E equipment. For all of the potentially affected equipment identified, there is no configuration where elastomer compression set or degradation could result in the equipment not being able to perform its intended function. These components were also evaluated to determine if there has been any affect on their long term qualified life based on the environment under which they were subjected. The results of this evaluation are documented in

our letter PY-CEI/OIE-0294 L dated November 30, 1987. An additional review will be conducted for potentially high temperature area environments for all Class 1E solenoids and related equipment with EPDM subcomponents where elastomer compression set or degradation could result in equipment not being able to perform its intended function. This review will be completed by the end of the first quarter 1988.

E. Safety Evaluation/Significance

The safety significance of the event has been divided into two parts; the immediate safety significance of having one or more MSIVs with isolation times outside their Technical Specification Limit, and the effect on accident analysis of having one Main Steam Line isolate at a time greater than five and one-half seconds.

(1) Immediate Safety Significance

On October 29, 1987 Main Steam Isolation Valve (MSIV) 1B21-F022D exceeded it's allowable stroke time during performance of a startup test and was declared inoperable at 1900. Technical Specification 3.6.4 Action (a) then became applicable. This required the plant to make the valve operable within four (4) hours or isolate the penetration. At 2103 and 2106, 1B21-F022D was cycled and stroked closed within the 5 second isolation time required by Technical Specification 3.6.4. The D Main Steam line was isolated at approximately 2240 as required by the Technical Specification.

Subsequent to the 1B21-F022D valve testing, all MSIVs were cycled in order to verify adequate stroke times. At 2144, the 1B21-F028D failed it's stroke time test and was considered inoperable. At this point, Technical Specifications required the plant to be shutdown within 12 hours. (One other MSIV, 1B21-F028B, also failed it's first stroke time test at 2216).

By 2310, all MSIVs that failed their initial stroke times had successfully completed subsequent tests and the results evaluated. The valves were considered Operable. The bases for this decision was that the cause of the slow closures was attributed to be a one time deposit of debris in the respective solenoids causing a delay in their response. Once the valves were cycled and the stroke times passed, the debris was assumed to have been exhausted. This conclusion was believed to be consistent with known industry problems regarding air systems and MSIV solenoid valves. In addition, a full MSIV closure test was to be performed in less than one week. These factors were considered heavily in the final decision. No further actions per Technical Specifications were required. None of the Technical Specification Limiting Conditions for Operation (LCO) were violated.

On November 3, 1987 another series of stroke timing tests were performed on the MSIVs. At 1157, the 1B21-F022D failed it's stroke time and was declared inoperable. At 1208 the 1B21-F028D failed to close. Both valves were subsequently recycled satisfactorily within minutes of their first tests. However, because the valves again failed to properly actuate on the first attempt, the bases for an isolated failure was no longer considered valid. The plant commenced a shutdown at 1330 and the D and B lines were isolated by 1354. The plant was shutdown within the 12 hours required by Technical Specification 3.6.4 Action (a).

Since no LCO was violated during either event, the plant remained within the constraints of the analytical bases contained in the operating license. Consequently, the incidents resulted in no immediate safety significance.

(2) Effects on Accident Analysis

It was determined that two accident scenarios and three transients described in the FSAR took credit for closure of the MSIVs. The events were as follows:

a. Steamline break outside containment
b. Inside containment breaks which reach RPV Level 1
c. Pressure regulator failure transient
d. Loss of condenser vacuum transient
e. Loss of AC power transient

If Regulatory Guide 1.3 assumptions were used a delay or failure to isolate one steamline substantially effects the radiological evaluation of the DBA recirculation line break inside containment since it requires the assumption that 100% of all activity in the core is released. This activity would then be available for transport outside the containment until all steamlines are isolated. However, the Perry FSAR Chapter 15 analysis concluded that for the original accident scenarios (a and b), no fuel failure would occur. Using this premise, FSAR Table 15.6-17 values were used for isotopic content of the reactor coolant when performing the evaluations.

The bounding event of those described above was determined to be the steamline break outside containment since this event would permit the largest amount of activity to reach the site boundary. An analysis was performed to determine what the mass flow would be for a main steam line break outside containment given the as found conditions that existed on November 3, 1987 (i.e. three main steam lines isolate with proper times, and the remaining main steam line isolates in 18 seconds). The analysis was done using the GE's SAFE 06 Code, a NRC approved code which has been previously used by Perry in the ECCS

performance analyses (FSAR Chapter 6). The mass release determined by this code was much less than the mass release discussed in FSAR 15.6.4.4 for the main steam line break outside containment. This was due to the conservative assumptions used in the FSAR analysis, such as assuming that level rise time is 1.0 seconds, that mixture quality is a constant 7.0%, and that the system pressure remains constant at 1060 psig throughout MSIV closure.

However, it was decided that two calculations would be done. The first would use the mass release given in the FSAR (FSAR page 15.6-10) for the first 5.5 seconds and then use the GE supplied flow data after 5.5 seconds when only one main steamline is open. The second calculation used the GE supplied data throughout the event. For each calculation two results were determined. First the postulated amount of radiation which would be released in the 18 seconds it took for the D line to isolate on November 3, and secondly the total time it would take with one main steam line unisolated before 10CFR Part 100 limits were exceeded. For these calculations it was conservatively assumed that there would be no plateout or hold up time for the release.

For the calculation using the FSAR mass release the following conclusions were drawn:

Exclusive Boundary Area Iodine dose with 18 second single MSIV closure - 192 Rem

Exclusive Boundary Area Iodine dose with 79 second single MSIV closure - 300 Rem

For the calculation using the GE data the following conclusions were drawn:

Exclusive Boundary Area Iodine dose with 18 second single MSIV closure - 82 Rem

Exclusive Boundary Area Iodine dose with 120 second single MSIV closure - 300 Rem

As shown above for either calculation the slow closure (18 second) of the D MSIV line on November 3 would not have resulted in a release exceeding 10CFR100 guidelines. Also, depending on which calculation was used, it was determined that the plant would have had between 79 and 120 seconds to isolate that line under accident conditions prior to exceeding 10CFR100 guidelines. Therefore, the 18 second slow closure of the D main steam line penetration has been shown to be within the bounds of accident guidelines. In conclusion, the Technical Specifications were followed negating any immediate safety significance, and analyses using appropriate assumptions showed that had an accident occurred on November 3, 1987, the plant would have responded in a manner which would have met NRC guidelines.

F. Conclusion

In summary, the MSIV slow closure problem was thoroughly evaluated and diagnosed. The actions taken by the operations staff during the initiating events were evaluated as proper and in accordance with plant procedures and regulatory requirements. The root cause was determined to be a failure of the respective MSIV 3-way dual solenoid valves. This failure resulted from a hardening and dimpling of the EPDM rubber disc seat material and other EPDM seals, c[illegible] the disc holder assembly to wedge in place when the solenoid [illegible]nergized.

Following troubleshooting, extensive short and long term evaluations and corrective actions were initiated. These included solenoid valve replacement, work history reviews, environmental evaluations, installation of additional temperature monitoring, instrument air laboratory analysis, and a followup laboratory analysis of the solenoid valves to confirm the failure mechanism.

An evaluation of this event was performed and concluded that since the plant remained within the constraints of the analytical bases contained in the operating license the incidents resulted in no immediate safety significance. In addition, the effects on the design bases accident analysis were reviewed and also determined to not be significant. The repairs to the MSIV solenoids have been completed and the plant successfully restarted.

November 29 Event Description

November 29 Event Description

A. Chronology of Events

On November 29, 1987 at 0240, modified Surveillance Instruction, SVI-C71-T0039 "Main Steam Line Isolation Valve (MSIV) Closure Channel Functional" was being performed on 1B21-F022B, Main Steam Line (MSL) B inboard MSIV. The test is performed by fully closing each MSIV individually, utilizing the test solenoid, followed by taking the control switch to close. Performance of the test in this manner verifies proper operation of the MSIV dual solenoid, since the MSIV will remain closed only if the dual solenoid de-energizes and properly repositions (see Diagrams 1 and 2). When the 1B21-F022B control switch was taken to the closed position (following slow closure), the valve stroked open, indicating a failure of the dual solenoid. Approximately three minutes later, the test was repeated with the same result. Two more attempts were made utilizing only the control switch. The valve failed to close during both attempts and was subsequently declared inoperable.

At 0410, a reactor shutdown was commenced in accordance with commitments documented in our letter PY-CEI/OIE-0289 L dated November 13, 1987. In addition, at 0509, MSL B was isolated in accordance with Technical Specification Action requirement 3.6.4.a. After reducing reactor power, a manual scram was initiated at 1114. Operators commenced a plant cooldown in preparation for entering Operational Condition 4, Cold Shutdown.

During the plant cooldown, personnel entered the Drywell to visually inspect the 1B21-F022B valve while operators again attempted to stroke the valve using the control switch. At 1303, with assistance from drywell personnel (providing a slight tap on the solenoid body), the valve was successfully stroked closed. The valve was then reopened and at 1306, again stroked satisfactorily from the control switch. By 1720, the plant was in cold shutdown.

On November 30, the Nuclear Regulatory Commission (NRC) issued a Confirmatory Action Letter (CAL) detailing various actions to take in preparation for an NRC Augmented Inspection Team (AIT). The team arrived on site November 29 and 30.

B. Troubleshooting Activities

On November 30, the 1B21-F022B dual solenoid valve (ASCO Model Number NP-8323A20E) was removed from the field, disassembled and visually inspected. While the visual inspections were underway, a troubleshooting plan was developed. The plan's purpose was to conduct a thorough, timely and systematic investigation of the circumstances surrounding the MSIV failure. The plan was comprised of three major segments; (1) collection and documentation of pertinent information (2) analysis of that data for root cause determination and (3) implementation of corrective action necessary to prevent recurrence. The troubleshooting plan and associated work orders were presented to and approved by the NRC AIT. The details of the plan are discussed below.

The information collection and documentation of results included visual and microscopic examinations of various valve parts and foreign materials. In addition, chemical analysis was performed on these samples which included destructive and consumptive tests. Specifically:

(1) Tests conducted on the 1B21-F022B solenoid included the following:

a. The solenoid was disassembled and visual inspections performed. The visual inspections were intended to identify surface defects, impurities or the presence of foreign material.

Results:

A sliver and two other small segments of foreign material were discovered in the B solenoid valve body area (see Diagram 1 and Appendix A). The seating surface was also inspected and no evidence found of hardening of the discs or O-rings. The discs and O-rings remained flexible and non-rigid. There was only slight dimpling of the exhaust port disc and a minor depression on the inlet port disc. There was no resemblance to the extruded hardened dimples observed on the seats identified during the November 3, 1987 event.

b. Chemical analysis was performed of the foreign material identified above (see Appendix C). The chemical analysis included infrared analysis to determine material composition, and microscopy, intended to enhance the ability to conduct visual inspections.

Results:

(i) The infrared analysis indicated the presence of EPDM and small amounts of silicone on the sliver and on the only other particle found capable of analysis. Both materials are part of the solenoid valve assembly. This analysis also concluded that there was no evidence of oxidation. Oxidation if present, would be indicative of the presence of hydrocarbons.

(ii) The microscopy indicated that the material was black in color, spongy in construction and exhibited a compression set similar to EPDM material. This supports the conclusion that the material was EPDM.

(iii) Microscopy Dimensional Analysis of the foreign material and that of the pre-rebuild O-ring from the 1B21-F022B solenoid valve were compared. The results indicated that the foreign material was similar to a gouge identified in one of the pre-rebuild O-rings in it's shape and overall dimension (0.8 mm X 4.2 mm X 0.3 mm).

(iv) An infrared analysis was performed on the pre-rebuild O-ring and confirmed that the foreign material organic chemical composition matched that of the O-ring (EPDM).

(v) Further chemical composition analysis for metallics was performed by Scanning Electron Micrograph (SEM) on all particles (e.g. foreign material) and the pre-rebuild O-ring. This analysis provided further confirmation of material source by comparing trace metal catalysts and cross linking agents present in the samples. The results of this analysis document that the microstructure of the O-ring and sliver are the same.

(vi) Microscopy evaluation of both the pre-rebuild and existing O-rings was performed and verified no other potential sources of the foreign material.

(2) The 1B21-F022C and F022D ASCO solenoid valves were disassembled and visual inspections performed. (The F022C solenoid valve was previously rebuilt while the F022D solenoid valve was replaced with a new valve as a result of the November 3, 1987 event).

Results:

No foreign materials were identified. Only minor seat impressions were visible on the disk (similar to 1B21-F022B disk).

(3) Evaluations conducted on the pre-replacement 1B21-F022A solenoid valve included seat leakage tests followed by disassembly and visual inspection.

Results:

No seat leakage was observed. No significant foreign materials (other than small particulate) or other discrepancies were identified.

(4) Air blows were performed on the Instrument Air System followed by dew point and particle count analysis.

Results:

a. The air blow was conducted using a pillowcase as the filter medium. Although slight discoloration was noted, no visible particulate was identified. Additional particulate count analysis demonstrated that Instrument Air quality was within design requirements. The largest particle measured was in the less than 20 micron range.

b. A dew point check was performed at the air supply line to the F022B solenoid. The results (-42 degrees F) were satisfactory.

c. Samples were collected and results concluded that no hydrocarbons were present within the Instrument Air System.

(5) A review was performed on solenoid valve construction, allowable tolerances and dimensional analysis for thermal affects which may have contributed to the solenoid valve failure. The solenoid valve spring constants including any resulting heat effects on these values were also evaluated to determine if they had contributed to the solenoid valve failure.

Results:

The vendor has provided written certification documenting that spring characteristics and valve dimensions are within design tolerances and are bounded by the results of the Environmental Qualification Tests. In addition, it was determined that the particles found were of sufficient size to become lodged between sliding surfaces around the solenoid core thus inhibiting movement and causing the valve to malfunction.

(6) A review of the Air Quality Standard for the Instrument Air System was performed. Included in this review was a justification of previous data collected on November 7, 1987 which documents greater than 40 micron size particles.

Results:

Because of the probability of some contamination occurring due to the large amount of exposed sample handling involved with the filter paper collection method, it is not easily ascertained what percentage of these results were due to contamination. It is suspected that the majority of fibers found are dust particles from room air. As a more accurate method, the particle counter instrument was recalibrated to detect and quantify particles in the 40-50 micron and >50 micron range and was used to test the validity of the filter paper collection results. The results of this analysis concluded that Instrument Air quality was within design requirements for particulate (see Appendix D).

C. Data Analysis and Root Cause Determination

(1) Summary

A detailed root cause analysis was performed with a draft report provided to the NRC AIT. It concluded that the root cause of the MSIV failure was binding of the "B" solenoid (refer to Diagram 1) due to the presence of foreign material.

During visual examination, a sliver of foreign material (EPDM) was discovered in the 1B21-F022B solenoid valve body core cavity. The material was demonstrated to have originated from rebuild activities conducted during the previous MSIV outage (early November 1987). This sliver was inadvertently dropped into the core area of the "B" solenoid and since that portion of the solenoid was not disassembled, it was not detected until the current investigation. Inspection of the "B" solenoid core area required removing the "B" coil. However, the leads for the "B" coil would have required cutting to remove the coil. By the time this solenoid valve was being rebuilt, the root cause had already been determined to be heating of EPDM material. Consequently it was decided that the "B" solenoid core area would not require inspection.

The sliver of foreign material caused mechanical binding of the solenoid valve. This binding caused the solenoid to remain in the normally energized position which prevented the air bleed off from the MSIV actuator and thus valve (MSIV) closure.

(2) Supporting Analysis

Microscopic and infrared analysis performed on this foreign material and on the pre-rebuild O-ring from the 1B21-F022B valve support this root cause determination. A summary of other analysis demonstrates no other reasonable cause or contributing factor. Specifically;

a. Visual inspections of other solenoid valves and associated parts revealed no other discrepancies which could have contributed to the valve failure.

b. Instrument air samples and analysis identified no problems which could have contributed to the solenoid failure. Although earlier filter collection samples identified some amount of particles in excess of the 40 micron limit,

subsequent samples using a particulate counter found the air quality within design requirements. Consequently, particulate in the Instrument Air System are not believed to be a contributing factor to the solenoid valve failure.

The system is designed to meet the guidelines of ANSI Standard MC-11-1 (ISA-S7.3) with the exception that the maximum allowable particulate size for air to safety related equipment is 40 microns. Recent instrument air analysis has confirmed the dew point, hydrocarbon levels and particulate to be within required limits.

c. A variety of destructive and chemical tests were performed on many pre-rebuild and new solenoid valve parts. The results of these tests identified no discrepancies which could have contributed to the solenoid valve failure.

(3) Relationship of November 29, 1987 Event to Previous Events

As discussed in Section 3 of this report, MSIV solenoid valves experienced failures to shift in the past (also refer to our letter PY-CEI/OIE-0288 L dated November 9, 1987 and 0289 L dated November 13, 1987). During the October 29 and November 3 events, the root cause was determined to be failure of the solenoid valves due to EPDM elastomer degradation of the seating surface. This degradation was caused by elevated temperatures resulting from steam leaks in the vicinity of the MSIV air packs.

The root cause of these previous events is unchanged by any of the post November 29 event investigations completed to date. This conclusion is based on the following:

a. Temporary instrumentation mounted on the ASCO valve and contact readings taken during the November 29 drywell entry indicated temperatures below the maximum allowable values documented in the existing Environmental Qualification Report.

b. Subsequent disassembly (post November 29 event) of the 1B21-F022B ASCO solenoid valve and examination of elastomers indicted no evidence of hardening of the discs or O-rings. The discs and O-rings remained flexible and non-rigid. There was only slight dimpling of the exhaust port disc and a minor depression on inlet port disc. These indications are expected due to the operational design of the solenoid valve. In addition, O-rings installed during the rebuild were removed freely.

D. Corrective Actions

To prevent recurrence, all MSIV dual solenoid valves have been replaced with new valves and were cycled 10 times as part of the retest activity prior to the December 9 reactor startup. In addition, administrative controls will be instituted on future Class 1E ASCO solenoid valve work to require the use of new valves or complete disassembly and cleanout to ensure no particles are introduced during the rebuild process.

Previous corrective actions discussed in Section 3.D of this report and documented in our earlier letter, PY-CEI/OIE-0289 L dated November 13, 1987, will be completed as planned with the following clarifications:

(1) The dual solenoid valve inspection discussed in Section 3.D. (10) and on page 5 of the enclosure to our previous letter will be performed during an outage of opportunity prior to the end of October 1988. This is based on the complete replacement of all MSIV solenoid valves discussed above.

(2) The modified monthly slow closure surveillance test discussed in Section 3.D. (10) and on page 5 of the enclosure to our previous letter will be performed on a staggered basis as follows:

a. Until the January 4, 1988 outage, the test will be performed weekly, staggered between the inboard and outboard MSIV's.

b. For a one month period following the January outage this test will be performed once every two weeks, again staggered between the inboard and outboard MSIV's.

c. A revision to the baseline temperatures for a few selected points was necessary following removal and reattachment of the temporary temperature monitoring elements required for the solenoid replacement discussed above.

E. Safety Evaluation/Significance

Throughout the November 29 event, the outboard B MSL isolation valve remained operable and capable of performing its intended safety function. There was no loss of safety system function.
In addition, operator actions were in accordance with Technical Specification requirements and previous commitments. Within three hours following the discovery of the failure, the affected Main Steam Line was isolated and a reactor shutdown commenced.
Consequently, the event was not safety significant.

F. Conclusions

This section describes the event chronology, troubleshooting efforts and evaluations performed to determine the cause of events on November 29, 1987 when one Perry Unit 1 Main Steam Isolation Valve (MSIV), 1B21-F022B, failed to remain closed during performance of a modified surveillance test to verify the MSIVs would fast close on command. The cause was attributed to the failure of an Automatic Switch Company (ASCO) Model NP8323A20E 3-way dual solenoid valve.

The root cause was binding of the "B" solenoid due to the presence of foreign material in the solenoid core area. The source of foreign material has been identified by visual examination and laboratory testing as a sliver of EPDM material which separated from an O-ring. This occurred during the solenoid rebuild process conducted subsequent to the events of November 3, 1987. This sliver was inadvertently dropped into the core area of the "B" solenoid and, since that portion of the solenoid was not disassembled, it was not detected until the current investigation.

Overall Conclusion

Overall Conclusion

This report summarizes the findings and conclusions reached during investigations following the MSIV solenoid valve failures of October 29, November 3 and November 29. The first event (October 13 and November 3) identified the cause of failure to be EPDM elastomer degradation due to elevated temperatures in the vicinity of the air packs resulting from steam leaks. The second event (November 29) was discovered during special testing initiated as a result of the first event. The cause of this event was determined to be binding of the MSIV ASCO solenoid valve due to the presence of foreign material. The material was demonstrated to have originated from rebuild activities which occurred following the November 3 event. No evidence was discovered during the latest investigation which changed the root cause determination of the previous event.

Evaluations for safety significance were performed during the investigation of both events. In neither case were there any significant safety hazards identified nor any risk to the health and safety of the public.

Corrective actions were initiated following both events. As a result of the corrective actions generated from the November 29 event, it was appropriate to modify several of those actions initiated following the October 29/November 3 event.

In summary, each MSIV solenoid problem was thoroughly evaluated and diagnosed. A review of operator decision making during each event identified no actions which were contrary to existing commitments or requirements. The final corrective actions initiated will ensure that (1) the probability of recurrence of either failure type is minimal (2) that detection of any such problem will be rapid and (3) upon detection of such a problem, administrative controls will ensure that the plant is placed in a safe condition.

Diagrams

Diagram 1

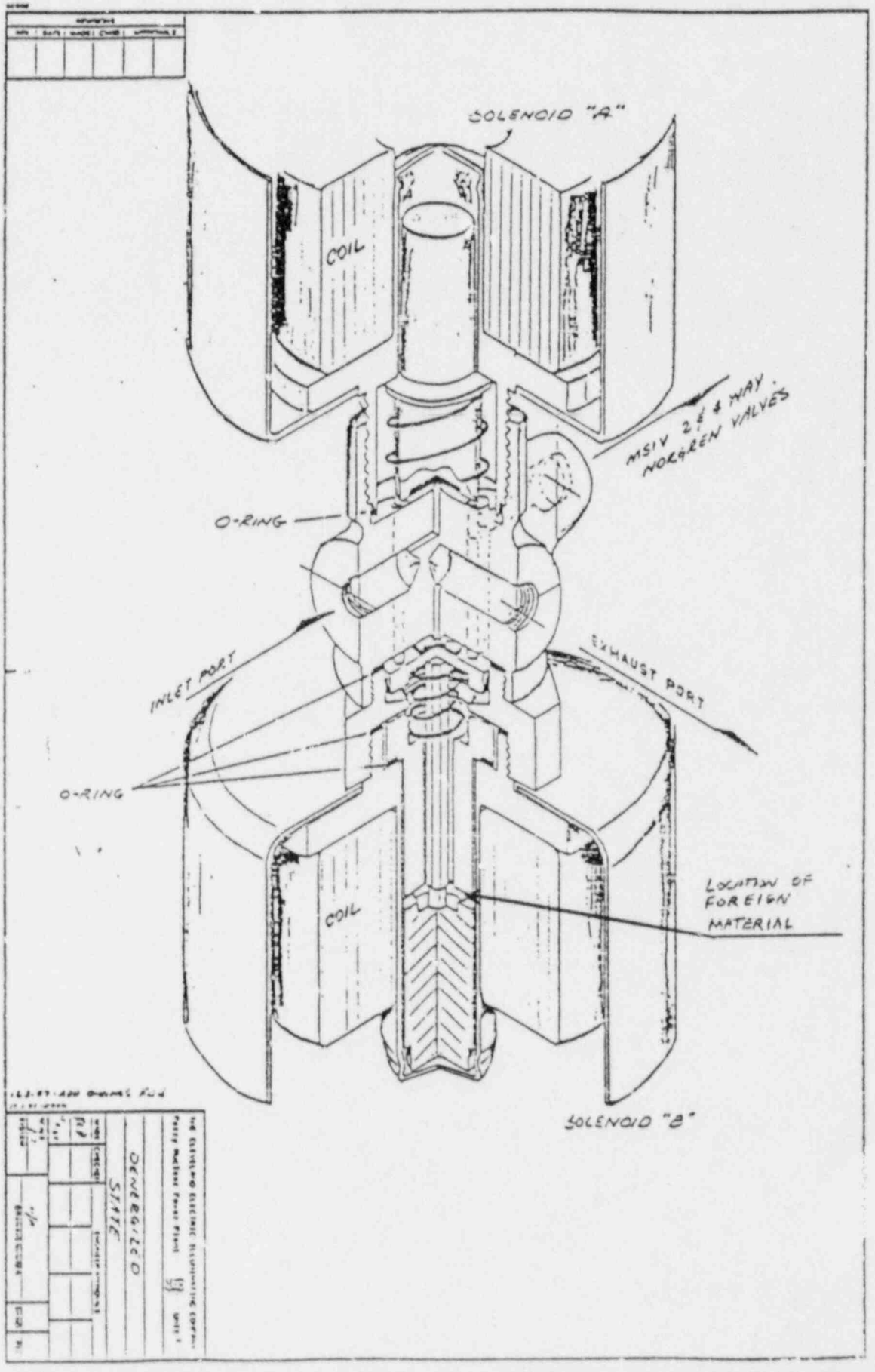

SOLENOID "A"
COIL
MSIV 2 & 4 WAY NORGREN VALVES
O-RING
INLET PORT
EXHAUST PORT
O-RING
COIL
LOCATION OF FOREIGN MATERIAL
SOLENOID "B"

Diagram 2

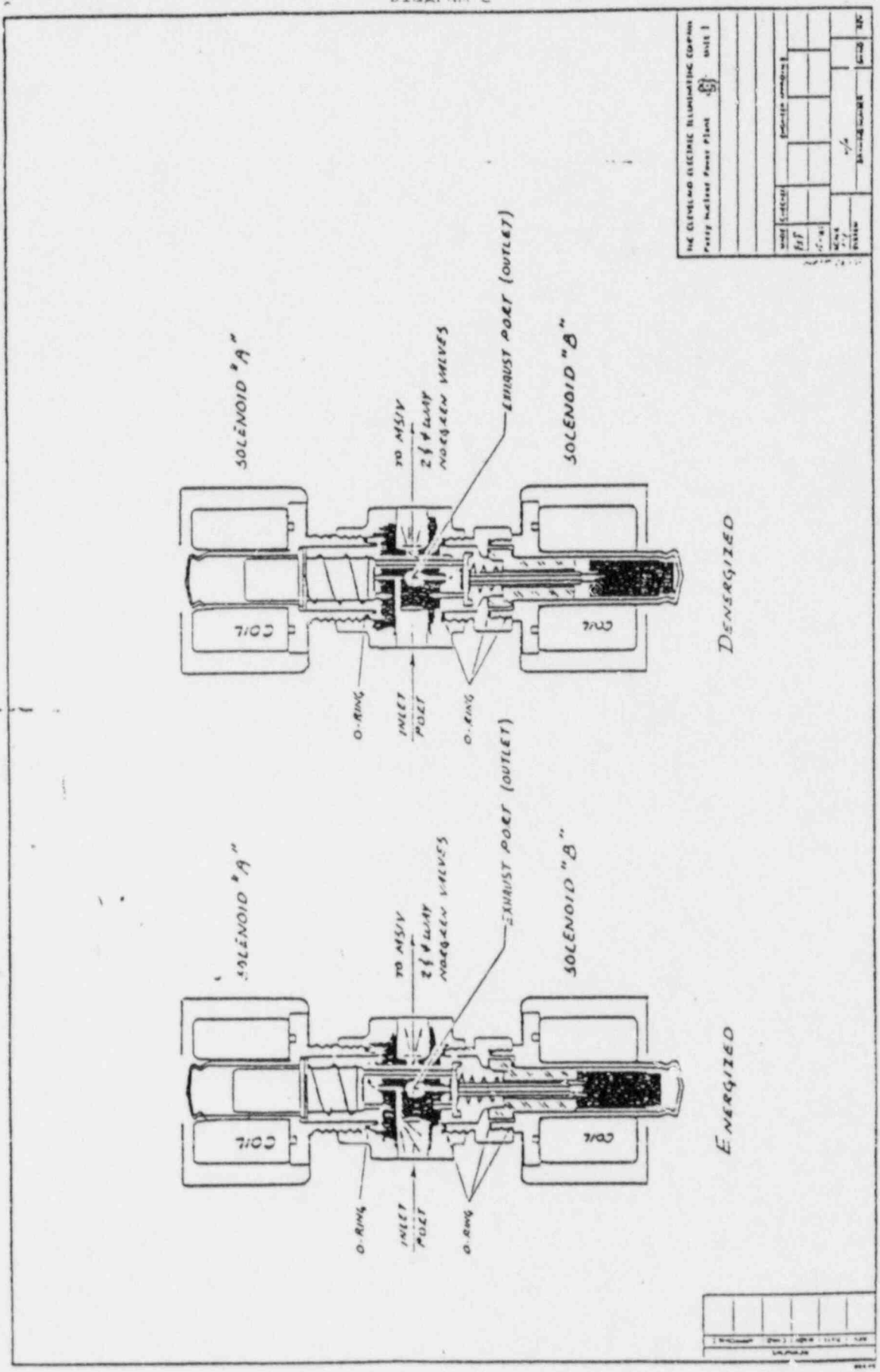
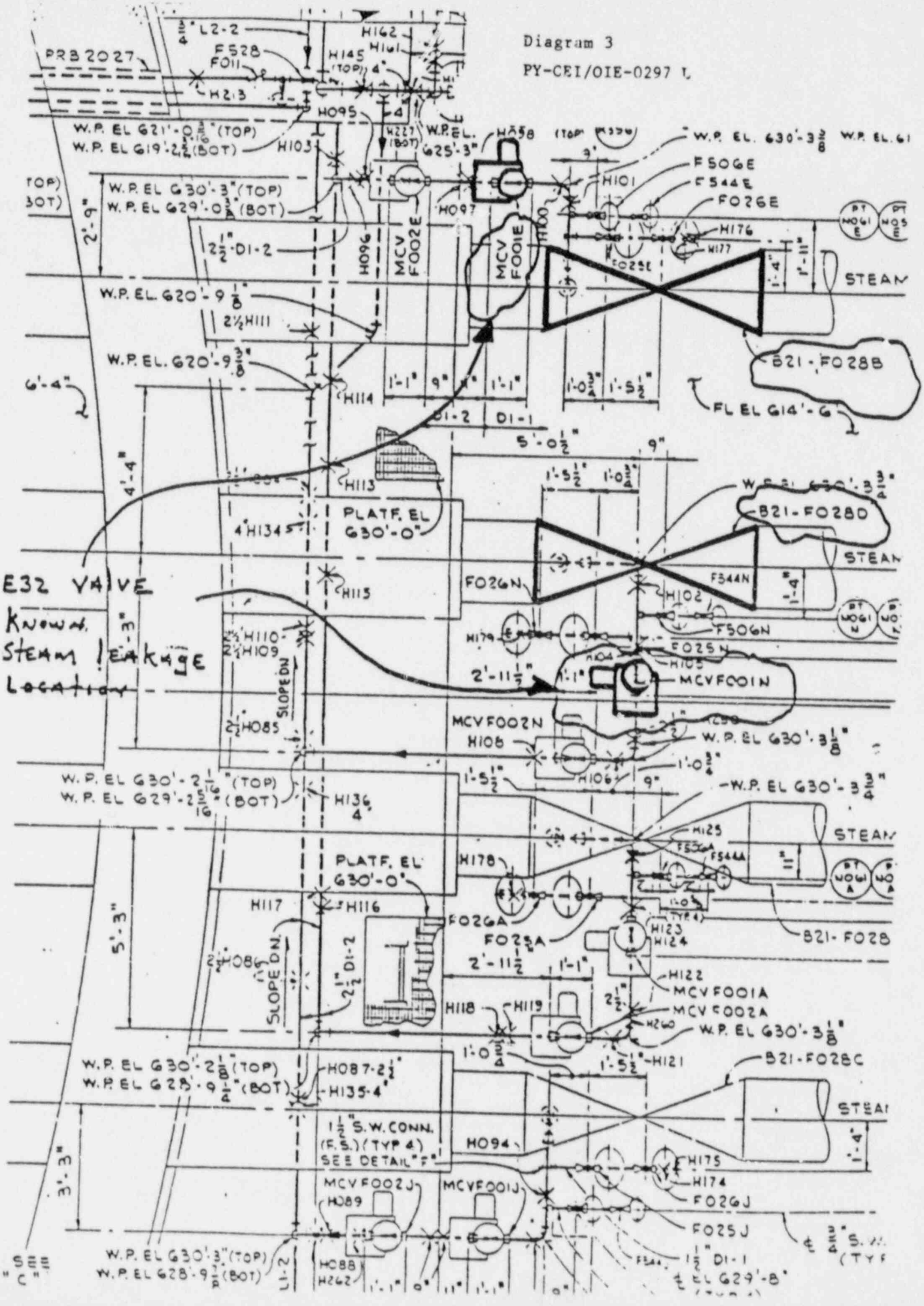
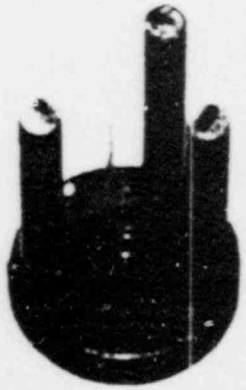

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
Perry Nuclear Power Plant
Unit 1
SOLENOID "A"
SOLENOID "B"
TO MSIV
2 1/4 LAMP
NORGREN VALVES
EXHAUST PORT (OUTLET)
COIL
O-RING
INLET PORT
DENERGIZED
ENERGIZED

Diagram 3

PY-CEI/OIE-0297 L



D



PERRY NUCLEAR POWER PLANT
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

Hardened Dimples on Disc Holder Assemblies for the three Failed Solenoids.

PERRY NUCLEAR POWER PLANT
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

Non-Legraded Disc Holder
Assembly (USED).

PERRY NUCLEAR POWER PLANT
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

Foreign Material Discovered in
1B21-F022B Solenoid.

ANALYSIS PLAN FOR EPDM SOLENOID COMPONENTS

I. INTRODUCTION

To determine the cause for failure of solenoid pilot valves which resulted in the slow closing of MSIV'S, two approaches will be taken. Both approaches involve analyses of the EPDM elastomer gasket material. The physical properties of the elastomeric material which was in service will be compared to new material to observe degradation, loss of material, deformation, anomalies in surface characteristics, and reduced performance. In addition, the gasket material will be subjected to chemical analyses to discover changes from original material at the molecular level. Data obtained from the analysis regimen along with data from a similar failure experienced at Brunswick in 1985 will be used to determine cause.

II. PERSONNEL CONTACTED

Interviews with the Harris Research Personnel and NRR provided information regarding analyses performed and resulting postulations. PNPP analyses will include methods to confirm or deny these postulated failures. The full Brunswick Failure Analysis Report has been sent and will be used as guidance. A meeting with Ricerca, Inc. personnel regarding this failure analysis program resulted in the following proposed course of testing.

III. ANALYSIS PROGRAM

A. Samples
   1. Unused Elastomer Gasket material.
   2. Used Elastomer from pilot solenoids which did not fail.
   3. Used, degraded Elastomer Material from failed pilot solenoids.
   4. Pilot Solenoid valve bodies with elastomer residue.

B. Physical Testing
   1. Profilimetric analysis to compare indentations in EPDM discs (sample nos. 3, and 2)
   2. Optical Microscopy to determine the presence of foreign material, or loss of material from surfaces.
   3. Hardness testing to compare with original specifications.
   4. Compression set to compare with unused material and note performance degradation.

C. Chemical Testing
   1. Infrared survey to determine carbonile content. This will provide information about mode of attack (organic acids from the presence of hydrocarbons) and extent of oxidation.
   2. Scanning Electron Microscopy/X-Ray dispersion Spectrometry to confirm or negate copper-catalyzed accelerated oxidation. (Which was a postulated Failure Mode at Brunswick)

D. Environmental Testing

Six new dual coil solenoids will be sent to a laboratory for additional environmental testing. The solenoids will be placed in three separate environmental chambers (two per chamber) at various elevated temperatures in an energized condition. The solenoids will remain energized to demonstrate that they will perform their safety function at a variety of elevated temperatures for a specific length of time.

IV. SUMMARY

The above analyses and their results will provide evidence of failure mode and will describe any further confirming analyses which may be needed. In addition, recommendations will be made in order to preclude recurrence.

Ricerca, Inc.
7528 Auburn Road P.O. Box 1000
Painesville Ohio 44077
216-357-3300

TO: J. J. Grimm - CEI
FROM: K. A. Krutyholowa
DATE: December 3, 1987

SUBJECT: FOREIGN MATERIAL FROM SOLENOID PLUNGER AREA MICROSCOPIC EVALUATIONS

SAMPLE NO.

Three particles identified as MSIV 32 and o-ring MSIV 23 were to be compared.

METHODS

The particles and o-ring were examined under a Zeiss Universal stereo widefield optical microscope (SV-8) equipped with indirect reflected light. All particle size measurements were taken from the optical micrographs.

Scanning electron micrographs were taken on the JEOL 35 SEM, equipped with Tracor Northern Energy Dispersive X-ray Spectroscopy (EDS) detector. Before examination, the o-ring and particles were mounted on carbon stubs and carbon coated. Elements from Na (Z=11) thru U (Z=92) can be detected by EDS.

Backscatter electron imaging (BEI) was used on both the o-ring and particles. In this technique, the contrast is dependent upon the average atomic number. The brighter areas reflect the presence of relatively heavier elements. For example, Pb will have a brighter image than Cu and Zn which will have a brighter image than Si.

RESULTS

OPTICAL MICROSCOPY (OM)

Particles MSIV 32

The particles are black and spongy in appearance. A few fibers are attached to the particles (Figures 1, 2 & 3). The approximate particle dimensions are listed in Table I.

TABLE I

	Length	Width	Depth
Particle 1	4.2 mm	0.8 mm	0.3 mm
Particle 2	0.6 mm	0.4 mm	0.1 mm
Particle 3	0.9 mm	0.3 mm	0.3 mm

O-ring MSIV 23

The brittle side of o-ring MSIV 23 has a piece missing whose length would be 4.2 mm. The indentation or gap is narrower at the edges and bent in the middle (Figure 4). The size and shape of this gap is similar to the largest particle (Particle 1).

SEM/EDS OF O-RING MSIV 23 (FIGURES 5 & 6)

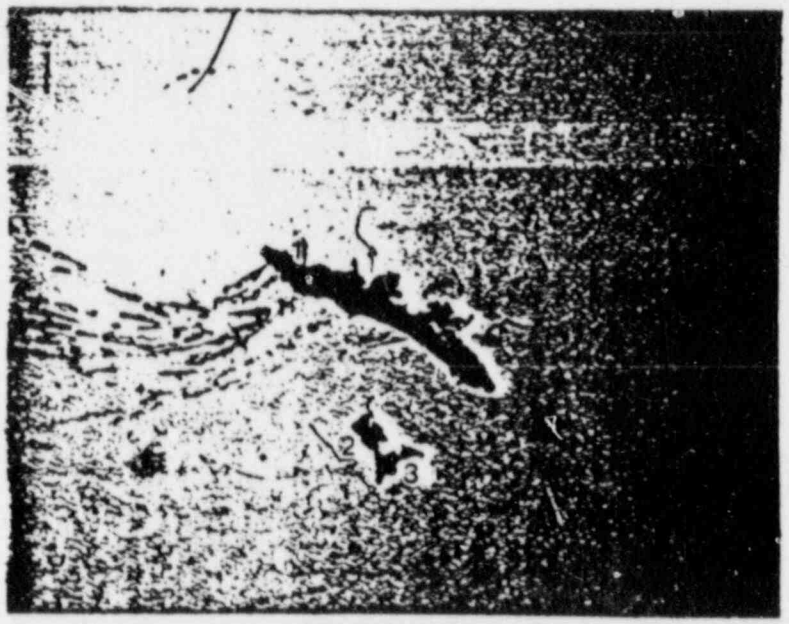
The edge of the o-ring has numerous areas where pieces of material are missing. Examination of the o-ring by back-scatter electron imaging (BEI) reveals numerous brighter areas indicating the presence of heavier elements (Figure 5d). The bright areas contain primarily Cu, Zn & Si. Spot mode analysis of areas A, B, C & D in Figure 5d have corresponding EDX spectra attached.

SEM/EDS OF PARTICLES MSIV 32 (FIGURES 7-10)

The particles contain many of the same elements present in the o-ring. Copper, Zn and Si are present in both the o-ring and particles. Iron is present in both the o-ring and the particles but the Fe counts are significantly higher in the particles. Cr is present only in the particles and not in the o-ring.

Note the morphology at higher magnification of the particles (Figures 10a, 8c & d, 7c) and compare this to the higher magnification micrographs of the gap in the o-ring (Figure 6a). The microstructures of the two materials are very similar.

Kathy A. Krutyholowa



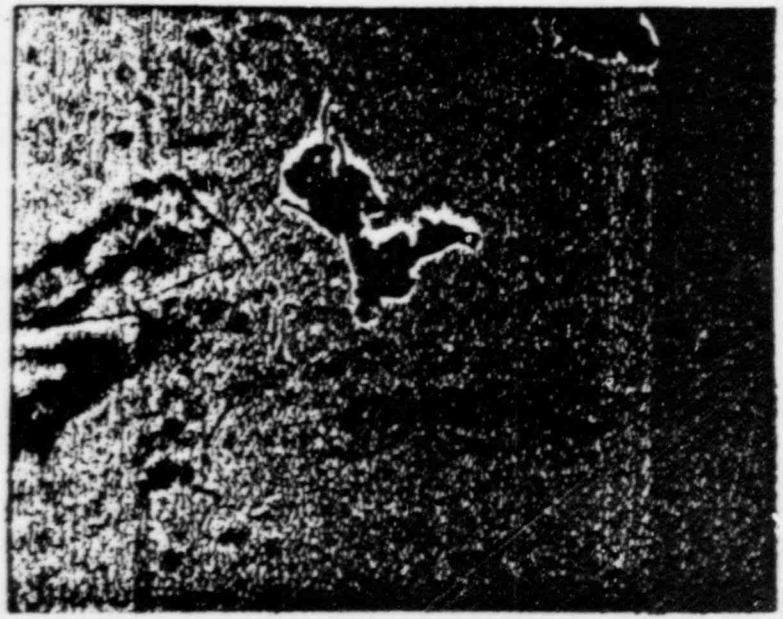
MSIV 32 9.5x

Particles 1, 2 + 3 1MM = 102μm

Figure 1 MSIV-32 OM

MSIV 32 Particle 1 24.6x
1mm = 41μm

MSIV 32 Particle 1 35.5x
1mm = 28μm



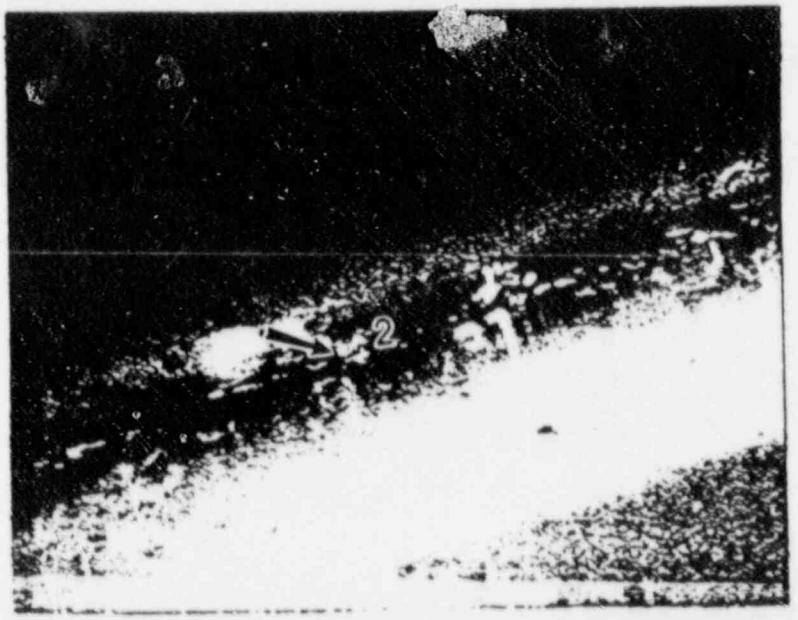
MSIV 32 Particle 2&3 24.6x

MSIV 32 Particles 2&3 35.5x
1mm = 28μm

Figure 6m

Figure 3
depth of particles
18.8×
1mm = 53μm
OM

a Particle 1



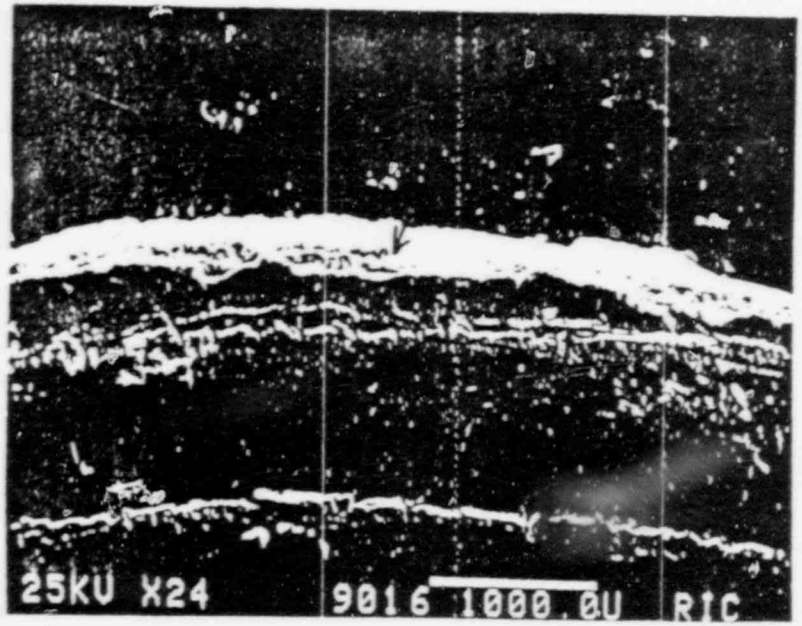
b Particle 2

c Particle 3

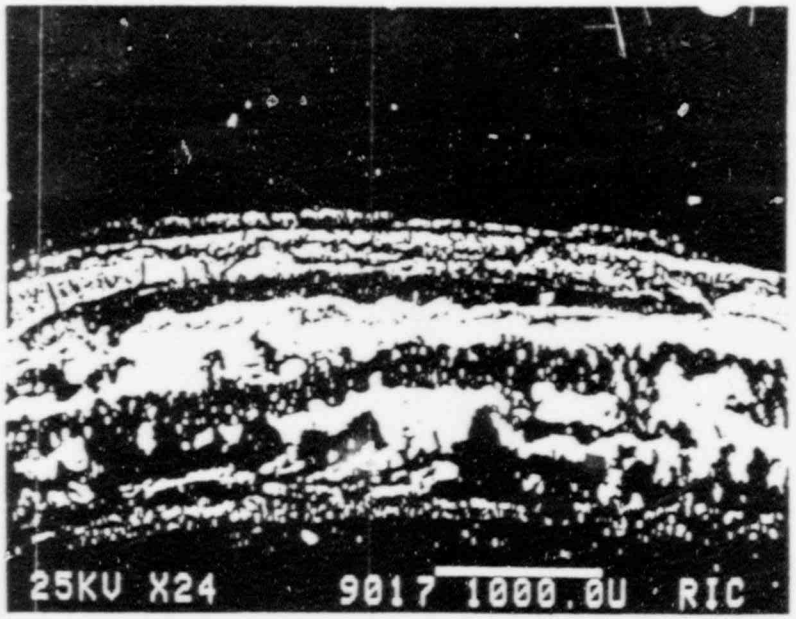
a MSIV 23 9.5X
1mm=102 μm

b MS IV 23 24.6x
1mm=41μm

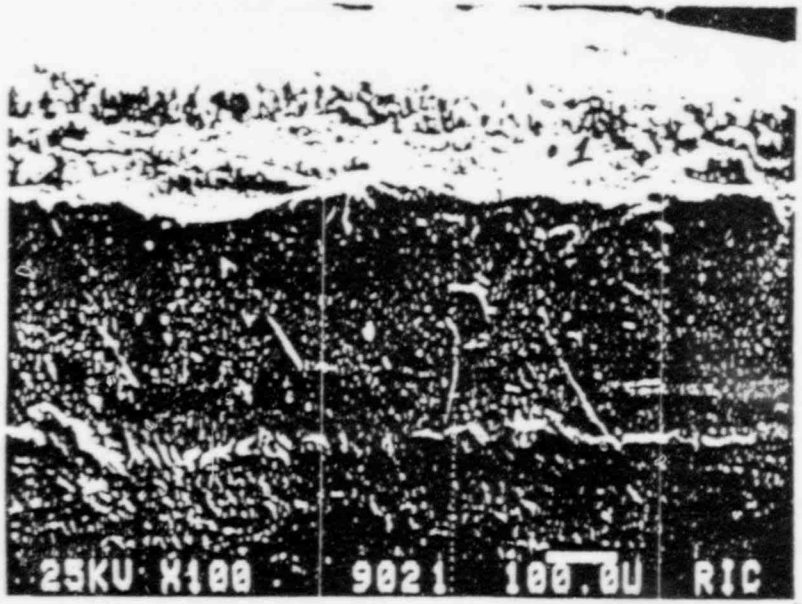
Figure 4 O-ring MSIV 23 OA



a Note gap

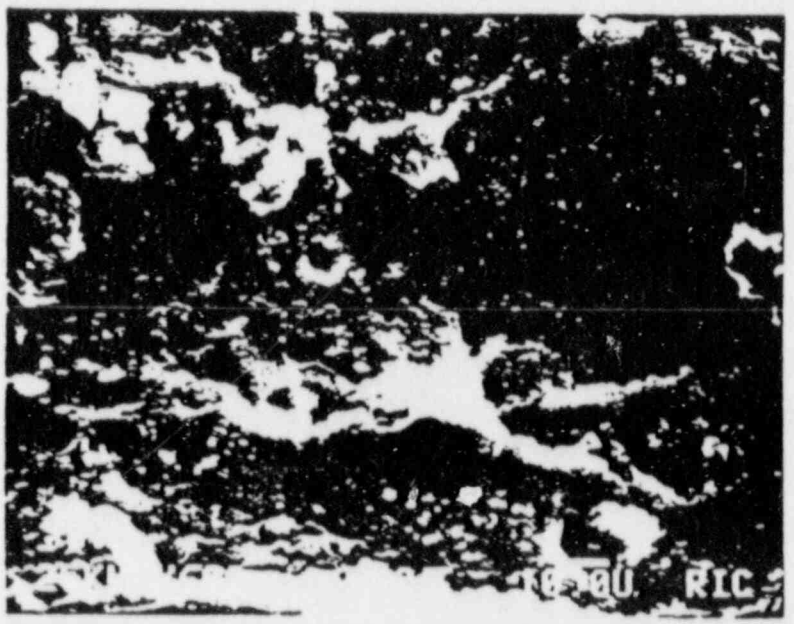


b BEI



c 1= see Figure 6a

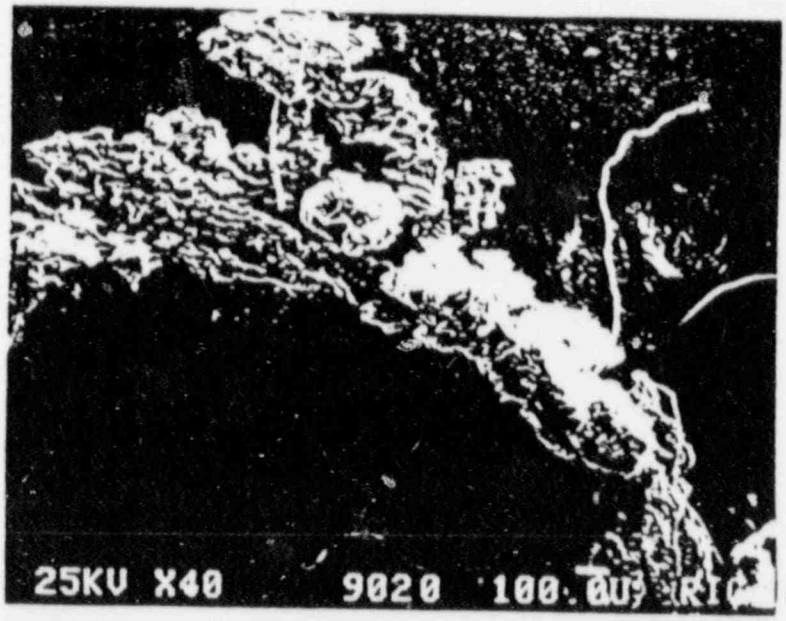
d BEI Area A, B, C, D see plots.



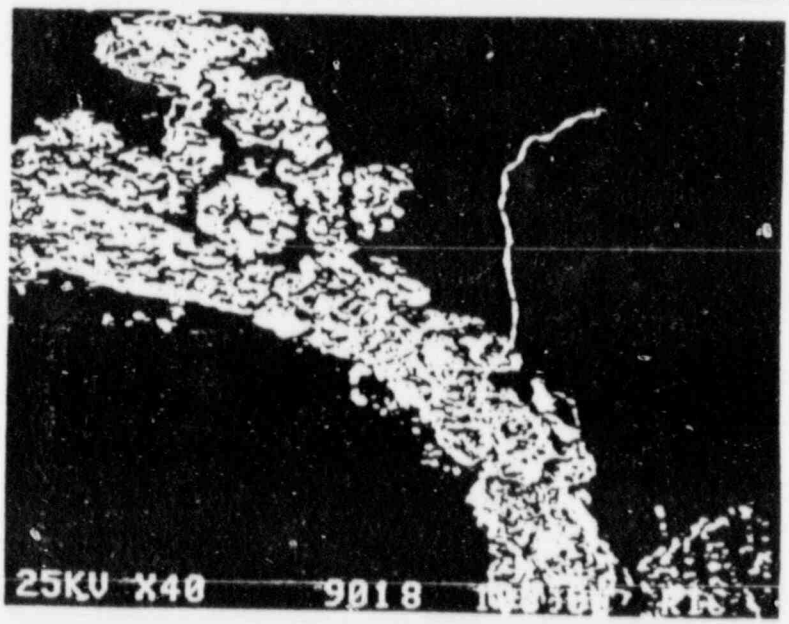
a Area 1 IN Fig 5c
Note microstructure
compare to particles

Figure 6 O-ring M31V23

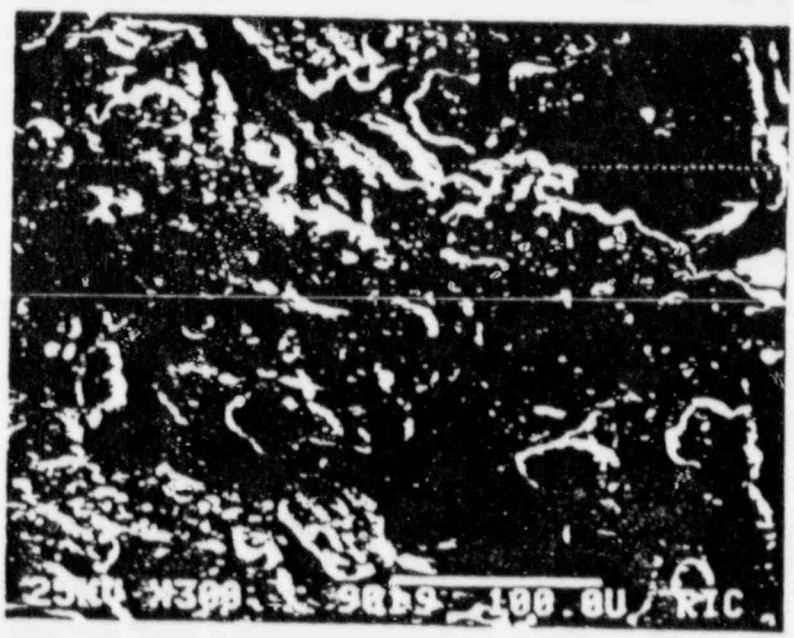
Figure 7
Particle 1
MSIU-32



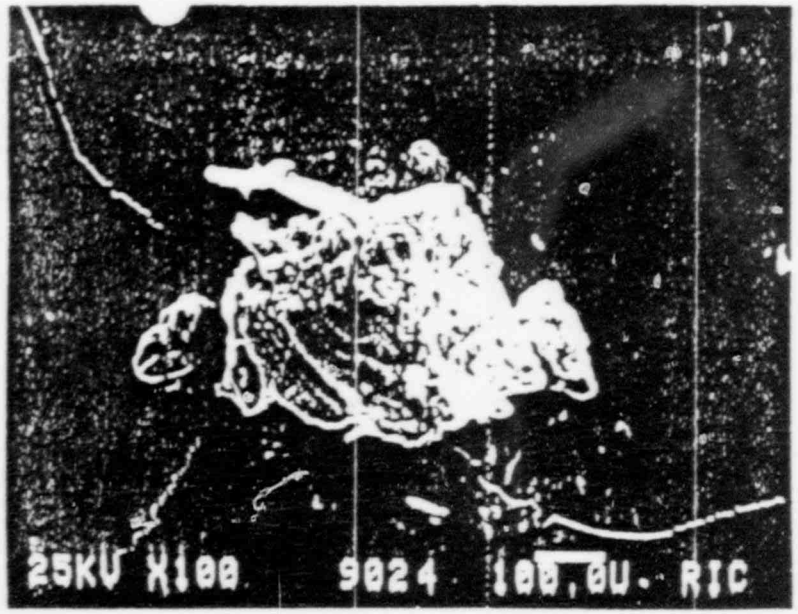
a



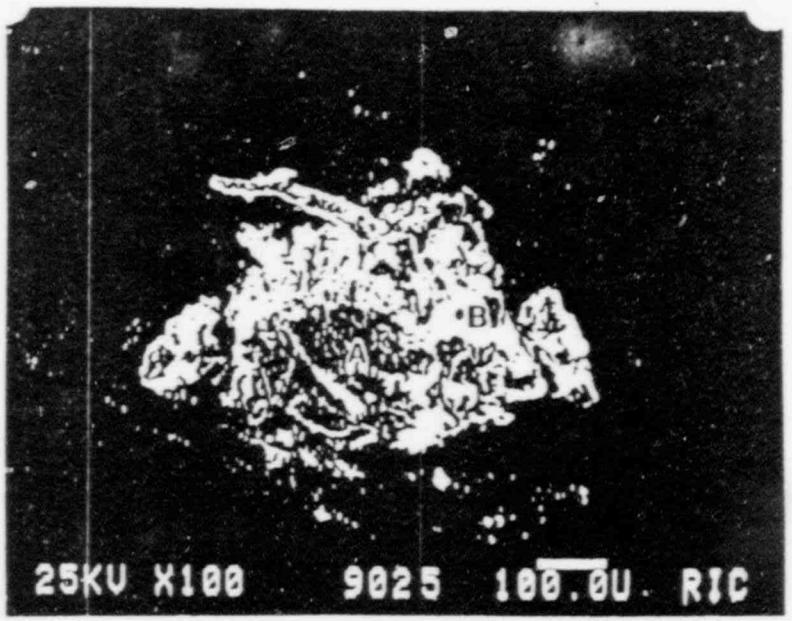
b BEI



c

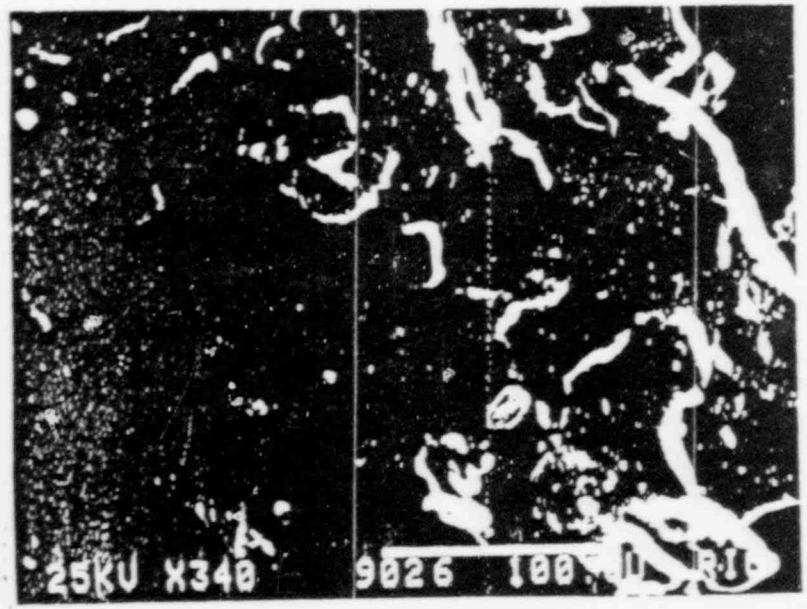


a

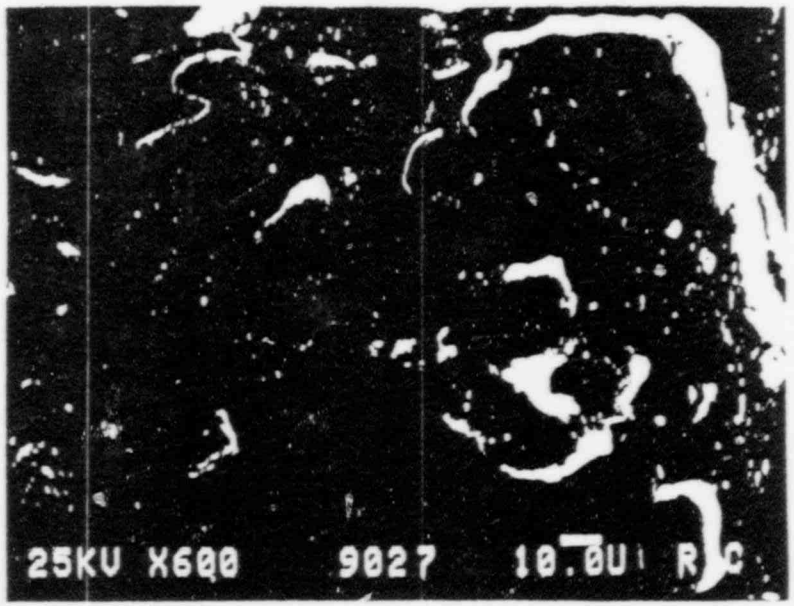


b BEI

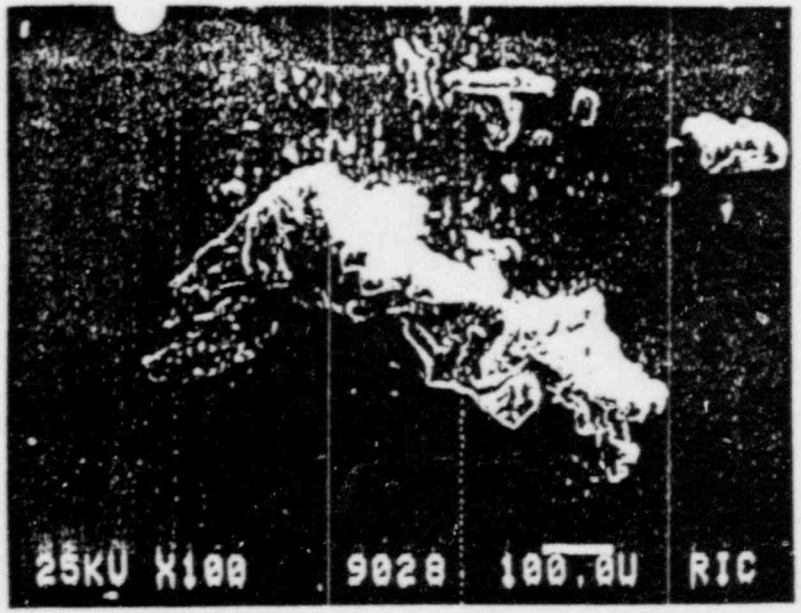
See corresponding plots Area A & B



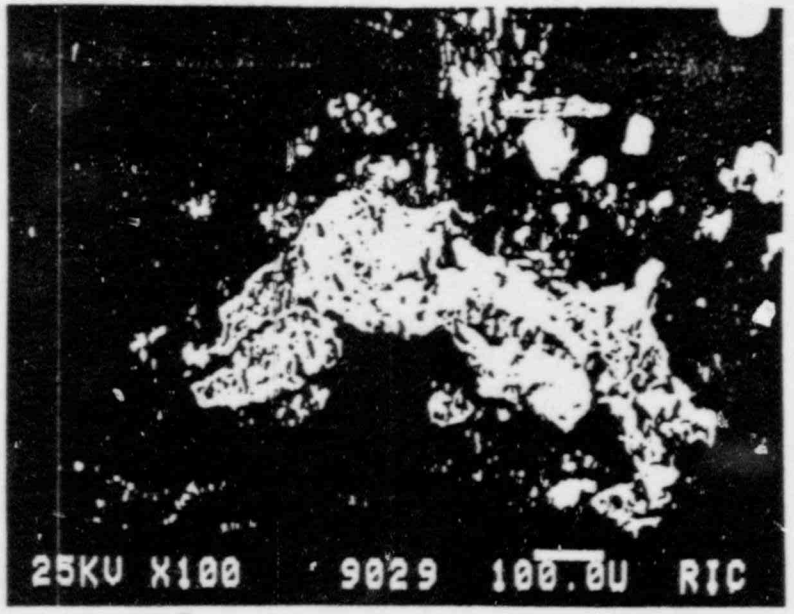
c Area A of 8b



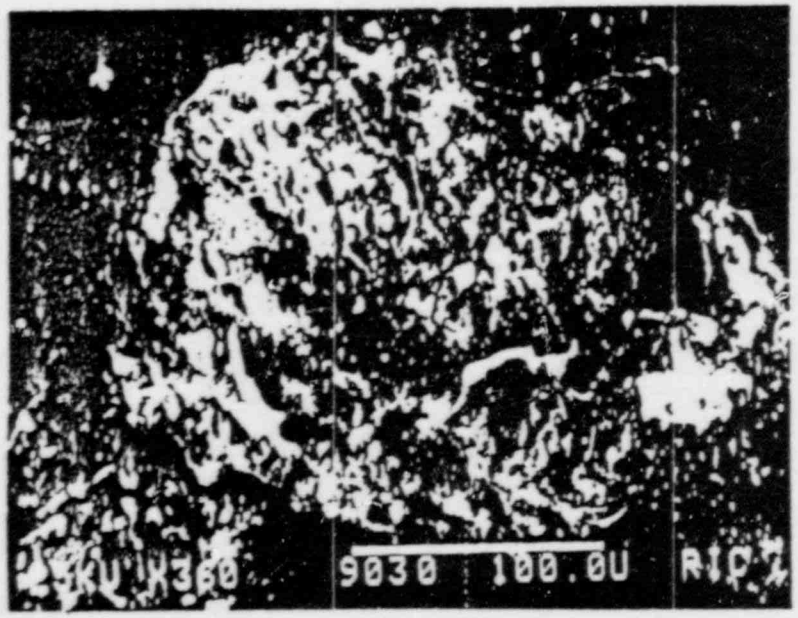
d Area B of 8b



a



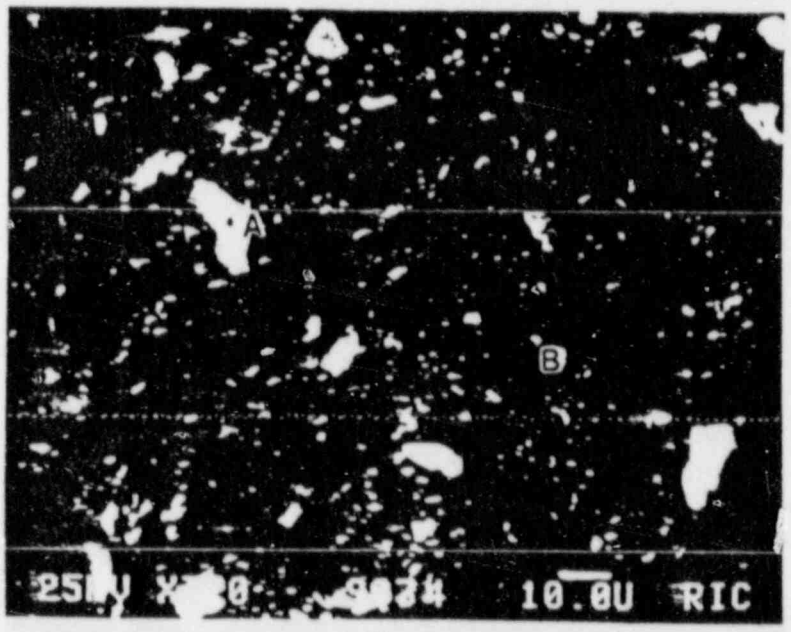
b BCI



C. BEI

Figure 8. Hole 3 MSW-32

a



b BEI OF Fig 10a
A + B see corresponding plots

Figure 10 MSIV-32 Particle 3

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 23 100X 21 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096

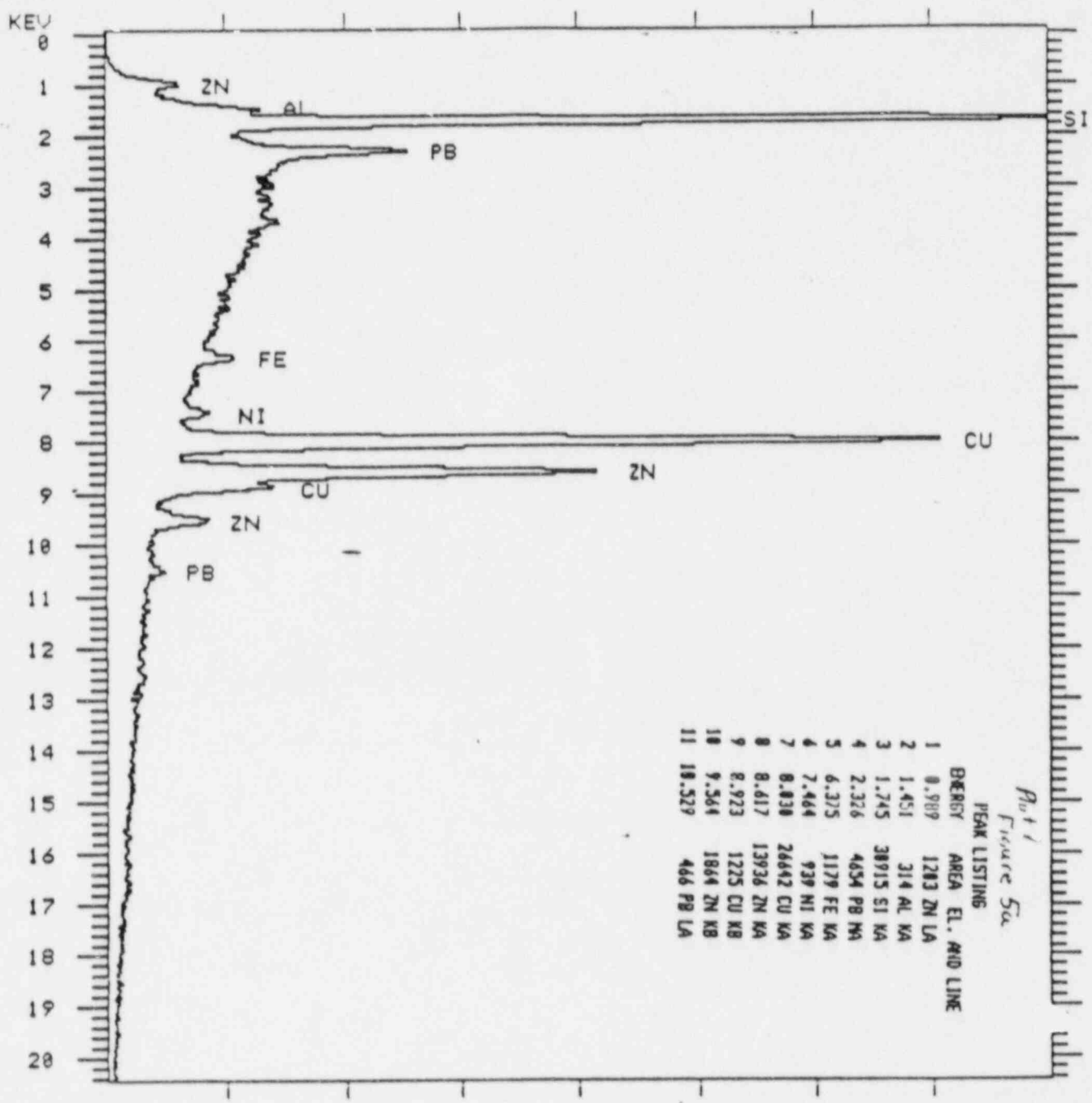
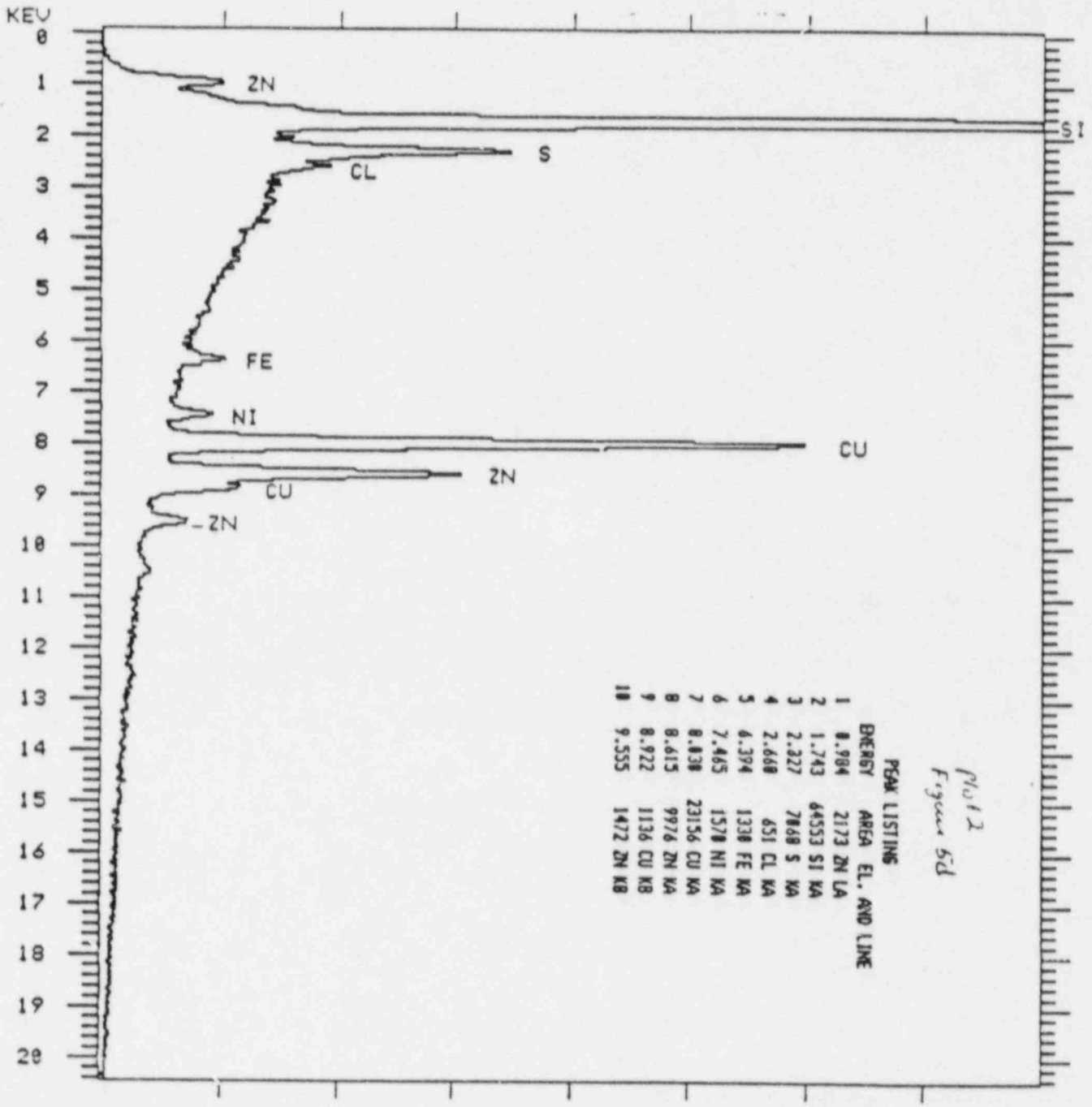


Figure 5a

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 23 AREA A 600 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



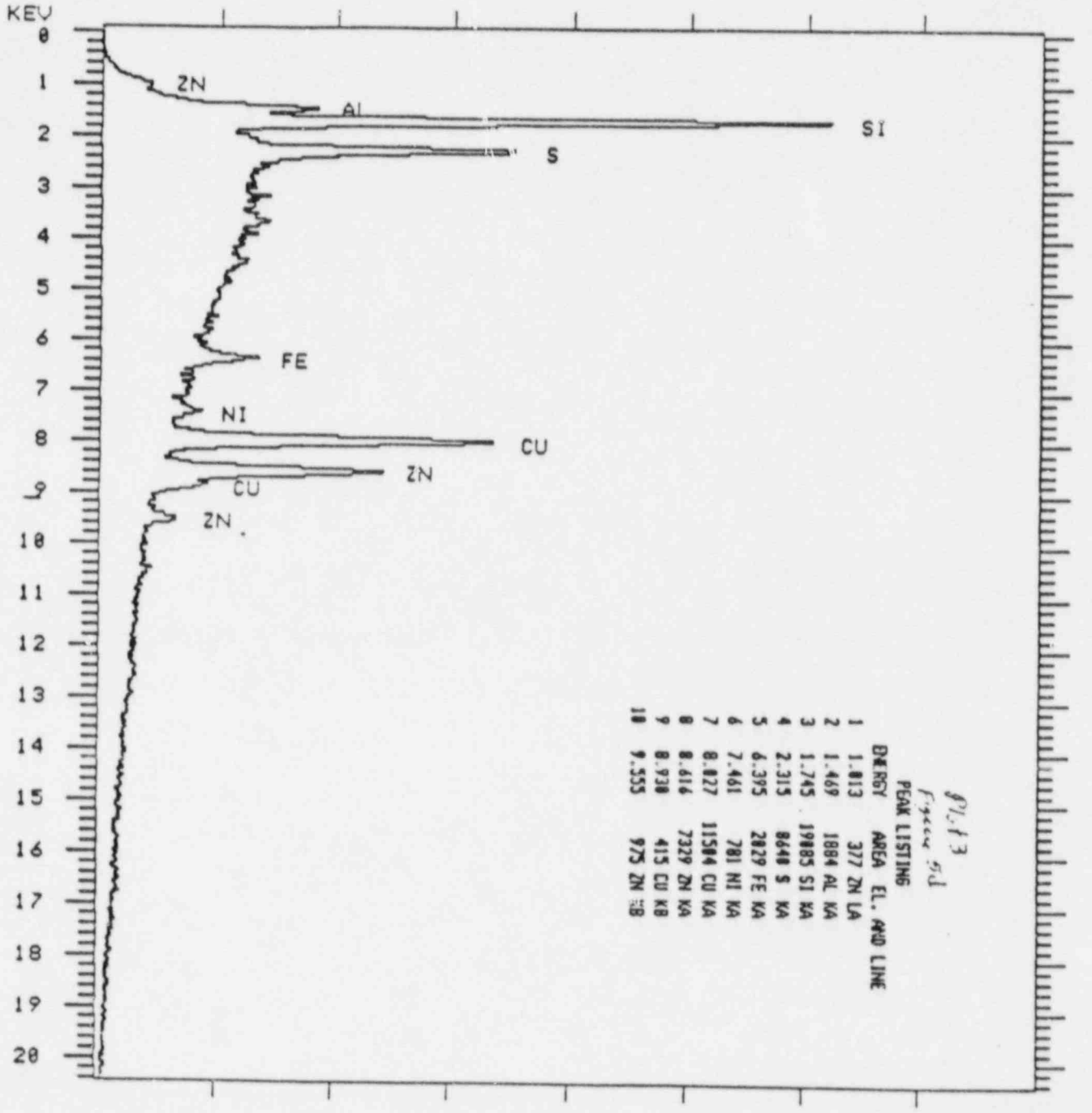
Plot 2
Figure 5d

))
SDMP2 10/33 S.DUMP

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 23 AREA B1000 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



PEAK LISTING

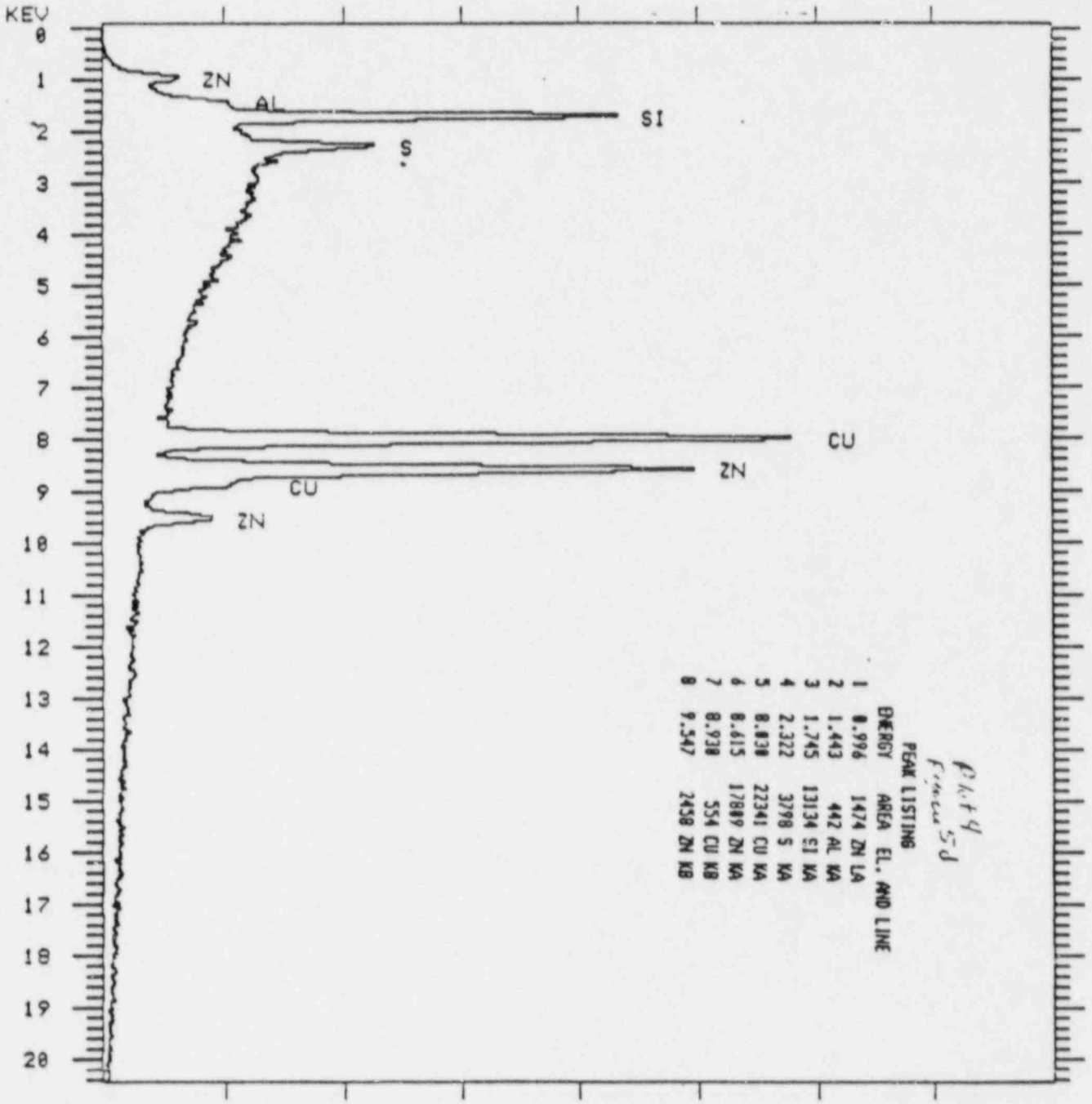
	ENERGY	AREA	EL. AND LINE
1	1.013	377	ZN LA
2	1.469	1884	AL KA
3	1.745	19885	SI KA
4	2.315	8648	S KA
5	6.395	2829	FE KA
6	7.461	781	NI KA
7	8.027	11584	CU KA
8	8.614	7329	ZN KA
9	8.930	415	CU KB
10	9.553	975	ZN KB

Plot 3
Figure 5d

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 23 AREA C1000 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



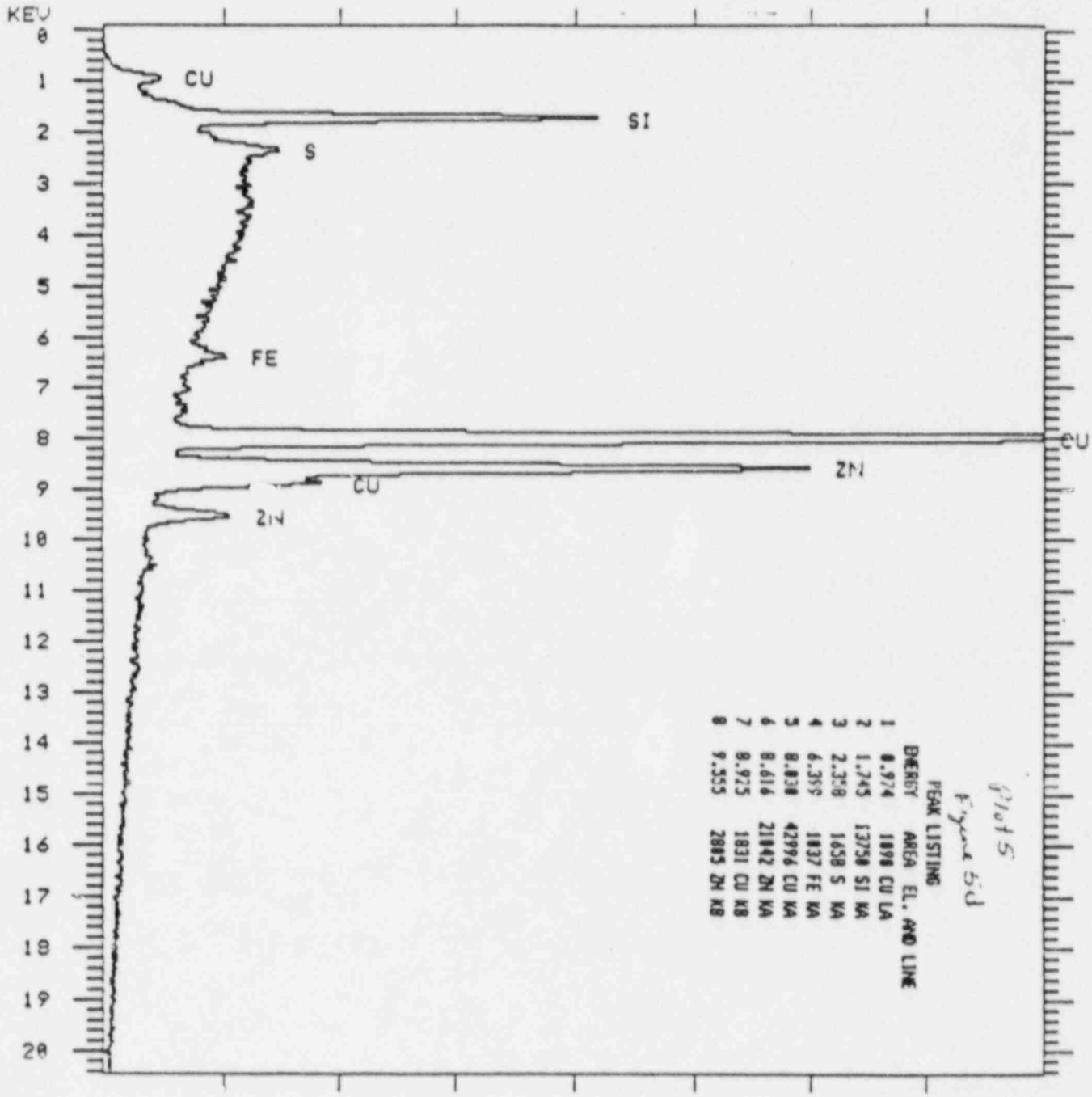
PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	0.996	1474	ZN LA
2	1.443	442	AL KA
3	1.745	13134	SI KA
4	2.322	3798	S KA
5	8.038	22341	CU KA
6	8.615	17889	ZN KA
7	8.938	554	CU KB
8	9.547	2458	ZN KB

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 23 AREA D1000 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



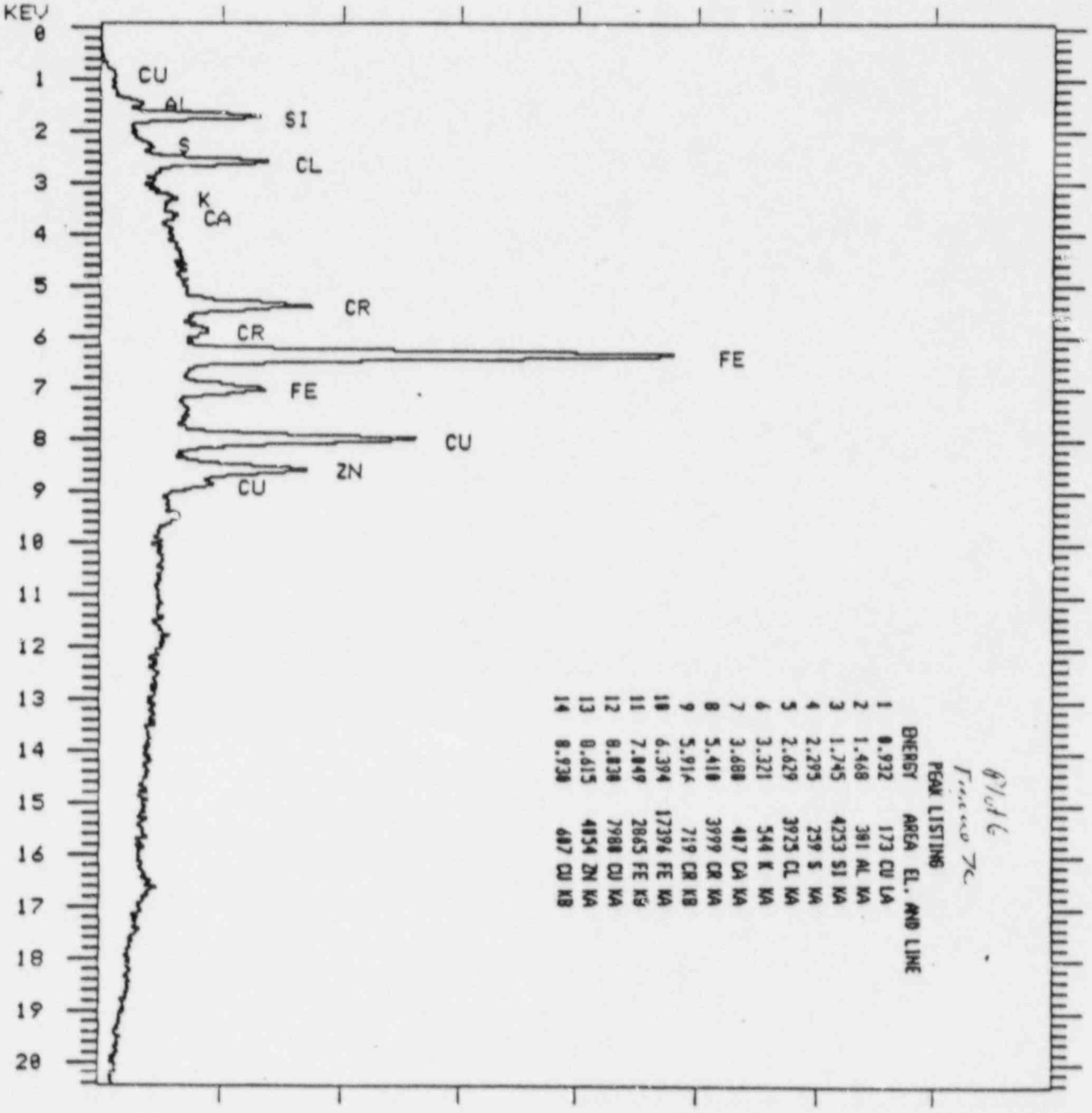
Plot 5

Figure 5d

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: PARTICLE/1000X 32 LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



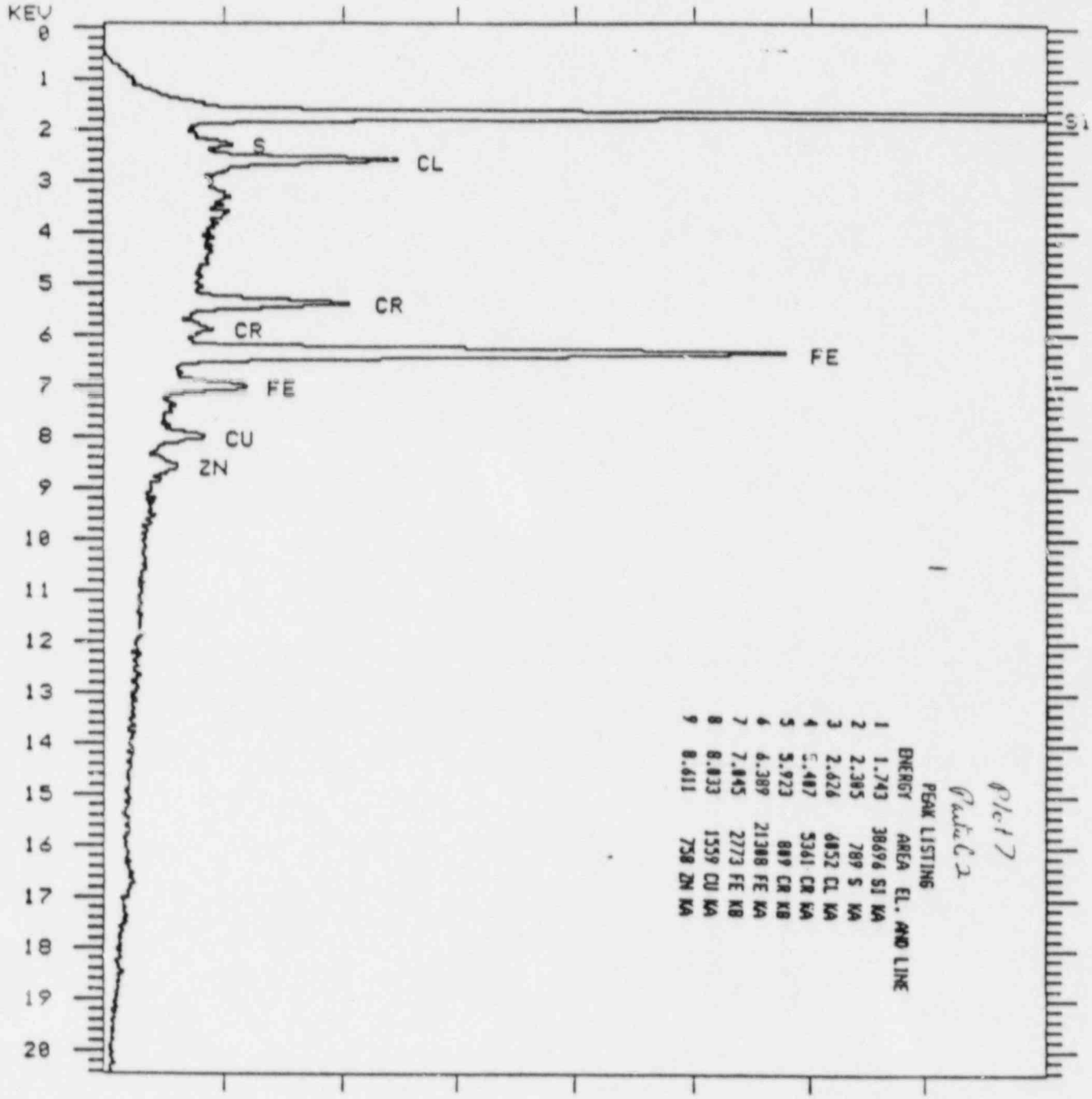
PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	0.932	173	CU LA
2	1.468	381	AL KA
3	1.745	4253	SI KA
4	2.295	259	S KA
5	2.629	3925	CL KA
6	3.321	544	K KA
7	3.688	487	CA KA
8	5.410	3999	CR KA
9	5.914	719	CR KB
10	6.394	17396	FE KA
11	7.049	2865	FE KB
12	8.038	7988	CU KA
13	8.615	4854	ZN KA
14	8.930	687	CU KB

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART 2 340X LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



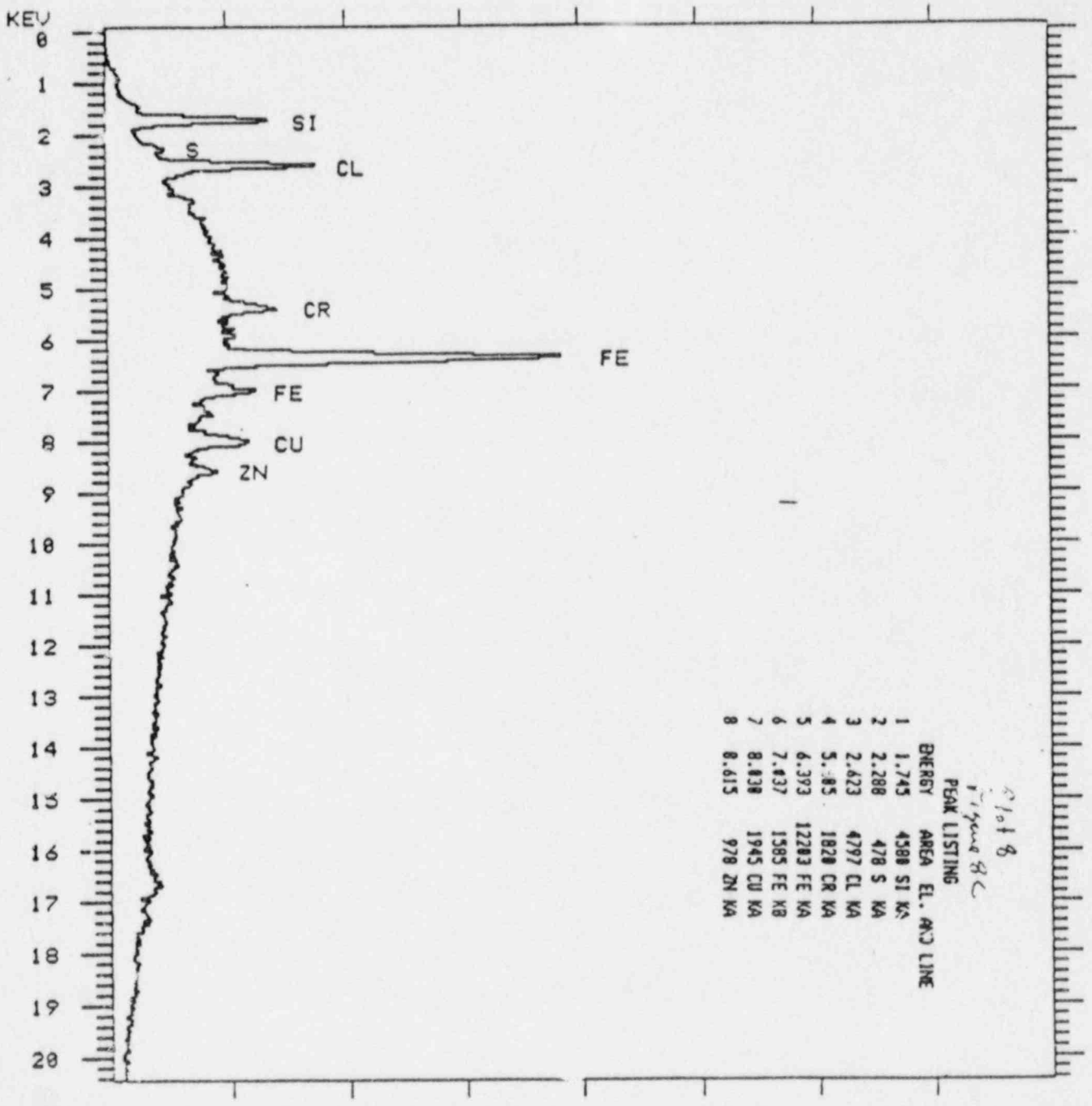
plot 7
Part 2

SDMP2 10/33 S.DUMP

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART 2A1000X LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



Plot 8
Figure 8C

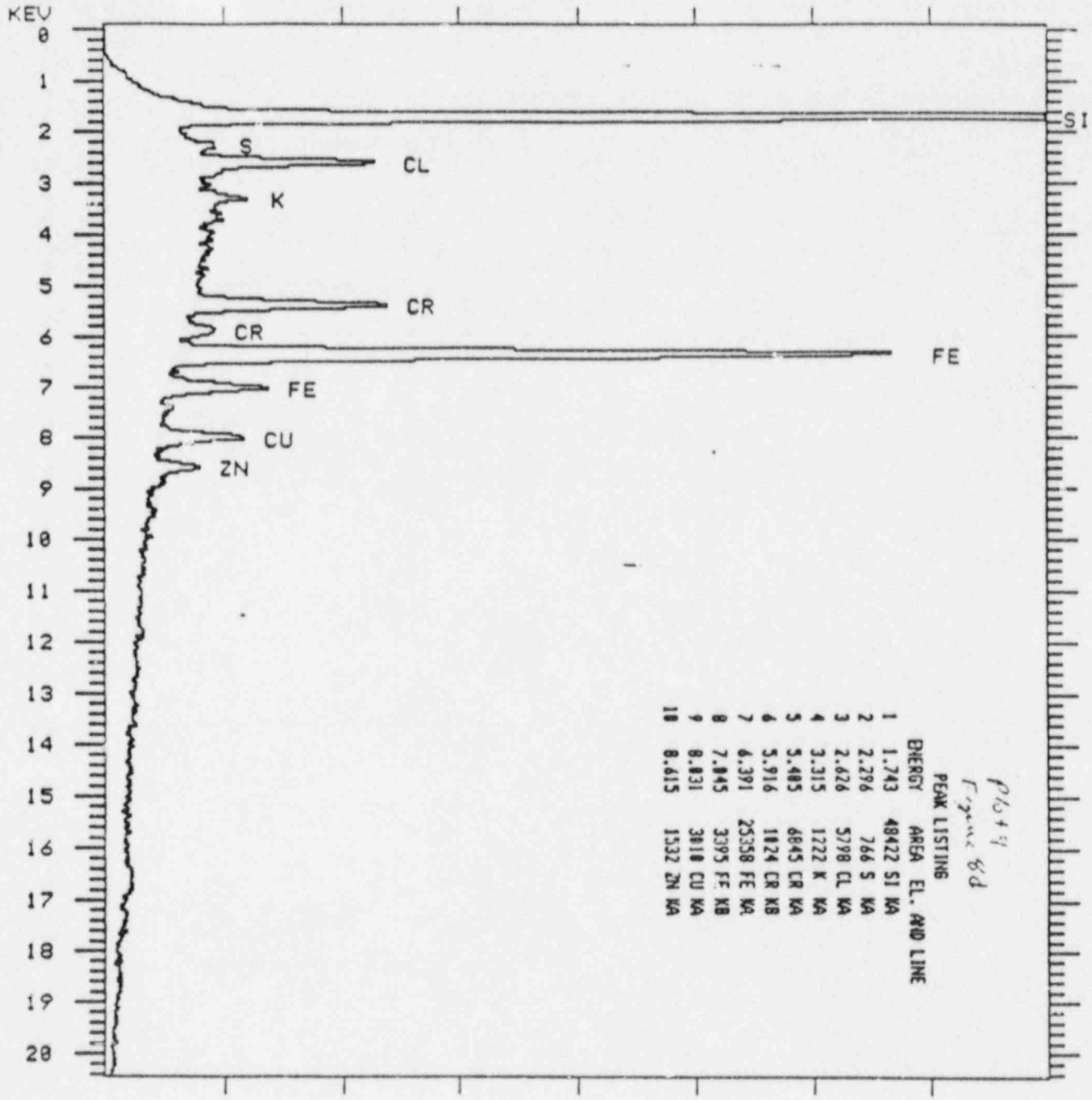
PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.745	4588	SI KA
2	2.288	478	S KA
3	2.623	4797	CL KA
4	5.185	1828	CR KA
5	6.393	12283	FE KA
6	7.037	1585	FE KB
7	8.038	1945	CU KA
8	8.615	978	ZN KA

TAYLOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART 2B1000X LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



PEAK LISTING

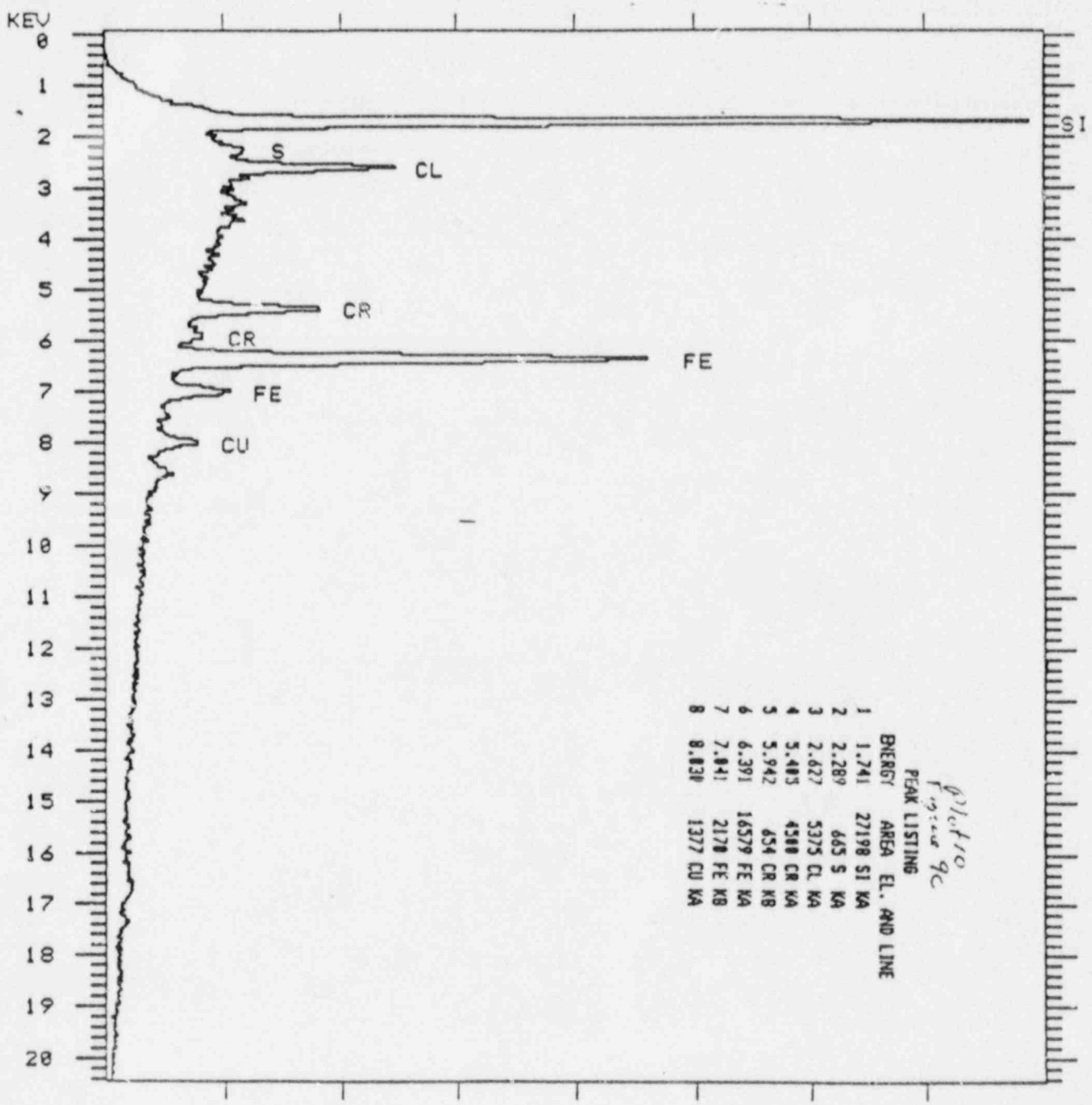
	ENERGY	AREA	EL. AND LINE
1	1.743	48422	SI KA
2	2.296	766	S KA
3	2.626	5798	CL KA
4	3.315	1222	K KA
5	5.405	6845	CR KA
6	5.916	1824	CR KB
7	6.391	25358	FE KA
8	7.045	3395	FE KB
9	8.031	3818	CU KA
10	8.615	1532	ZN KA

Plot 1
Figure 8d

TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART3 340 X LT= 160 SECS 0.020 KEV

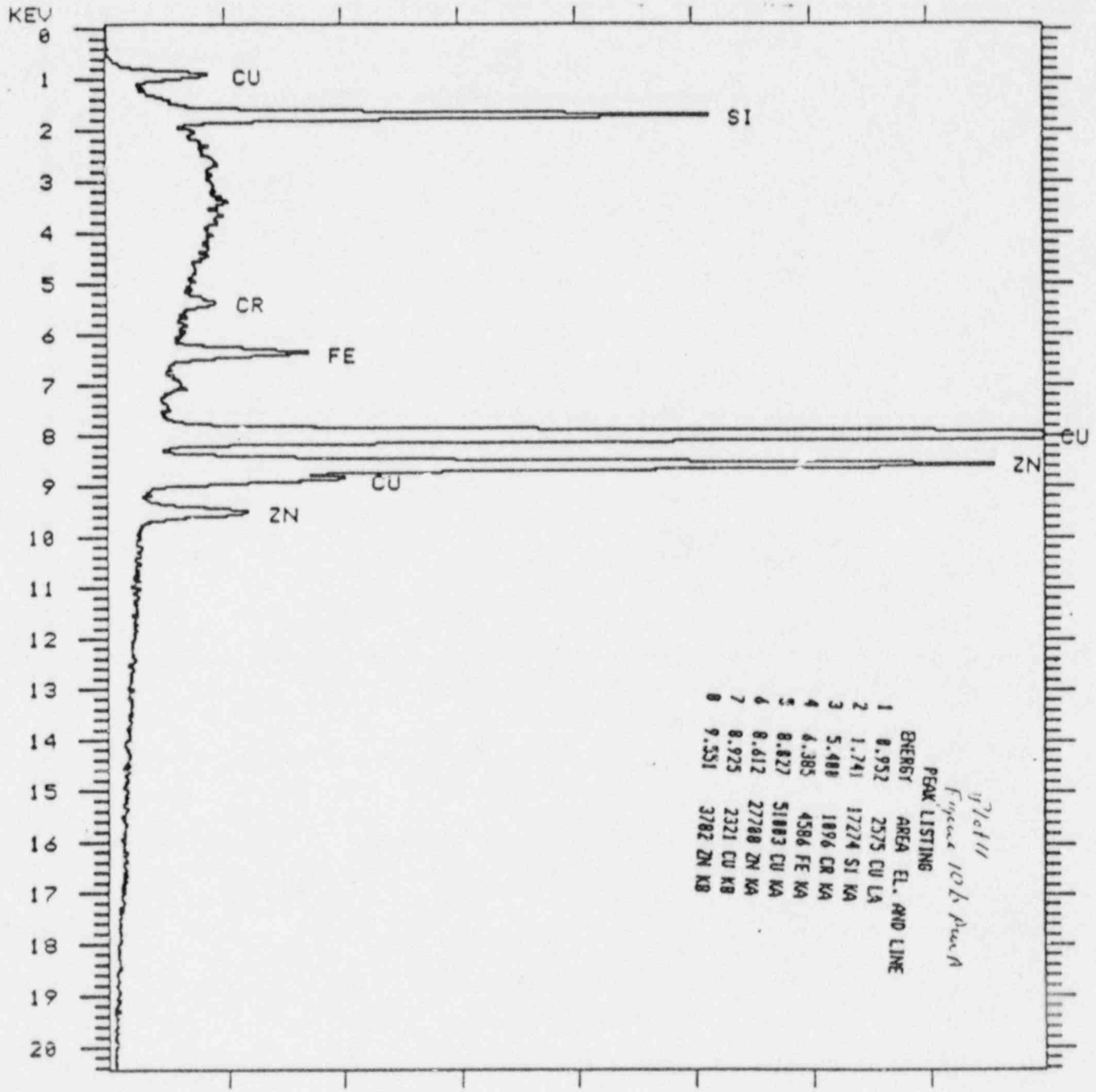
COUNTS F.S.= 4096



TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART3 34 A LT= 160 SECS 0.020 KEV

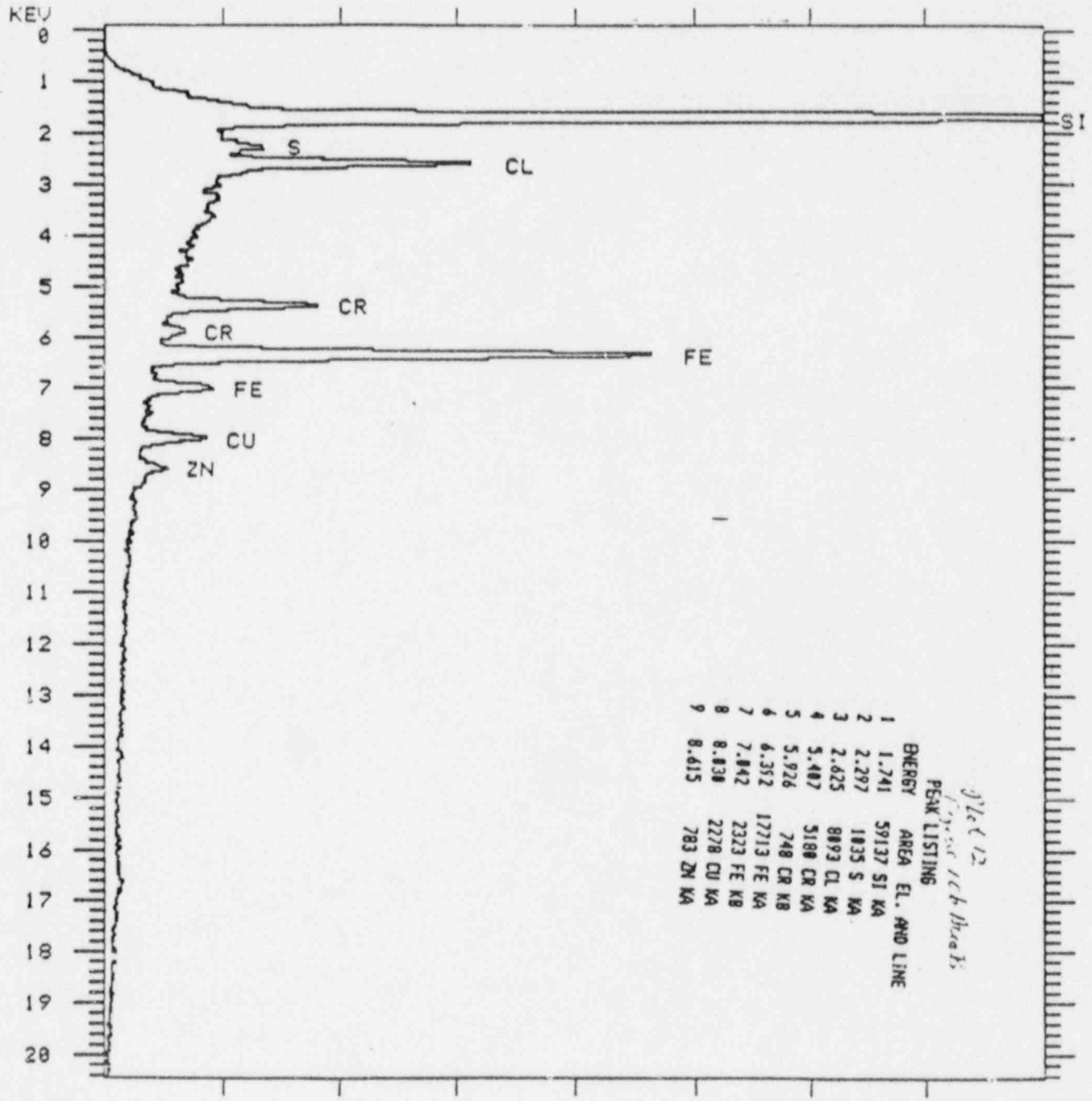
COUNTS F.S.= 4096



TRACOR-NORTHERN SPECTRAL PLOT

FULL MEM: MSIV 32 PART3 34 B LT= 160 SECS 0.020 KEV

COUNTS F.S.= 4096



PEAK LISTING

	ENERGY	AREA	EL. AND LINE
1	1.741	59137	SI KA
2	2.297	1035	S KA
3	2.625	8893	CL KA
4	5.407	5180	CR KA
5	5.926	748	CR KB
6	6.352	17713	FE KA
7	7.042	2323	FE KB
8	8.038	2278	CU KA
9	8.615	783	ZN KA

SUMMARY OF AIR QUALITY TESTING

Introduction

Work Order 87-9983 was generated to perform dewpoint temperature measurements and air particle size distribution for the Instrument Air (IA) supply to the "B" inboard MSIV (1B21F022B). The WO was initiated to help in determining if air quality could have contributed to the failure of the ASCO dual solenoid valve that occurred 11/29/87.

Method

Testing was performed at the 3/8" air supply to the ASCO dual solenoid valve and at the 1 5/8" air supply from the MSIV accumulator to the air pack. Prior to performing the dew point temperature check, an air blow of approximately 8 minutes through a pillow case was performed. The pillow case was affixed so that the air was blown through an area equal in size to the end of the connection. Dewpoint temperatures were determined using a dewpoint hygrometer sensor (MPL L70N502B). Air particle size distribution was determined using a HIAC/ROYCO particle counter (MPL L70Y091A).

Results

Dewpoint temperature measurement satisfied the acceptance criteria of -40 degrees F. The measured dewpoint temperature of the 3/8" air supply to the ASCO dual solenoid was -49 degrees F, and to the 1 5/8" supply from the accumulator was -42 degrees F. This is approximately 165 degrees F below the normal ambient area temperature during operations.

Air particle size distribution measurements satisfied the acceptance criteria of zero particles in the greater than 40 micron range at both of the sample points. The largest particle measured was in the less than 20 micron range. Attachment 1 presents the measured particle distributions. A uniform light grey stain was observed on the pillowcase. This is similar to what was previously observed when air blows were performed on 11/06/87 following the original ASCO solenoid failures.

Conclusion

The instrument air supply to the "B" inboard MSIV was tested to determine if dewpoint temperature and air particle distribution met acceptance criteria of -40 degrees F and zero particles greater than 40 microns. This acceptance criteria was satisfied. Based on

these acceptable results, it does not appear that the failure of the ASCO dual solenoid was related to the instrument air supply.

PARTICLE SIZE DISTRIBUTION

Sample 1 : Instrument Air supply from MSIV accumulator to air pack for 1B21F022B performed 12/04/87 at 0452.

Sample 2 : Instrument Air supply to ASCO dual solenoid for 1B21F022. performed 12/04/87 at 0505.

CHANNNEL	SIZE	SAMPLE 1	SAMPLE 2
1	> 3uM	37	9
2	>10uM	1	0
3	>20uM	0	0
4	>30uM	0	0
5	>40uM	0	0
6	>50uM	0	0

MSIV SOLENOID AND AREA TEMPERATURES

Outboard

Temporary Monitoring Point	Baseline (^{o}F)	Action Level (^{o}F)
1B21-F028B		
At solenoid 2 coil	193	212
At solenoid 2/3 body	186	205
At solenoid 3 coil	185	204
Behind actuator	133	146
At solenoid 1 body	133	146
At top of actuator	132	145
Between air pack and actuator	133	146
Bottom of actuator	134	147
At air pack	136	150
1B21-F028D		
At solenoid 2/3 body	189	208
At solenoid 1 body	131	144
1B21-F028A		
At solenoid 2/3 body	194	214
At solenoid 1 body	129	142
1B21-F028C		
At solenoid 2 coil	168	185
At solenoid 2/3 body	168	185
At solenoid 3 coil	165	182
Top of actuator	122	134
Bottom of actuator	104	114
At solenoid 1 body	117	129
At air pack	107	118
Between air pack and actuator	112	123
Behind actuator	113	124
1E12-F008C		
Point 33	117	129

MSIV SOLENOID AND AREA TEMPERATURES

Inboard

1B21-F022A		
Six inches from airpack solenoid	130	143
Mounted to airpack solenoid	165	182
Between F022A and F022D	127	140
1B21-F022B		
Six inches from airpack solenoid	132	146
Mounted to airpack solenoid	167	184
1B21-F022C		
Six inches from airpack solenoid	132	145
Mounted to airpack solenoid	167	184
1B21-F022D		
Six inches from airpack solenoid	130	143
Mounted to airpack solenoid	167	184

SAMPLE	DATE/TIME	DESCRIPTION	ANALYSIS
MSIV-1	11/6/87:1115	B21-F028B Deposits from 1 5/8" air hose.	IR
MSIV-2	11/6/87:1545	B21-F028B exhaust port (unknown fluid)	IR
MSIV-3	11/6/87:1115	Fitting from B21-F028B w/foreign mat'l inside (black solids and oily fluid)	IR
MSIV-4	11/6/87:2101	B21-F022D: ≈ 0.1 ft.^{3} solenoid supply collected on 0.45μ filter paper.	PSC
MSIV-5	11/6/87:2108	B21-F022D: ≈ 0.1 ft.^{3} solenoid supply collected on 0.45μ filter paper.	PSC
MSIV-6	11/6/87:2125	B21-F022D: ≈ 0.1 ft.^{3} actuator supply collected on 0.45μ filter paper.	PSC
MSIV-7	11/6/87:2135	B21-F022D: ≈ 0.1 ft.^{3} actuator supply collected on 0.45μ filter paper.	PSC
MSIV-8	11/7/87:0800	Rectorseal™ Thread sealant sample.	IR
MSIV-9	11/7/87:0800	Neverseeze™ Thread lubricant sample	IR
MSIV-10 (Destroyed (consumed in analysis))	11/7/87:0730	P52-F556: Instr. air at Containment penetration (outside). 10 min. blow-down, 5 min. purge of sampler.	GC
MSIV-11 CONSUMED	11/7/87:0745	P52-F556: Instr. air at Containment penetration (outside). 10 min. blow-down, 15 min. purge of sampler.	GC
MSIV-12	11/7/87:1151	B21-F028B: Solenoid supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-13	11/7/87:1202	B21-F028B: Solenoid supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-14	11/7/87:1214	B21-F028B: Actuator supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-15	11/7/87:1220	B21-F028B: Actuator supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-16	11/7/87:1503	B21-F028B: Solenoid supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC

SAMPLE	DATE/TIME	DESCRIPTION	ANALYSIS
MSIV-17	11/7/87:1521	B21-F028B: Solenoid supply, ≈0.5ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-18	11/7/87:1537	B21-F028B: Actuator supply, ≈0.1ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-19	11/7/87:1553	B21-F028B: Actuator supply, ≈0.5ft.^{3} on 0.45μ particulate filter.	PSC
MSIV-20	11/16/87:1600	B21-F028D: Solenoid valve body.	
MSIV-21	11/16/87:1600	Solenoid Rebuild Kits (3 kits w/ elastomer parts)	
MSIV-22	11/16/87:1600	B21-F028A: Gaskets, disc, core assembly.	
MSIV-23	11/16/87:1600	B21-F022B: Gaskets, disc, core assembly.	
MSIV-24	11/16/87:1600	B21-F028B: Gaskets, disc, core assembly.	
MSIV-25	11/16/87:1600	B21-F022C: Gaskets, disc, core assembly.	
MSIV-26	11/16/87:1600	B21-F028C: Gaskets, disc, core assembly.	
MSIV-27	11/16/87:1600	B21-F022D: Gaskets, disc, core assembly.	
MSIV-28	11/16/87:1600	B21-F028D: Gaskets, disc, core assembly.	
MSIV-29	11/30/87:1230	B21-F022B: Plungers, solenoid "B"	
MSIV-30	11/30/87:1230	B21-F022B: Core Assembly, seats & gaskets.	
MSIV-31	11/30/87:1230	B21-F022B: Valve body.	
MSIV-32	11/30/87:1230	B21-F022B: Foreign Material from Plunger area "B" solenoid (3 particles total)	
MSIV-33	11/30/87:2200	B21-F022B: Instrument Air grab sample from 2" supply.	
MSIV-34	11/30/87:2215	B21-F022B: Instrument Air grab sample from Solenoid supply line.	

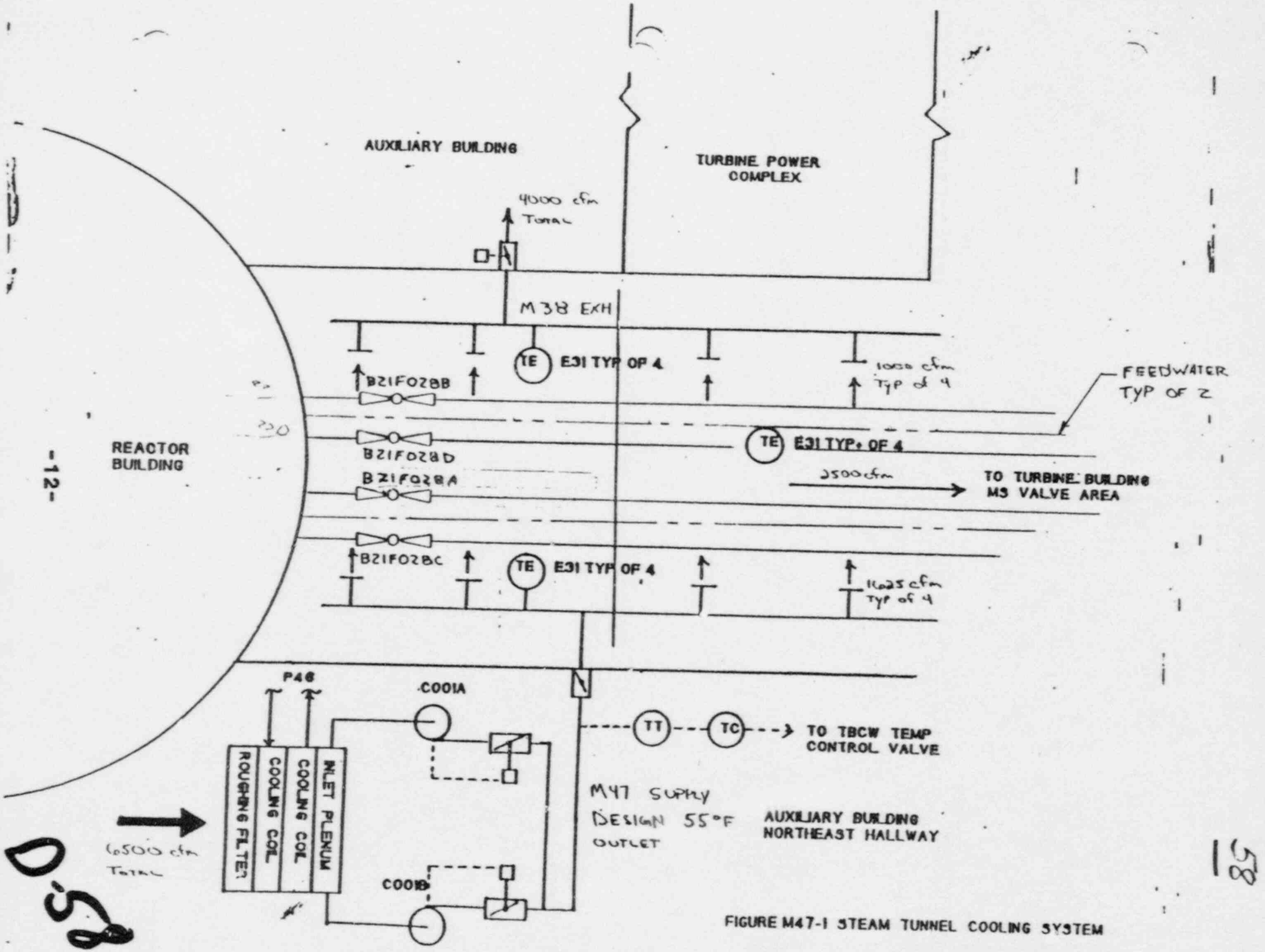


FIGURE M47-1 STEAM TUNNEL COOLING SYSTEM

D.58

185

Roger Lanksbury
NRC Office 59

CLASS 1E SOLENOID VALVES
(ASCO NP SERIES)

EXCLUDING THE MSIV APPLICATIONS, PNPP EMPLOYS A TOTAL OF 55 OF THE SUBJECT VALVES.

OF THIS 55, 37 ARE EITHER LOCATED IN MILD ENVIRONMENTS OR HAVE NO DESIGN BASIS EVENT SAFETY FUNCTION AND ARE VERIFIED NOT TO FAIL IN A MANNER DETRIMENTAL TO OTHER SAFETY SYSTEMS, ie, ARE CLASSIFIED AS "A3" (NUREG 0588 APPENDIX E, PARA.2.C.)

EXCLUDING THESE 37 LEAVES A TOTAL OF 18 WITH DESIGN BASIS EVENT SAFETY FUNCTIONS FOR WHICH THEY ARE CURRENTLY QUALIFIED. OF THIS 18 THERE ARE A TOTAL OF 5 WHICH ARE OF NORMALLY-ENERGIZED CONFIGURATION.

TECH. SPEC REQUIREMENTS REQUIRE THAT THESE 5 BE CYCLED PER THE APPLICABLE SVI'S AT FREQUENCIES OF 92 DAYS (QUARTERLY) OR LESS.

BASED ON MAINTENANCE HISTORIES REVIEW, THE SVI'S HAVE BEEN PERFORMED PROPERLY, AS SCHEDULED. NONE OF THE WORK HISTORIES SHOW ANY PROBLEMS WITH THE OPERABILITY OF THESE SOLENOID VALVES WITH RESPECT TO SEAT/DISC "STICKING".

Roger
If you have any questions on this, I can be reached on X5183,

Ken Mathews

0-59

LEAK HISTORY

FOR 8D → 90

↓

NEXT

DO COMPLETE WO

FOR 8B → START WITH

① TEMP COMPARED TO LOCATION OF MSIVs AND COMPARED TO LEAKS LOCATIONS

② LOOK AT ART DATES FOR STEAM LEAK OFF DATES

BRI - PACKLESS

REPORT ON PARTICLES-
INSTRUMENT AIR AT MSIV'S

Prepared By 12/2/87 Date

INTRODUCTION

Samples were collected on instrument air supply lines on November 7, 1987 to visually inspect and measure particles collected on 0.45 micron, gridded filter paper. The samples were then logged and sent to Ricerca Inc. for visual inspection and sizing.

METHOD

The samples were collected by installing a filter paper holder assembly in series with a rotameter to determine flow rate. The filter paper holder assembly with rotameter was then connected to the MSIV instrument air supply line with tygon tubing. Air was then admitted to the filter paper until a total of 0.1 cubic feet was collected (0.5 cubic feet for samples MSIV-17 & MSIV-19). This total volume was selected as this is the standard volume drawn for sample collection by the laboratory particle counter. Results obtained could then be more closely correlated to past data collected by use of the particle counter.

The samples were then transported to Ricerca Inc. for inspection and measurement. The particles were inspected and measured by Ricerca laboratory personnel using a Zeiss Universal optical microscope at a magnification power of 125x for particles < 40 microns and at 161x for particles > 40 microns.

The calibrated eyepiece used to measure the particles was calibrated against a stage micrometer. Any fibers found were classified as fibers (instead of particles) if their length to width ratio was greater than 10:1.

Each filter had an effective filtering area of 980 square millimeters. For each sample, this entire area was evaluated.

RESULTS

Table 1 lists the samples by number, total number of particles >20 microns and the actual particle size.

The particle characteristics could be described as follows:

1. Clear, crystalline-like particles *
2. White, cloudy particles *
3. Dark particles *
4. Metallic-like particles
5. Fibers

D-55

* indicates the type of particles making up the majority of the particles >40 microns. Non-asterisked particles and fibers were relatively few in number by comparison, but several were greater than 40 micron in size.

CONCLUSION

Because of the probability of some contamination occuring due to the large amount of exposed sample handling involved with the filter paper collection method, it is not easily ascertained what percentage of these results may be due to contamination. It is suspected that the majority of fibers found are dust particles from room air. The particle counter instrument is currently being recalibrated to detect and quantify particles in the 40-50 micron and >50 micron range and will be used to test the validity of the filter paper collection results.

Table 1

MSIV-4 (22b)

Particle	#1	43 µm
	2	43
	3	56
	4	62
	5	68
	6	68

No fibers found

MSIV-6 (22h)

Particle	#1	37 µm
	2	56
	3	68
	4	68
	5	68
	6	87
	7	93
	8	124
	9	155
	10	260
Fiber	#1	143
	2	>160
	3	>600
	4	NM
	5	NM

NM=not measured

MSIV-12 (28B)

Particle	#1	38 µm
	2	50
	3	62
	4	74
	5	>186
	6	280

No fibers found

MSIV-14 (28B)

Particle	#1	40 µm
	2	43
	3	50
	4	50
	5	62
	6	62
	7	81
	8	87
	9	105
	10	130

No fibers found

MSIV-5 (22A)

Particle	#1	56 µm
	2	130
	3	167
	4	186
Fiber	#1	>500

MSIV-7 (22D)

Particle	#1	38 µm
	2	40
	3	50
	4	62
	5	81
	6	93
	7	93

No fibers found

MSIV-13 (28B)

Particle	#1	43 µm
	2	50
	3	68
	4	87
	5	174
	6	174
Fiber	#1	217
	2	279
	3	400
	4	3000

MSIV-15 (28B)

Particle	#1	43 µm
	2	50
	3	136
Fiber	#1	>700
	2	>6000

MSIV-16 (283)

Particle	#1	56 µm
	2	56
	3	87

No fibers found

MSIV-18 (288)

Particle	#1	38 µm
	2	62
	3	68
	4	74
	5	124

No fibers found

MSIV-17 (288)

Particle	#1	43 µm
	2	62
	3	62
	4	43
	5	68
	6	68

No fibers found

MSIV-19 (288)

Particle	#1	74 µm
	2	143
	3	217
	4	NM
Fiber	#1	NM

NM=not measured

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ISEG Review of R61 & C91 for MSIV Failure

The Independent Safety Engineering Group was asked to review the Sequence of Events Recorder and Process Computer Sequence of Events Log over the time period that the Main Steam Isolation Valves (MSIVs) were being tested. The October 29 and November 3, 1987 printouts were reviewed for any alarms associated with the MSIVs. There were no alarms associated with the MSIVs on the Sequence of Events Recorder. The Process Computer Sequence of Events Log appropriately listed those times when the MSIVs moved past the ninety percent open position.

Stephen F. Kuyper
ISEG Supervisor

D-57

SEQUENCE OF EVENTS LOG 10-23-87

TIME	PT ID	NAME	STATUS
18:33:53.914	M2INC050	MSL ISOLATION CH D	TRIPPED
18:33:53.958	M2INC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
18:39:36.167	B21NC047	MSL ISOLATION CH A	RESET
18:39:36.337	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
21:01:01.268	R21NC050	MSL ISOLATION CH D	TRIPPED
21:01:01.294	R21NC047	MSL ISOLATION CH A	TRIPPED
21:03:23.506	R21NC047	MSL ISOLATION CH A	RESET
21:03:23.467	R21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
21:04:30.029	B21NC050	MSL ISOLATION CH D	TRIPPED
21:04:30.054	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
21:05:27.769	B21NC047	MSL ISOLATION CH A	RESET
21:05:27.923	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
21:42:00.562	B21NL050	MSL ISOLATION CH D	TRIPPED
21:42:00.562	B21NL047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
21:43:09.081	B21NC047	MSL ISOLATION CH A	RESET
21:43:09.146	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
21:49:08.592	U21NC050	MSL ISOLATION CH D	TRIPPED
21:49:08.615	M21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS

TIME	PT ID	NAME	STATUS
21:49:54.751	B21NC047	MSL ISOLATION CH A	RESET
21:49:54.815	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:09:59.097	B21NC048	MSL ISOLATION CH B	TRIPPED
22:09:59.105	B21NC049	MSL ISOLATION CH C	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:10:32.309	R21NC049	MSL ISOLATION CH C	RESET
22:10:32.321	R21NC048	MSL ISOLATION CH B	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:11:52.824	B21NC048	MSL ISOLATION CH B	TRIPPED
22:11:52.859	B21NC047	MSL ISOLATION CH A	TRIPPED
22:12:19.730	B21NC047	MSL ISOLATION CH A	RESET
22:12:19.765	B21NC048	MSL ISOLATION CH B	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:13:17.567	B21NC049	MSL ISOLATION CH C	TRIPPED
22:13:17.584	B21NC050	MSL ISOLATION CH D	TRIPPED
22:13:37.218	B21NC050	MSL ISOLATION CH D	RESET
22:13:37.232	B21NC049	MSL ISOLATION CH C	RESET

END SEQUENCE OF EVENTS LOG

II	PI ID		
22:14:27.120	B21NC049	MSL ISOLATION CH C	TRIPPED
22:14:27.738	B21NC046	MSL ISOLATION CH B	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
22:15:21.447	B21NC048	MSL ISOLATION CH B	RESET
22:15:21.490	B21NC049	MSL ISOLATION CH C	RESET
22:15:48.798	B21NC049	MSL ISOLATION CH C	TRIPPED
22:15:48.814	B21NC048	MSL ISOLATION CH B	TRIPPED
22:16:13.251	B21NC048	MSL ISOLATION CH B	RESET
22:16:13.291	B21NC049	MSL ISOLATION CH C	RESET
22:16:42.202	B21NC047	MSL ISOLATION CH A	TRIPPED
22:16:42.241	B21NC048	MSL ISOLATION CH B	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:17:28.832	B21NC048	MSL ISOLATION CH B	RESET
22:17:28.999	B21NC047	MSL ISOLATION CH A	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LO

TIME	PT ID	NAME	STATUS
22:18:10.585	B21NC050	MSL ISOLATION CH D	TRIPPED
22:18:10.647	B21NC049	MSL ISOLATION CH C	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
22:19:12.770	B21NC049	MSL ISOLATION CH C	RESET
22:19:13.011	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
22:33:21.383	B21NC050	MSL ISOLATION CH D	TRIPPED
22:33:21.753	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
23:37:01.582	B21NC047	MSL ISOLATION CH A	RESET
23:37:01.647	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
11:55:59.454	B21NC048	MSL ISOLATION CH B	TRIPPED
11:55:59.463	B21NC049	MSL ISOLATION CH C	TRIPPED

-END-SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
11:57:08.313	U21NC049	MSL ISOLATION CH C	RESET
11:57:08.317	U21NC04B	MSL ISOLATION CH B	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
11:58:17.452	B21NC050	MSL ISOLATION CH D	TRIPPED
11:58:17.475	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
11:59:22.881	R21NC047	MSL ISOLATION CH A	RESET
11:59:23.040	R21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:00:21.535	B21NC050	MSL ISOLATION CH D	TRIPPED
12:00:21.559	B21NC047	MSL ISOLATION CH A	TRIPPED
12:01:17.993	B21NC047	MSL ISOLATION CH A	RESET
12:01:18.153	B21NC050	MSL ISOLATION CH D	RESET
12:02:08.251	B21NC046	MSL ISOLATION CH B	TRIPPED
12:02:08.259	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:03:28.942	B21NC047	MSL ISOLATION CH A	RESET
12:03:28.977	B21NC048	MSL ISOLATION CH B	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:04:16.599	B21NC049	MSL ISOLATION CH C	TRIPPED
12:04:16.605	B21NC050	MSL ISOLATION CH D	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:05:49.436	B21NC050	MSL ISOLATION CH D	RESET
12:05:49.451	B21NC049	MSL ISOLATION CH C	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:07:33.458	B21NC049	MSL ISOLATION CH C	TRIPPED
12:07:33.475	B21NC048	MSL ISOLATION CH B	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PI ID	NAME	STATUS
12:08:44.256	B21NC048	MSL ISOLATION CH B	RESET
12:08:44.298	B21NC049	MSL ISOLATION CH C	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:14:28.479	B21NC050	MSL ISOLATION CH D	TRIPPED
12:14:28.498	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:15:52.688	B21NC047	MSL ISOLATION CH A	RESET
12:15:52.735	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:18:15.284	B21NC050	MSL ISOLATION CH D	TRIPPED
12:18:15.307	B21NC047	MSL ISOLATION CH A	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:19:23.161	B21NC047	MSL ISOLATION CH A	RESET
12:19:23.247	B21NC050	MSL ISOLATION CH B	RESET

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:20:18.753	B21NC047	MSL ISOLATION CH A	TRIPPED
12:20:18.790	B21NC048	MSL ISOLATION CH B	TRIPPED

END SEQUENCE OF EVENTS LOG

RCINL047 MSL ISOLATION [illegible] RESET

ENL QUENCE OF EVENTS LOG RESET

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:22:21.050	B21NC050	MSL ISOLATION CH D	TRIPPED
12:22:21.114	B21NC049	MSL ISOLATION CH C	TRIPPED

END SEQUENCE OF EVENTS LOG

SEQUENCE OF EVENTS LOG

TIME	PT ID	NAME	STATUS
12:23:58.567	B21NC049	MSL ISOLATION CH C	RESET
12:23:58.806	B21NC050	MSL ISOLATION CH D	RESET

END SEQUENCE OF EVENTS LOG

PNPP No. 7210
Rev 2/87

INTENT
INSTRUCTION TEMPORARY CHANGE

PAP-0522-2

TEMPORARY CHANGE NO.: TCN- 10

INSTRUCTION NO. OM/A:	REV	INSTRUCTION TITLE
SVI-C71-T0039	1	MAIN STEAM LINE ISOLATION VALVE CLOSURE CHANNEL FUNCTIONAL
UNDELS TCN(S): NONE		

ORIGINATOR: Lusk A. Webster | DATE: 9/14/87

LIST EACH ATTACHED PAGE: 2,3,4,5,6,7,8,9,10,11,14,15,16, 17,18,19,20.

REASON:
Half Scrams and associated annunciators will not occur as discribed by this instruction. Deleted those steps that were not in accordance with the system logic.

ADMIN USE ONLY

INFORMATION ONLY

REVIEWED: D. T. Brandler | DATE: 9-14-87

10CFR50.59 APPLICABILITY CHECK

	YES	NO
Is there a Change to the plant as described in the FSAR?	☐	☒
REASON: NO CHANGE TO PLANT IS INVOLVED.		
Is there a Change to a procedure/instruction as described in the FSAR?	☐	☒
REASON: THIS INSTRUCTION IS NOT DETAILED IN THE FSAR.		
Is there a Test or experiment not described in the FSAR?	☐	☒
REASON: NO TEST OR EXPERIMENT IS INVOLVED.		
Is there a Change to Technical Specifications?	☐	☒
Is there an effect on the environment or change to the Environmental Protection Plan?	☐	☒
REASON: NO EFFECT ON THE ENVIRONMENT OR CHANGE TO THE EPP IS INVOLVED.		

☒ Answers to all questions are 'NO'. No potential for an Unreviewed Safety or Environmental Question exists. No further review required.

☐ Answers to one or more questions is 'YES'. Further review required.

PREPARED	DATE	REVIEWED	DATE	APPROVED	DATE
D. T. Brandler	9-14-87	Joseph C Hale	9/14/87	D A Philyaw FOR RAN	9-14-87

APPROVAL

NOH PORC: RESPONSIBLE GS/GSE: D A Philyaw FOR RANENKIRK — DATE: 9-14-87

PORC: PORC MTG. NO.: _____ RECOMMENDED FOR ☐ APPROVAL ☐ DISAPPROVAL

MANAGER PPTD — DATE

MANAGER PPOD — DATE

EFFECTIVE DATE: 9-14-87

DISAPPROVAL

DATE

REASON FOR DISAPPROVAL

ENTERED: BY Mike C. DATE 9-14-87

PWR NG 7309
Rev. 2 87
PWR-GADD-1

NON-INTENT
INSTRUCTION TEMPORARY CHANGE

TEMPORARY CHANGE NO. TCN- 9

INSTRUCTION NO	REV.	INSTRUCTION TITLE
OP7A.SVI-C71-T0035	1	MSL ISOL VLV CLOSURE CH. FUNCT

CANCELS TCN(S): N/A

ORIGINATOR: Tony Wescott | DATE: 3-25-87 | LIST EACH ATTACHED PAGE: 4,15

PROCESS FOR: ☐ CONDITIONAL APPROVAL ☑ FINAL APPROVAL ONLY

ADMIN. USE ONLY

REASON
DELETE STEPS THAT REQUIRE MSIV VALVE STEMS TO BE LUBRICATED AS PER SYSTEM ENG.

CONDITIONAL APPROVAL/IN DEPTH REVIEW

(Plant Management Staff) Robert Mazzi | DATE 3/27/87

CONDITIONAL APPROVAL

(SS or US) N/A | DATE

EFFECTIVE DATE 4-7-87

FINAL APPROVAL

NON-PROD: APPROVED | RESPONSIBLE GS/GSE: DB Phelps FOR RANEWIRK | DATE 4-2-87

PROD: PORC MTG. NO.: _____ RECOMMENDED FOR: ☐ APPROVAL ☐ DISAPPROVAL | MANAGER PPYD | DATE | MANAGER PPOD | DATE

DISAPPROVAL

DATE

REASON FOR DISAPPROVAL

SIGNED BY: J Kanicrat DATE: 4/7/87

INTENT

PNPP No. 7310
Rev 2/87

INSTRUCTION TEMPORARY CHANGE

PAP-0522-2

TEMPORARY CHANGE NO.: TCN- 8

INSTRUCTION NO.: DAY.7A.SVI-C71-T0039	REV: 1
INSTRUCTION TITLE: PSIV CLOSURE CH FUNCTIONAL	
CANCELS TCN(S): 1, 2, 5, 6, 7	
ORIGINATOR: Tony Wasett	DATE: 3-4-87
LIST EACH ATTACHED PAGE: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 14a, 14a, 15, 16, 17, 18, 19, 20, 21	

REASON: ADD STEP TO INFORM U.S. THAT MSIV's MAY NEED LUBRICATION.
CANCEL & INCORP. ALL TC's TO EASE IN PERFORMANCE OF SVI.

ADMIN USE ONLY

REVIEWED: Robert Murgi DATE: 3-11-87

10CFR50.59 APPLICABILITY CHECK

	YES	NO
Is there a Change to the plant as described in the FSAR?	☐	☒
REASON: The design of the plant is not changed by this SVI or TCN		
Is there a Change to a procedure/instruction as described in the FSAR?	☐	☒
REASON: The details of this instruction are not defined in the FSAR		
Is there a Test or experiment not described in the FSAR?	☐	☒
REASON: This is not a Test or Experiment. The responsibility for cycling MSIV's is directed to Operations by this TCN.		
Is there a Change to Technical Specification?	☐	☒
Is there an effect on the environment or change to the Environmental Protection Plan?	☐	☒
REASON: No impact on environment		

☒ Answers to all questions are 'NO'. No potential for an Unreviewed Safety or Environmental Question exist. No further review required.

☐ Answers to one or more questions is 'YES'. Further review required.

PREPARED	DATE	REVIEWED	DATE	APPROVED	DATE
Robert Murgi	3-11-87	Tony Wasett	3/11/87	R. Stark for RAN	3-12-87

APPROVAL

NON PORC — RESPONSIBLE MGR/GSE: Robert H Stark for R A Newkirk — DATE: 3-12-87

PORC — PORC MTG. NO.: _____ RECOMMENDED FOR ☐ APPROVAL ☐ DISAPPROVAL — MANAGER PPTD — DATE — MANAGER PPOC — DATE

EFFECTIVE DATE: 3-13-87

DISAPPROVAL — DATE

REASON FOR DISAPPROVAL

ENTERED — BY: J Barnicott — DATE: 3/13/87

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

PERRY NUCLEAR POWER PLANT OPERATIONS MANUAL

Surveillance Instruction

TITLE: MAIN STEAM LINE ISOLATION
VALVE CLOSURE CHANNEL FUNCTIONAL

REVISION: 1 EFFECTIVE DATE: 10/21/85

		DATE
PREPARER:	T.B. SHAFFER/ R.C. MILLER	10/15/85
REVIEWER:	Brent Burkhart	10/16/85
PORC MEETING NO:	85-119	
APPROVED:	[signature]	10/21/85

10CFR50.59 Applicability Check

	Yes	No
Is there a change to the plant as described in the FSAR?	___	✓
Is there a change to a procedure/instruction as described in the FSAR?	___	✓
Is there a test or experiment not described in the FSAR?	___	✓
Is there a change to the Technical Specification?	___	✓

(If yes, perform a 10CFR50.59 Safety Evaluation per PAP-0305).

Applicability Check Performed by S Rlinderson Date 10/16/85

SCOPE OF REVISION: 1. Instruction revised to incorporate format changes of TAP-0503.
2. Numerous corrections were made throughout the instruction.

Main Steam Line Isolation Valve Closure Channel Functional

1.0 DESCRIPTION

1.1 Scope:

The Main Steam Line Isolation Valve Closure instrumentation channels are functionally tested by stroking the MSIV's and monitoring each trip relay and their common annunciator.

This instruction fully satisfies the functional surveillance requirements of Technical Specification 4.3.1.1 Table 4.3.1.1-1 Item 6.

TC 8

This instruction fully satisfies the functional surveillance requirements of Technical Specification 4.3.1.1 Table 4.3.1.1-1 Item 6, and the fail safe function and partial exercise testing of valves 1B21-F022A, 1B21-F022B, 1B21-F022C, 1B21-F022D, 1B21-F028A, 1B21-F028B, 1B21-F028C and 1B21-F028D per Technical Specification 4.0.5.

This instruction will verify the operability of the following:

1. 1C71-N700A	9. 1C71-N702A
2. 1C71-N700B	10. 1C71-N702B
3. 1C71-N700C	11. 1C71-N702C
4. 1C71-N700D	12. 1C71-N702D
5. 1C71-N701A	13. 1C71-N703A
6. 1C71-N701B	14. 1C71-N703B
7. 1C71-N701C	15. 1C71-N703C
8. 1C71-N701D	16. 1C71-N703D

1.2 Frequency: At least once per 31 days

1.3 Technical Specification Applicable Operational Conditions: 1(e)

TC 8

(e) This function shall be automatically bypassed when the REACTOR MODE SWITCH is not in the RUN position.

1.4 Cross-Reference: N/A

2.0 PRECAUTIONS AND LIMITATIONS

1. Step numbers marked with a dollar sign ($) immediately to the left are required by Technical Specifications. Such items, if found to exceed their Allowable Value may be NRC reportable and shall be brought to the attention of the Unit Supervisor.

2. Those steps of this instruction designated by an "at" sign (@) are to be initialed or signed on the appropriate data sheet or Data Package Cover Sheet as data is entered or as each step is completed.

TC 8

3. All steps are to be performed in sequence and the instruction carried through to completion, unless otherwise indicated.

4. The Unit Supervisor or designated alternate must be notified immediately whenever an instructional step cannot be completed as stated, or if problems develop during the performance of this instruction.

5. This instruction should be read in its entirety before proceeding with the performance of the instructional steps.

TC 8

6. During the performance of this SVI the INBD and OTBD MSIV's will be stroked, in modes 1, 2 or 3 a steam sink may be required.

TC 10

DELETED

TC 8

8. Channel(s) will be made inoperable in section 5.0 of this instruction.

9. To avoid unnecessary valve wear, full stroking of MSIV's must be kept to a minimum.

3.0 MANPOWER AND EQUIPMENT

3.1 Manpower/Communications

TC 8

1. Two I&C technicians are required to perform this instruction.

   a. Two technicians in Control Room to monitor the trip relays at the following panels:

      1. DIV 1 RPS INSTRUMENTATION & AUXILIARY RELAY PANEL (1H13-P691)
      2. DIV 2 RPS INSTRUMENTATION & AUXILIARY RELAY PANEL (1H13-P692)
      3. DIV 3 RPS INSTRUMENTATION & AUXILIARY RELAY PANEL (1H13-P693)
      4. DIV 4 RPS INSTRUMENTATION & AUXILIARY RELAY PANEL (1H13-P694)

TC 8

2. Establish communications between the technicians and the Supervising Operator.

TC 8

3.2 Required Measuring and Test Equipment (M&TE)

1. 2 Digital Multimeters (DMM-1 & DMM-2), Fluke 77.

3.3 Additional Tools and Equipment

1. Keys needed for P691, P692, P693 and P694.

TC 8

4.0 PREREQUISITES

@ 1. Obtain the Unit Supervisor's "Authorization to Start Prerequisites" signature on the Data Package Cover Sheet.

TC 8 | @ 2. This instruction may be performed in Operational Condition 1,2,3,4 or 5. Attachment 1.

@ 3. Verify that no testing or maintenance is being performed which would initiate a half scram RPS signal. Attachment 1.

4. Verify the following annunciators are reset: Attachment 1.

@ a. 1/2 SCRAM A/C (P680-5A-A9)
@ b. 1/2 SCRAM B/D (P680-5A-B9)

R 10 | 5. a. DELETED

6. If Unit is in MODE 3,4, or 5, verify the following: Attachment 2.

@ a. C95 computer point RPS CHANNEL ISOLATION A STATUS, B21EC013 indicates NORM.
@ b. C95 computer point RPS CHANNEL ISOLATION B STATUS, B21EC014 indicates NORM.
@ c. C95 computer point RPS CHANNEL ISOLATION C STATUS, B21EC015 indicates NORM.
@ d. C95 computer point RPS CHANNEL ISOLATION D STATUS, B21EC016 indicates NORM.

TC 8 | @ 7. A RWP may be required for performance of this instruction. Attachment 1.

TEMP CHANGE # 10 PAGE 3 OF 17

TEMP CHANGE # 9 PAGE 1 OF 2

TEMP CHANGE # 8 PAGE 4 OF 21

8. Verify the Calibration Due Date is current on all test equipment. Attachment 1.

9. Record all test instruments, MPL, Cal Date, and Cal Due Date. Attachment 2.

Tc 8

10. Verify the following: Attachment 1.

- a. Switch 1C71A-S6A MAIN STEAM LINE ISOL VALVE TEST (P691) is in the NORM position.
- b. Switch 1C71A-S6B MAIN STEAM LINE ISOL VALVE TEST (P692) is in the NORM position.
- c. Switch 1C71A-S6C MAIN STEAM LINE ISOL VALVE TEST (P693) is in the NORM position.
- d. Switch 1C71A-S6D MAIN STEAM LINE ISOL VALVE TEST (P694) is in the NORM position.

5.0 SURVEILLANCE INSTRUCTION

5.1 Surveillance Test

1. Obtain the Supervising Operator's "Authorization to Start Test" signature on the Data Package Cover Sheet.

2. ~~Inform Supervising Operator that the following annunciators will come on and reset during this surveillance:~~

Tc 10

~~a. RPS MSIV CLOSURE (P680-5A-A6) (MODE 1 only)~~

b. c. DELETED

Tc 9 | Tc 8

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TC 8

5. Connect Digital Multimeter (DMM-1) to terminals B and C of relay 1C71A-K3A (P691) (set to ohms).

6. Connect Digital Multimeter (DMM-2) to terminals B and C of relay 1C71A-K3B (P692) (set to ohms).

@ 7. Inform Unit Supervisor that the MSIV's will be stroked. Record time and date. Obtain U.S. signature. Attachment 2.

@ 8. Request Supervising Operator to place MSL A INBD MSIV 1B21-F022A switch (P601-18C) to TEST. Attachment 2.

@ 9. Request Supervising Operator to place MSL A OTBD MSIV 1B21-F028A switch (P601-19C) to TEST. Attachment 2.

TC 10

10. Request Supervising Operator to depress and hold MSL A INBD MSIV TEST switch 1B21H-S3A (P601-18C) until the following occurs, then release switch: Attachment 2.

@ a. MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is on.

TC 8 $@ b. DMM-1 indicates relay 1C71A-K3A contact closed.

TC 8 $@ c. DMM-2 indicates relay 1C71A-K3B contact closed.

TC 10 d. DELETED

11. After MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is off, verify the following: Attachment 2.

@ a. MSL A INBD MSIV 1b21-F022A green indicating light (P601-18C) is off.

TC 8 @ b. DMM-1 indicates relay 1C71A-K3A contact open.

TC 8 @ c. DMM-2 indicates relay 1C71A-K3B contact open.

TC 10

12. Request Supervising Operator to depress and hold MSL A OTBD MSIV TEST switch 1B21H-S4A (P601-19C) until the following occurs, then release switch: Attachment 2.

@ a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is on.
TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3A contact closed.
TC 8 | $@ c. DMM-2 indicates relay 1C71A-K3B contact closed.
TC 10 | d. DELETED

13. After MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is off, verify the following: Attachment 2.

@ a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is off.
TC | @ b. DMM-1 indicates relay 1C71A-K3A contact open.
TC 8 | @ c. DMM-2 indicates relay 1C71A-K3B contact open.
TC 10 | d. DELETED

TC 8 | @ 14. If in Mode 1 or 2 request Supervising Operator to place MSL A INBD MSIV 1B21-F022A switch (P601-18C) to AUTO. Attachment 2.

TC 8 | @ 15. If in Mode 1 or 2 request Supervising Operator to place MSL A OTBD MSIV 1B21-F028A switch (P601-19C) to AUTO. Attachment 2.

@ 16. If in Mode 3,4, or 5, request Supervising Operator to place MSL A INBD MSIV 1B21-F022A switch (P601-18C) to CLOSE. Attachment 2.

@ 17. If in Mode 3,4, or 5, request Supervising Operator to place MSL A OTBD MSIV 1B21-F028A switch (P601-19C) to CLOSE. Attachment 2.

TC 8 | 18. Connect Digital Multimeter (DMM-1) to terminals B and C of relay 1C71A-K3C (P693) (set to ohms).

19. Connect Digital Multimeter (DMM-2) to terminals B and C of relay 1C71A-K3H (P694) (set to ohms).

@ 20. Request Supervising Operator to place MSL C INBD MSIV 1B21-F022C switch (P601-18C) to TEST. Attachment 2.

@ 21. Request Supervising Operator to place MSL C OTBD MSIV 1B21-F028C switch (P601-19C) to TEST. Attachment 2.

22. Request Supervising Operator to depress and hold MSL C INBD MSIV TEST switch 1B21H-S3C (P601-18C) until the following occurs, then release switch: Attachment 2.

@ a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is on.
TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3C contact closed.
TC 8 | $@ c. DMM-2 indicates relay 1C71A-K3H contact closed.
TC 10 | d. DELETED

23. After MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is off, verify the following: Attachment 2.

@ a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is off.
TC 8 | @ b. DMM-1 indicates relay 1C71A-K3C contact open.
TC 8 | @ c. DMM-2 indicates relay 1C71A-K3H contact open.
TC 10 | d. DELETED

24. Request Supervising Operator to depress and hold MSL C OTBD MSIV TEST switch 1B21H-S4C (P601-19C) until the following occurs, then release switch: Attachment 2.

@ a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is on.
TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3C contact closed.
TC 8 | $@ c. DMM-2 indicates relay 1C71A-K3H contact closed.
TC 10 | d. DELETED

25. After MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is off, verify the following: Attachment 2.

@ a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is off.
TC 8 | @ b. DMM-1 indicates relay 1C71A-K3C contact open.
TC 8 | @ c. DMM-2 indicates relay 1C71A-K3H contact open.
TC 10 | @ d. DELETED

TC 8 | @ 26. If in Mode 1 or 2 request Supervising Operator to place MSL C INBD MSIV 1B21-F022C switch (P601-18C) to AUTO. Attachment 2.

TC 8 | @ 27. If in Mode 1, 2, request Supervising Operator to place MSL C OTBD MSIV 1B21-F028C switch (P601-19C) to AUTO. Attachment 2.

@ 28. If in Mode 3,4, or 5, request Supervising Operator to place MSL C INBD MSIV 1B21-F022C switch (P601-18C) to CLOSE. Attachment 2.

@ 29. If in Mode 3,4, or 5, request Supervising Operator to place MSL C OTBD MSIV 1B21-F028C switch (P601-19C) to CLOSE. Attachment 2.

TC 10 | 30. DELETED

31. DELETED.

TC 8 | 32. Connect Digital Multimeter (DMM-1) to terminals B and C of relay 1C71A-K3G (P693) (set to ohms).

33. Connect Digital Multimeter (DMM-2) to terminals B and C of relay 1C71A-K3F (P692) (set to ohms).

@ 34. Request Supervising Operator to place MSL B INBD MSIV 1B21-F022B switch (P601-18C) to TEST. Attachment 2.

@ 35. Request Supervising Operator to place MSL B OTBD MSIV 1B21-F028B switch (P601-19C) to TEST. Attachment 2.

TC 10 |

36. Request Supervising Operator to depress and hold MSL B INBD MSIV TEST switch 1B21H-S3B (P601-18C) until the following occurs, then release switch: Attachment 2.

@ a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is on.

TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3G Contact closed.

$@ c. DMM-2 indicates relay 1C71A-K3F Contact closed.

TC 10 | d. DELETED

37. After MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is off, verify the following: Attachment 2.

@ a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is off.

TC 8 @ b. DMM-1 indicates relay 1C71A-K3G contact open.

TC 8 @ c. DMM-2 indicates relay 1C71A-K3F contact open.

TC 10 d. DELETED

38. Request Supervising Operator to depress and hold MSL B OTBD MSIV TEST switch 1B21H-S4B (P601-19C) until the following occurs, then release switch: Attachment 2.

@ a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is on.

TC 8 $@ b. DMM-1 indicates relay 1C71A-K3G contact closed.

TC 8 $@ c. DMM-2 indicates relay 1C71A-K3F contact closed.

TC 10 d. DELETED

39. After MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is off, verify the following: Attachment 2.

@ a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is off.

TC 8 @ b. DMM-1 indicates relay 1C71A-K3G contact open.

TC 8 @ c. DMM-2 indicates relay 1C71A-K3F contact open.

TC 10 d. DELETED.

R 8 @ 40. If in Mode 1 or 2 request Supervising Operator to place MSL B INBD MSIV 1B21-F022B switch (P601-18C) to AUTO. Attachment 2.

@ 41. If in Mode 1 or 2 request Supervising Operator to place MSL B OTBD MSIV 1B21-F028B switch (P601-19C) to AUTO. Attachment 2.

@ 42. If in Mode 3,4, or 5, request Supervising Operator to place MSL B INBD MSIV 1B21-F022B switch (P601-18C) to CLOSE. Attachment 2.

@ 43. If in Mode 3,4, or 5, request Supervising Operator to place MSL B OTBD MSIV 1B21-F028B switch (P601-19C) to CLOSE. Attachment 2.

TC 8 | 44. Connect Digital Multimeter (DMM-1) to terminals B and C of relay 1C71A-K3E (P691) (set to ohms).

45. Connect Digital Multimeter (DMM-2) to terminals B and C of relay 1C71A-K3D (P694) (set to ohms).

@ 46. Request Supervising Operator to place MSL D INBD MSIV 1B21-F022D switch (P601-18C) to TEST. Attachment 2.

@ 47. Request Supervising Operator to place MSL D OTBD MSIV 1B21-F028D switch (P601-19C) to TEST. Attachment 2.

48. Request Supervising Operator to depress and hold MSL D INBD MSIV TEST switch 1B21H-S3D (P601-18C) until the following occurs, then release switch: Attachment 2.

@ a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is on.

TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3E contact closed.

$@ c. DMM-2 indicates relay 1C71A-K3D Contact closed.

TC 10 | d. DELETED

49. After MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is off, verify the following: Attachment 2.

@ a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is off.

TC 8 | @ b. DMM-1 indicates relay 1C71A-K3E contact open.

@ c. DMM-2 indicates relay 1C71A-K3D Contact open.

TC 10 | d. DELETED

50. Request Supervising Operator to depress and hold MSL D OTBD MSIV TEST switch 1B21H-S4D (P601-19C) until the following occurs, then release switch: Attachment 2.

@ a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is on.

TC 8 | $@ b. DMM-1 indicates relay 1C71A-K3E Contact closed.

$@ c. DMM-2 indicates relay 1C71A-K3D Contact closed.

TC 10 | d. DELETED

51. After MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is off, verify the following: Attachment 2.

@ a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is off.

TC 8 @ b. DMM-1 indicates relay 1C71A-K3E contact open.

TC 8 @ c. DMM-2 indicates relay 1C71A-K3D contact open.

TC 10 A. DELETED

TC 8 @ 52. If in Mode 1 or 2 request Supervising Operator to place MSL D INBD MSIV 1B21-F022D switch (P601-18C) to AUTO. Attachment 2.

@ 53. If in Mode 1 or 2 request Supervising Operator to place MSL D OTBD MSIV 1B21-F028D switch (P601-19C) to AUTO. Attachment 2.

@ 54. If in Mode 3,4, or 5, request Supervising Operator to place MSL D INBD MSIV 1B21-F022D switch (P601-18C) to CLOSE. Attachment 2.

@ 55. If in Mode 3,4, or 5, request Supervising Operator to place MSL D OTBD MSIV 1B21-F028D switch (P601-19C) to CLOSE. Attachment 2.

TC 10 56. DELETED

57.

58. DISCONNECT DMM-1 and DMM-2.

TC 8 @ 60. Inform Unit Supervisor that the stroking of the MSIV's is completed. Record time and date. Obtain U.S. signature. Attachment 2.

5.2 Plant/System Restoration

@ 1. Complete the System Restoration Checklist (Attachment 3) using the methods of Independent Verification. Upon completion, inform Supervising Operator of system restoration and return the keys for P691, P692, P693 and P694.

5.3 Acceptance Criteria

1. If any Technical Specification required items as indicated by dollar signs ($) on the Data Sheet have not been performed satisfactorily, notify the Unit Supervisor.

2. If any other items checked in this surveillance did not perform satisfactorily, notify the I&C Supervisor.

3. Satisfactory completion of the surveillance will be based on Technical Specification items (marked with a dollar sign) only.

@ 4. Check the appropriate block on the Data Package Cover Sheet as to whether the test results were acceptable or unacceptable and obtain Unit Supervisor's signature.

5.4 Records

The following documents are generated by this instruction:

1. Quality Assurance Records:

   Data Package Cover Sheet
   Prerequisites Sign-off Sheet
   Data Sheets
   System Restoration Checklist

2. Non Quality Records:
   None

Records identification and disposition are accomplished in accordance with Records Retention/Disposition Schedule (RR/DS) and handled in accordance with PAP-1701, Plant Records Management.

6.0 REFERENCES

6.1 CEI Perry Technical Specifications

6.2 CEI Prints

B-208-013
B-208-040
B-208-222

7.0 ATTACHMENTS

7.1 Attachment 1-Prerequisites Sign-off Sheet

7.2 Attachment 2-Data Sheets

7.3 Attachment 3-System Restoration Checklist

7.4 Attachment 4-Relay Base Diagram

TEMP CHANGE # 10 PAGE 11 OF 17

Attachment 1
Sheet 1 of 1

TEMP CHANGE # 8 PAGE 13 OF 21

OM7A: SVI-C71-T0039
Page: 14
Rev.: 1

Main Steam Line Isolation Valve Closure Channel Functional Prerequisite Sign-off Sheet

			Initials
TC 8	4.0.2.	This instruction may be performed in Operational Condition 1,2,3,4 or 5.	___
	4.0.3.	No testing or maintenance is being performed which would initiate a half scram RPS signal.	___
	4.0.4.	The following annunciators are reset:	
		a. 1/2 SCRAM A/C (P680-5A-A9)	___
		b. 1/2 SCRAM B/D (P680-5A-B9)	___
TC 10	4.0.5.	DELETED	
	4.0.6.	If unit is in MODE 3, 4, or 5:	
		a. C95 computer point, RPS CHANNEL ISOLATION A STATUS, B21EC013 indicates NORM.	___
		b. C95 computer point, RPS CHANNEL ISOLATION B STATUS, B21EC014 indicates NORM.	___
		c. C95 computer point, RPS CHANNEL ISOLATION C STATUS, B21EC015 indicates NORM.	___
		d. C95 computer point, RPS CHANNEL ISOLATION D STATUS, B21EC016 indicates NORM.	___
TC 8	4.0.7	An RWP in effect. ☐ YES ☐ NO	___
	4.0.8.	Calibration Due Date is current on all test equipment.	___
TC 8	— SEE ATTACHED PAGE 14a —		

Performed by: _____ / _____ / _____

Signature / Initials / Date

TC
8

TEMP CHANGE 8
PAGE 14 OF 21

Attachment 1 (Cont.)
Sheet 1a of 1

		Initials
4.0.10.a.	Switch 1C71A-S6A MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.	____
4.0.10.b.	Switch 1C71A-S6B MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.	____
4.0.10.c.	Switch 1C71A-S6C MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.	____
4.0.10.d.	Switch 1C71A-S6D MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.	____

TEMP CHANGE # 10 PAGE 12 OF 17

TEMP CHANGE # 9 PAGE 2 OF 2

TEMP CHANGE # 8 PAGE 15 OF 21

Main Steam Line Isolation Valve Closure Channel Functional Data Sheet

SECTION 5.1 Initials

TC 8 | TC 9

7. Unit Supervisor will be stroked. informed that the MSIV's ____/____ Time Date ____

U.S. Signature

8. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to TEST. ____

9. MSL A OTBD MSIV 1B21-F028A switch (P601-19C) placed to TEST. ____

10.a. MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is on. ____

TC 8 | $ 10.b. DMM-1 indicates relay 1C71A-K3A contact closed. ____

$ 10.c. DMM-2 indicates relay 1C71A-K3B contact closed. ____

TC 10 | 10.d DELETED

11.a. MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is off. ____

TC 8 | 11.b. DMM-1 indicates relay 1C71A-K3A contact open. ____

11.c. DMM-2 indicates relay 1C71A-K3B contact open. ____

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 13 OF 17

TEMP CHANGE # 8 PAGE 16 OF 21

SECTION 3.1

Initials

TC 10 | 11.d DELETED

12.a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is on. ____

TC 8 | $ 12.b. DMM-1 indicates relay 1C71A-K3A contact closed ____

TC 8 | $ 12.c. DMM-2 indicates relay 1C71A-K3B contact closed. ____

TC 10 | 12.D DELETED

13.a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is off. ____

TC 8 | 13.b. DMM-1 indicates relay 1C71A-K3A contact open. ____

13.c. DMM-2 indicates relay 1C71A-K3B contact open. ____

TC 10 | 13.d DELETED

TC 8 | 14. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to AUTO. (Mode 1 or 2) ____

15. MSL A OTBD MSIV 1B21-F028A switch placed (P601-19C) to AUTO. (Mode 1 or 2) ____

16. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5) ____

17. MSL A OTBD MSIV 1B21-F028A switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5) ____

20. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to TEST. ____

21. MSL C OTBD MSIV 1B21-F028C switch (P601-19C) placed to TEST. ____

22.a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is on. ____

TC 8 | $ 22.b. DMM-1 indicates relay 1C71A-K3C Contact closed. ____

$ 22.c. DMM-2 indicates relay 1C71A-K3H Contact closed. ____

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 14 OF 17

TEMP CHANGE # 8 PAGE 17 OF 21

SECTION 5 1 Initials

TC 10 | 22.a DELETED

23.a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is off. ___

TC 8 | 23.b. DMM-1 indicates relay 1C71A-K3C contact open. ___

23.c. DMM-2 indicates relay 1C71A-K3H contact open. ___

TC 10 | 23.d DELETED

24.a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is on. ___

TC 8 | $ 24.b. DMM-1 indicates relay 1C71A-K3C contact closed. ___

$ 24.c. DMM-2 indicates relay 1C71A-K3H contact closed. ___

TC 10 | 24.d DELETED

25.a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is off. ___

TC 8 | 25.b. DMM-1 indicates relay 1C71A-K3C contact open. ___

25.c. DMM-2 indicates relay 1C71A-K3H contact open. ___

TC 10 | 25.d DELETED

TC 8 | 26. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to AUTO. (Mode 1 or 2) ___

27. MSL C OTBD MSIV 1B21-F028C switch placed (P601-19C) to AUTO. (Mode 1 or 2) ___

28. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5) ___

29. MSL C OTBD MSIV 1B21-F028C switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5) ___

TC 10 | 30. DELETED

31.

$ Denotes Technical Specification requirement.

SECTION 5.1 — Initials

34. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to TEST. ____

35. MSL B OTBD MSIV 1B21-F028B switch (P601-19C) placed to TEST. ____

36.a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is on. ____

TC 8 | $ 36.b. DMM-1 indicates relay 1C71A-K3G Contact closed. ____

TC 8 | $ 36.c. DMM-2 indicates relay 1C71A-K3F Contact closed. ____

TC 10 | 36.d DELETED

37.a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is off. ____

TC 8 | 37.b. DMM-1 indicates relay 1C71A-K3G Contact open. ____

37.c. DMM-2 indicates relay 1C71A-K3F Contact open. ____

TC 10 | 37.d DELETED

38.a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is on. ____

TC 8 | $ 38.b. DMM-1 indicates relay 1C71A-K3G Contact closed. ____

$ 38.c. DMM-2 indicates relay 1C71A-K3F Contact closed. ____

TC 10 | 38.d DELETED

39.a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is off. ____

TC 8 | 39.b. DMM-1 indicates relay 1C71A-K3G Contact open. ____

39.c. DMM-2 indicates relay 1C71A-K3F Contact open. ____

TC 10 | 39.d DELETED

TC 8 | 40. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to AUTO. (Mode 1 or 2) ____

$ Denotes Technical Specification requirement.

SECTION 5.1 — Initials

TC 8 | 41. MSL B OTBD MSIV 1B21-F028B switch placed (P601-19C) to AUTO. (Mode 1 or 2) ____

42. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5) ____

43. MSL B OTBD MSIV 1B21-F028B switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5) ____

46. MSL D INBD MSIV 1B21-F022D switch (P601-18C) placed to TEST. ____

47. MSL D OTBD MSIV 1B21-F028D switch (P601-19C) placed to TEST. ____

48.a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is on. ____

TC 8 | $ 48.b. DMM-1 indicates relay 1C71A-K3E contact closed. ____

$ 48.c. DMM-2 indicates relay 1C71A-K3D contact closed. ____

TC 10 | 48.d DELETED

49.a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is off. ____

TC 8 | 49.b. DMM-1 indicates relay 1C71A-K3E contact open. ____

49.c. DMM-2 indicates relay 1C71A-K3D contact open. ____

TC 10 | 49.d DELETED

50.a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is on. ____

TC 8 | $ 50.b. DMM-1 indicates relay 1C71A-K3E contact closed. ____

$ 50.c. DMM-2 indicates relay 1C71A-K3D contact closed. ____

TC 10 | 50.d DELETED

51.a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is off. ____

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 17 OF 17

TEMP CHANGE # 8 PAGE 20 OF 21

SECTION 5.1

Initials

TC 8 | 51.b. DMM-1 indicates relay 1C71A-K32 Contact open. ___

51.c. DMM-2 indicates relay 1C71A-K32 Contact open ___

TC 10 | 51.d DELETED

TC 8 | 52. MSL D INBD MSIV 1B21-F022D switch (P601-18C) placed to AUTO. (Mode 1 or 2) ___

53. MSL D OTBD MSIV 1B21-F028D switch placed (P601-19C) to AUTO. (Mode 1 or 2) ___

54. MSL D INBD MSIV 1B21-F022D switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5) ___

55. MSL D OTBD MSIV 1B21-F028D switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5) ___

TC 10 | 56. DELETED

57.

TC 8 | 60. Unit Supervisor informed that stroking the MSIV's completed. ___/___ ___
Time Date

U.S. Signature

SECTION 4.0
TEST INSTRUMENTS:

	MPL NUMBER	CAL. DATE	CAL DUE DATE	INI
DIGITAL MULTIMETER	_____	_____	_____	____
DIGITAL MULTIMETER	_____	_____	_____	____

COMMENTS: _____

Performed by: _____ _____/_____/___

_____ _____/_____/___

Independent Verifier _____/_____/___
Initials Date

$ Denotes Technical Specification requirement.

TEMP CHANGE # 8
PAGE 27 OF 27

SYSTEM RESTORATION CHECKLIST

Title: Main Steam Line Isolation Valve Closure Channel Functional

Verified By: _____ _____
Signature/Initials Date

LOCATION	COMPONENT MPL OR NAME	REQUIRED POSITION	INITIALS FIRST VERIF	INITIALS SECOND VERIF	REMARKS
Control Rm P601-18C	MSL A INBD MSIV 1B21-F022A switch	*			
Control Rm P601-18C	MSL B INBD MSIV 1B21-F022B switch	*			
Control Rm P601-18C	MSL C INBD MSIV 1B21-F022C switch	*			
Control Rm P601-18C	MSL D INBD MSIV 1B21-F022D switch	*			
Control Rm P601-19C	MSL A OTBD MSIV 1B21-F028A switch	*			
Control Rm P601-19C	MSL B OTBD MSIV 1B21-F028B switch	*			
Control Rm P601-19C	MSL C OTBD MSIV 1B21-F028C switch	*			
Control Rm P601-19C	MSL B OTBD MSIV 1B21-F029B switch	*			
Control Rm P691	DMM	removed			
Control Rm P692	DMM	removed			
Control Rm P693	DMM	removed			
Control Rm P694	DMM	removed			

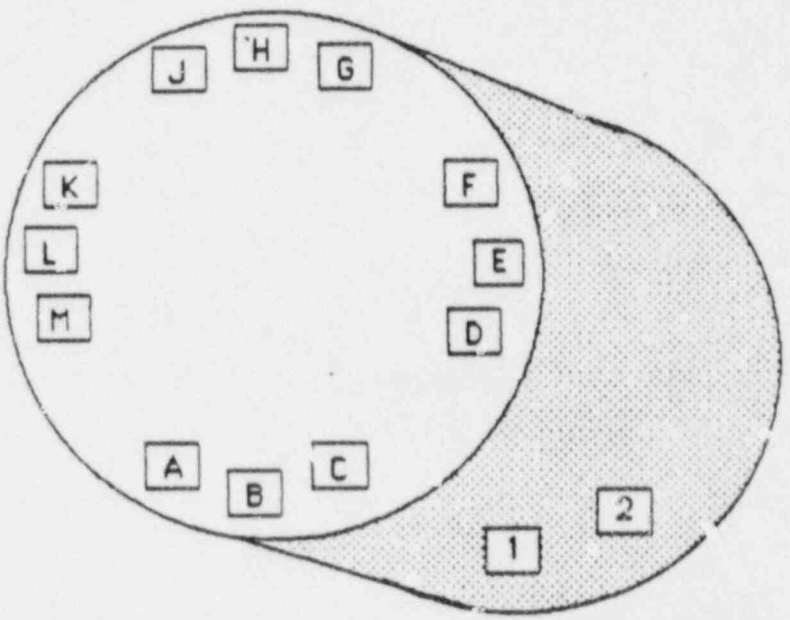
TC 8

* As directed by Supervising Operator.

RELAY DRAWING

POTTER & BRUMFIELD

MDR RELAY



DATA PACKAGE COVER SHEET

PMP NO. 6687 REV 10/86 PMP-1105-1

INSTRUCTION NO. SVI-C71-T0039

TEST PERFORMANCE

AUTHORIZATION TO START PREREQUISITES: [signature] OPERATIONS UNIT SUPERVISOR — DATE AND TIME: 11-2-87 1933

AUTHORIZATION TO START TEST: [signature] SUPERVISING OPERATOR — DATE AND TIME: 11/2/87 1942

INSTRUCTION COMPLETION	[X] FULL	[ ] PARTIAL*			*See comments for extent of testing
TECH. SPEC. ACCEPTANCE CRITERIA	[X] ACCEPTABLE	[ ] UNACCEPTABLE	[ ] NA		When both As Left and As Found data are taken, acceptance will be based on As Left data only.
OTHER DATA CRITERIA	[X] ACCEPTABLE	[ ] UNACCEPTABLE	[ ] NA		When both As Left and As Found data are taken, acceptance will be based on As Left data only.
TASK COMPLETION	[X] CREDIT**	[ ] NO CREDIT			**Task fully completed or all failed/not completed items tracked per LCO Tracking, Work Orders, etc.

TCN'S IN EFFECT: 010, 009 & 008

COMMENTS: N.E

LEAD PERFORMER'S SIGNATURE: [signature] — DATE AND TIME: 11-2-87 8150

OPERATIONS UNIT SUPERVISOR: MAN [signature] — DATE AND TIME: 11-2-87 2210

SHIFT SUPERVISOR: -N/A- (Required If Tech. Spec. Acceptance Criteria Is Not Met, Otherwise Mark N/A) — DATE AND TIME

TEST RESULTS REVIEW

COMMENTS

SYSTEM ENGINEER/RESPONSIBLE SECTION REVIEWER — DATE

5a1

TEMP CHANGE # 10 PAGE 11 OF 17

Attachment 1
Sheet 1 of 1

TEMP CHANGE # 8 PAGE 13 OF 21

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Main Steam Line Isolation Valve Closure Channel Functional Prerequisite Sign-off Sheet

			Initials
TC 8	4.0.2.	This instruction may be performed in Operational Condition 1,2,3,4 or 5.	
	4.0.3.	No testing or maintenance is being performed which would initiate a half scram RPS signal.	
	4.0.4.	The following annunciators are reset:	
		a. 1/2 SCRAM A/C (P680-5A-A9)	
		b. 1/2 SCRAM B/D (P680-5A-B9)	
TC 10	4.0.5.	DELETED	
	4.0.6.	If unit is in MODE 3, 4, or 5:	
		a. C95 computer point, RPS CHANNEL ISOLATION A STATUS, B21EC013 indicates NORM.	11-2-87
		b. C95 computer point, RPS CHANNEL ISOLATION B STATUS, B21EC014 indicates NORM.	
		c. C95 computer point, RPS CHANNEL ISOLATION C STATUS, B21EC015 indicates NORM.	
		d. C95 computer point, RPS CHANNEL ISOLATION D STATUS, B21EC016 indicates NORM.	
TC 8	4.0.7	An RWP in effect: ☐ YES ☒ NO	
	4.0.8.	Calibration Due Date is current on all test equipment.	11-2-87
TC 8	— SEE ATTACHED PAGE 14a —		

Performed by: _____ 11-2-87

Signature Initials Date

TC 1
8

TEMP CHANGE 8
PAGE 14 OF 21

Attachment 1 (Cont.)
Sheet 1a of 1

Initials

4.0.10.a. Switch 1C71A-S6A MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.

4.0.10.b. Switch 1C71A-S6B MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.

4.0.10.c. Switch 1C71A-S6C MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.

4.0.10.d. Switch 1C71A-S6D MAIN STEAM LINE ISOL VALVE TEST is in the NORM position.

TEMP CHANGE # 10 PAGE 12 OF 17

TEMP CHANGE # 9 PAGE 2 OF 2

TEMP CHANGE # 8 PAGE 15 OF 21

Main Steam Line Isolation Valve Closure Channel Functional Data Sheet

SECTION 5.1 — Initials

TC 8 | TC 9

7. Unit Supervisor informed that the MSIV's will be stroked. 2050 / 11-2-87 (Time / Date)

U.S. Signature

8. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to TEST.

9. MSL A OTBD MSIV 1B21-F028A switch (P601-19C) placed to TEST.

10.a. MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is on.

TC 8 | $ 10.b. DMM-1 indicates relay 1C71A-K3A contact closed.

$ 10.c. DMM-2 indicates relay 1C71A-K3B contact closed.

TC 10 | 10.d DELETED

11.a. MSL A INBD MSIV 1B21-F022A green indicating light (P601-18C) is off.

TC 8 | 11.b. DMM-1 indicates relay 1C71A-K3A contact open.

11.c. DMM-2 indicates relay 1C71A-K3B contact open.

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 13 OF 17

TEMP CHANGE # 8 PAGE 16 OF 21

SECTION 5.1 Initials

TC 10 | 11.d DELETED

12.a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is on.

TC 8 | $ 12.b. DMM-1 indicates relay 1C71A-K3A contact closed

$ 12.c. DMM-2 indicates relay 1C71A-K3B contact closed.

TC 10 | 12.D DELETED

13.a. MSL A OTBD MSIV 1B21-F028A green indicating light (P601-19C) is off.

TC 8 | 13.b. DMM-1 indicates relay 1C71A-K3A contact open.

13.c. DMM-2 indicates relay 1C71A-K3B contact open

TC 10 | 13.d DELETED

TC 8 | 14. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to AUTO. (Mode 1 or 2)

15. MSL A OTBD MSIV 1B21-F028A switch placed (P601-19C) to AUTO. (Mode 1 or 2)

16. MSL A INBD MSIV 1B21-F022A switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5)

17. MSL A OTBD MSIV 1B21-F028A switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5)

20. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to TEST.

21. MSL C OTBD MSIV 1B21-F028C switch (P601-19C) placed to TEST.

22.a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is on.

TC 8 | $ 22.b. DMM-1 indicates relay 1C71A-K3C Contact closed.

$ 22.c. DMM-2 indicates relay 1C71A-K3E Contact closed.

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 14 OF 17

TEMP CHANGE # 8 PAGE 11 OF 21

SECTION 5.1 — Initials

TC 10 — 22.a DELETED

23.a. MSL C INBD MSIV 1B21-F022C green indicating light (P601-18C) is off.

TC 8 — 23.b. DMM-1 indicates relay 1C71A-K3C contact open.

23.c. DMM-2 indicates relay 1C71A-K3H contact open.

TC 10 — 23.d DELETED

24.a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is on.

TC 8 — $ 24.b. DMM-1 indicates relay 1C71A-K3C contact closed.

$ 24.c. DMM-2 indicates relay 1C71A-K3H contact closed.

TC 10 — 24.d DELETED

25.a. MSL C OTBD MSIV 1B21-F028C green indicating light (P601-19C) is off.

TC 8 — 25.b. DMM-1 indicates relay 1C71A-K3C contact open.

25.c. DMM-2 indicates relay 1C71A-K3H contact open.

TC 10 — 25.d DELETED

TC 8 — 26. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to AUTO. (Mode 1 or 2)

27. MSL C OTBD MSIV 1B21-F028C switch placed (P601-19C) to AUTO. (Mode 1 or 2)

28. MSL C INBD MSIV 1B21-F022C switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5)

29. MSL C OTBD MSIV 1B21-F028C switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5)

TC 10 — 30. DELETED

31.

$ Denotes Technical Specification requirement.

SECTION 5.1

Initials

34. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to TEST.

35. MSL B OTBD MSIV 1B21-F028B switch (P601-19C) placed to TEST.

36.a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is on.

TC 8 | $ 36.b. DMM-1 indicates relay 1C71A-K3G Contact closed.

$ 36.c. DMM-2 indicates relay 1C71A-K3F Contact closed.

TC 10 | 36.d DELETED

37.a. MSL B INBD MSIV 1B21-F022B green indicating light (P601-18C) is off.

TC 8 | 37.b. DMM-1 indicates relay 1C71A-K3G Contact open.

37.c. DMM-2 indicates relay 1C71A-K3F Contact open.

TC 10 | 37.d DELETED

38.a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is on.

TC 8 | $ 38.b. DMM-1 indicates relay 1C71A-K3G Contact closed.

$ 38.c. DMM-2 indicates relay 1C71A-K3F Contact closed.

TC 10 | 38.d DELETED

39.a. MSL B OTBD MSIV 1B21-F028B green indicating light (P601-19C) is off.

TC 8 | 39.b. DMM-1 indicates relay 1C71A-K3G Contact open.

39.c. DMM-2 indicates relay 1C71A-K3F Contact open.

TC 10 | 39.d DELETED

TC 8 | 40. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to AUTO. (Mode 1 or 2)

$ Denotes Technical Specification requirement.

SECTION 5.1

			Initials
TC 8		41. MSL B OTBD MSIV 1B21-F028B switch placed (P601-19C) to AUTO. (Mode 1 or 2)	
		42. MSL B INBD MSIV 1B21-F022B switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5)	
		43. MSL B OTBD MSIV 1B21-F028B switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5)	N/A
		46. MSL D INBD MSIV 1B21-F022D switch (P601-18C) placed to TEST.	
		47. MSL D OTBD MSIV 1B21-F028D switch (P601-19C) placed to TEST.	
		48.a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is on.	
TC 8	$	48.b. DMM-1 indicates relay 1C71A-K3E contact closed.	
	$	48.c. DMM-2 indicates relay 1C71A-K3D contact closed.	
TC 10		~~48.d~~ DELETED	
		49.a. MSL D INBD MSIV 1B21-F022D green indicating light (P601-18C) is off.	
TC 8		49.b. DMM-1 indicates relay 1C71A-K3E contact open.	
		49.c. DMM-2 indicates relay 1C71A-K3D contact open.	
TC 10		~~49.d~~ DELETED	
		50.a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is on.	
TC 8	$	50.b. DMM-1 indicates relay 1C71A-K3E contact closed.	
	$	50.c. DMM-2 indicates relay 1C71A-K3D contact closed.	
TC 10		~~50.d~~ DELETED	
		51.a. MSL D OTBD MSIV 1B21-F028D green indicating light (P601-19C) is off.	

$ Denotes Technical Specification requirement.

TEMP CHANGE # 10 PAGE 17 OF 17

Attachment 2 (Cont.)
Sheet 6 of 6

TEMP CHANGE # 8 PAGE 20 OF 21

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SECTION 5.1

		Initials
TC 8	51.b. DMM-1 indicates relay 1C71A-K3E Contact open.	
	51.c. DMM-2 indicates relay 1C71A-K3D Contact open	
TC 10	51.a Deleted	
TC 8	52. MSL D INBD MSIV 1B21-F022D switch (P601-18C placed to AUTO. (Mode 1 or 2)	
	53. MSL D OTBD MSIV 1B21-F028D switch placed (P601-19C) to AUTO. (Mode 1 or 2)	
	54. MSL D INBD MSIV 1B21-F022D switch (P601-18C) placed to CLOSE. (Mode 3,4, or 5)	N/A
	55. MSL D OTBD MSIV 1B21-F028D switch placed (P601-19C) to CLOSE. (Mode 3,4, or 5)	N/A
TC 10	56. Deleted	
	57.	
TC 8	60. Unit Supervisor informed that stroking the MSIV's completed. 2142 / 11-2-87 Time / Date	

U.S. Signature

SECTION 6.0
TEST INSTRUMENTS:

	MPL NUMBER	CAL. DATE	CAL DUE DATE	INT.
DIGITAL MULTIMETER	L20-N052F	N/A	N/A	
DIGITAL MULTIMETER	L-70 R348A	N/A.	N/A	

COMMENTS: None

Performed by: [signature] 11-2-87
None

Independent Verifier: None
Signature Initials Date

$ Denotes Technical Specification requirement.

Attachment 3
Sheet 1 of 1

TEMP CHANGE # 8
PAGE 21 OF 21

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Page: 21
Rev.: 1

SYSTEM RESTORATION CHECKLIST

Title: Main Steam Line Isolation Valve Closure Channel Functional

Verified By: DBC 11-2-87
11-2-87
Signature/Initials Date

LOCATION	COMPONENT MPL OR NAME	REQUIRED POSITION	INITIALS FIRST VERIF	INITIALS SECOND VERIF	REMARKS
Control Rm P601-18C	MSL A INBD MSIV 1B21-F022A switch	*	DBC		SW IN AUTO
Control Rm P601-18C	MSL B INBD MSIV 1B21-F022B switch	*	DBC		
Control Rm P601-18C	MSL C INBD MSIV 1B21-F022C switch	*	DBC		
Control Rm P601-18C	MSL D INBD MSIV 1B21-F022D switch	*	DBC		
Control Rm P601-19C	MSL A OTBD MSIV 1B21-F028A switch	*	DBC		
Control Rm P601-19C	MSL B OTBD MSIV 1B21-F028B switch	*	DBC		
Control Rm P601-19C	MSL C OTBD MSIV 1B21-F028C switch	*	DBC		
Control Rm P601-19C	MSL B OTBD MSIV 1B21-F028B switch	*	DBC		
Control Rm P691	DMM	removed	DBC		NONE
Control Rm P692	DMM	removed	DBC		
Control Rm P693	DMM	removed	DBC		
Control Rm P694	DMM	removed	DBC		

TC 8 | * As directed by Supervising Operator.

① Sequence of Events

- Copy of Unit Logs for 10/29/87 and 11/3/87

- Hand written sequence - (For Planning)

D-64

MSIV-Chronology of Events

October 29, 1987

1825 - Stroked INBD MSIV 1B21-F0022D for STI-B21-025A Section 8.3, per ERIS valve did not close for 18 seconds. Level 1 Test Exception Report written (STA Log)

1842 - Re-opened 1B21-F0022D (Plant Log)

1900 - Declared 1B21-F0022D Inop, closing time was 22.8 seconds from STI data (Plant Log) (LCO written, 87-2031)

2103 - Re-stroked 1B21-F0022D - time to close 3.2 seconds (Plant Log)

2106 - Stroked 1B21-F0022D again - time to close 2.9 seconds (Plant Log

2144 - Stroked 1B21-F0028D - time to close 77 seconds (Plant Log)

2150 - 2211 stroked all MSIVs (Unit Log)

2221 - Decision (had been made by Plant Management to stroke all MSIV's to check for common mode failure. Found 1B21-F0028B had an initial slow stroke time of 11.9 seconds, second stroke was 3.9 seconds (Plant Log)

2230 - 1B21-F0022D was re-stroked, valve closed in less than 3 seconds. Valve was stroked again and stroke time was less than 3 seconds (STA Log) 1B21-F0028D and F0028B also experienced long closing times (77 seconds and 12 seconds). When restroked valves had times of approx. 3 seconds each. In all cases the solenoid lights on 1H13-P622 and -P623 de-energized (STA-Log)
Isolated "D" Main Steam Line (STA Log)

2236-2250 - Isolated "D" MSL (Unit Log)

22-1 - Isolated "D" MSL (Plant Log)

2310 - All MSIVs were verified to stroke within 3-5 seconds. Could not repeat the initial condition causing MSIV to slow close. Stroking the MSIV has freed up the Solenoid/Pneumatic valves, which control MSIV stroking, of any foreign matter or moisture. In 5 to 7 days MSIV Isolation Scram test is scheduled, if this is delayed we'll fast stroke the MSIV's again to see if event is repeatable. Declared 1B21-F0022D, F0028D and F0028B operable. (Plant Log)

2340 - Restored "D" MSL (Plant Log)

October 30, 1987

0010 - Made 4hr. report on slow closing MSIV's (Plant Log)

0300 - Test Exception Report (TER) 451-1 for MSIV closure was approved. All MSIV's restored. (STA Log)

October 30, 1987

0330 - TER 451-1 (MSIV Fast Closure) was resolved and closed. No restrictions to going back to 10-7 (Plant Log)

0355 - Increasing power (Plant Log)

November 2, 1987

1942 - Commenced SVI C71-T0039, MSL Isol Valve Closure Channel functional (Unit Log) (10% stroke - partial closure - RPS)

2142 - Completed SVI C71-T0039 - Sat

November 3, 1987

1145 - Decreased power to 80% to stroke MSIVs (Plant Log)

1154-1222 - stroked MSIVs (Unit Log)

1157 - 1B21-F022D took 18 seconds to close (Plant Log)

1158 - Unit Supervisor declared F022D Inop (Unit Log)

1159 - 1B21-F022D restroked in 3.0 seconds (Plant Log)

1200 - Unit Supervisor declared F022D operable (Unit Log)

1212 - 1B21-F028D did not close in the 2 minute 49 seconds that the control switch was in "close". Took switch back to "Auto", then to "close", valve shut in 3.4 seconds (Plant Log)

1212 - Unit Supervisor declared F028D Inop (Unit Log)

1230 - Declared MSL "D" Inop based on repeated failure of 1B21-F022D and F028D to stroke in required time. (see 10-29-87 20-24 shift entry) (Plant Log) (ALCO written, 87-2128)

1330 - Informed System Operation Center of intended plant shutdown (Unit Log)

1337 - Commenced PWR decrease (Unit Log)
Commenced a normal Rx shutdow (Plant Log)

1353 - Closed 1B21-F022D 3.4 seconds (Unit Log)

1354 - Closed 1B21-F028D 3.3 seconds (Unit Log)

1355 - Shut 1B21-F022D and F028D, out of T.S. 3.4.7 and 3.6.4. Made 4hr. report (Plant Log)

Attachments: Unit Log
Plant Log
STA Log (2)
CR 87-503
CR 87-513

1221- WETFED SGC (HEATING) OF APPROX 100MWE LOSS DECREASE SUBSEQ INCREASE DUE TO STI CES-022

1243- DECREASED LOAD SET TO OBTN 2.5 BYPASS VALVES INITIATION ECONOMIC POWER 2453 MWTH.

1247- COMPLETED SUI-CS1-T0028F-SAT

1250- D SWITCHES AUTO SHIFT OF CES PRESSURE CONTROL

1400- CANCELLED SUI 1831-T0087D-SAT

1400- RELEASED CES SYSTEM TO DUAL CONTROL OPERATIONS. SWITCH CES TO B CHANNEL. DISABLED AUTO SWITCH OF CES SYSTEM

1313- LOAD FINAL RW PUMPDOWNS DISCHG OF CLOSE B TO CLOSE 33C

1426- RESTORED CES SYSTEM TO DUAL CHANNEL OPERATION. NOTIFIED SCC CHANGE IN POWER (LOAD INCREASE TO 720-800 MWE

1515- RESTORED TURBINE CONTROL SET TO 125 MWE > TURBINE CONTROL VALVES CLOSED - PEAK RX POWER 2750 MWTH - NO CONTROL ROD

1530- COMMENCED PUMP [illegible] FOR SURVEILLANCE

1545- COMMENCED [illegible] WATER SAMPLE FOR [illegible]

1548- DOUG SHELTON (QC) EVALUATED MAIN STEAM NO1 VI FOR INSPECTION

1550- COMMENCED SUI-1822-T1C-1 HPCS LOW FLOW FUNCT (FCV-E22-F012)

1550- SET UP TO PERFORM STI FOR MODE CES COMMENCED CES

1600- DOUG SHELTON EVALUATED MAIN STEAM VALVE

1602- COMPLETED SVI-B21-T0189K-SAT

1643- COMPLETED SUI-E22-T202-SAT

1657- SWITCHES B33 TO FLUX INVERT

1702- COMPLETED RTI N32 P001 - UNSAT FOR ECOP DATA

1704- CORE FLOW > 45%

1705- COMMENCED SUI G50-T0266 - LRW RELEASE PERMIT FOR FIST 3

1716- SWITCH B33 TO FLUX AUTO

1721- RW WINDING BACK FROM FOST A TO CST

1725- SWITCH B33 TO FLUX MANUAL

1733- COMMENCED SVI-1N16-T2001 - DW UNIT RECIRC LOOP VLV OPERS

1748- SHIFTING B33 TO FLUX AUTO

1813- RECEIVED ANSWER #4 IS SATISFACTORY

1828- COMMENCED SUI B21 T0127R HPCS/RCIC L2/L8 RPV LEVEL FUNCTIONAL (SVI-

1837- START B21-F022D - TIME CLOSURE 08.2 STI B21 0254 SEC - 8.3

1842- CHANGE B21 F022D - VALVE DIDN'T RESPOND TO CLOSE WITHIN 5 TS

CONTINUED - EVALUATING DATA

10/23/87

1932 Completed SU1 - B21 - T0187R - SIT

A00 - LATE ENTRY - B21 - FC22D DECLARED INOP, LIMITED TO 75% FOR 55

1940 - SHIFTED BASE TO FLUX FLATTENING

1955 - CORE POWER REDUCED TO 53% , DECREASE FEED IN TO 100% FOR LOAD

1957 Resumed the Shift

2055 Started CRD Pump A Secured CRD Pump E

2103 CLOSED B21-F022D FOR STEALE TEST FOR SU1-B21 3.24s Stopped

2106 OPENED B21-F022D

2106 CLOSED B21-F022D FOR STEALE TEST FOR SU1-B21 3.44s Stopped

2108 OPENED B21-F022D

2107 Commenced SU1-N17-T2002

2114 Closed B21-F028C In 17s Started L70-N302C

2145 Opened B21-F028D

2152 Closed B21-F028D Secured L70-N302C

2153 Opened B21-F028D

2211 Closed B21-F022B 3.07s L70-N302P

2211 Opened B21-F022B

2213 Closed B21-F022A 3.37s L70-N302P

2213 Opened B21-F022A

2215 Closed B21-F022C 3.45s L70-N302P

2215 Opened B21-F022C

2216 Closed B21-F028B L70-N302P

2218 Opened B21-F028B

2218 Closed B21-F028B 3.96s L70-N302P

2218 Opened B21-F028B

2219 Closed B21-F028A 3.48s L70-N302P

2219 Opened B21-F028A

2220 Closed B21-F028C 4.12s L70-N302P

2221 Opened B21-F028C

2236 Closed B21-F028D and B21-F067D

2240 Determined 1E32-F001N is closed position and 1B21-F067D closed & deenergized

2250 Deenergized B21-F028D Solenoids in alternate position

2310 Relanded Lead to B21-F028D Energized B21-F022D B21-F028D and B21-F028B Tagged

2327 Power Outage 22:59 to 4:8

2333 Inspected SU1-N16-T2004 & SU1-N17-T2002

PERRY NUCLEAR POWER PLANT

COPY

UNIT LOG
Unit 1 – Vol 22

No. 78

11-2-87

1904 Commenced SVI-R10-T5217

1914 Completed SVI R10-T5217 partial - SAT.

→ 1942 Commenced SVI-C71-T0039, main Inst. Air Header Check Valve Functional

2015 Completed Rev. 1 WR A to Instr.

2029 Bypassed APRM C 4. allowing bypassing LPRM 24-25-4B.

2050 Unbypassed APRM 'C'.

8050 - Formed B1 Bus MW

2121 Completed adding O_2 to the generator.

2122 CVCW Chiller 'A' tripped Investigating

2127 Unable to determine why CV chiller A tripped due to P90 A CW being restored on 1613-P90.

2130 Attempted to start CV chiller A Chiller inoperable

2144 Completed SVI-[illegible]

2159 Shutdown SSE Blowdowning

2201 Bypassed APRM C

2214 Started SSE

2241 Secured SSE

2242 Unbypassed APRM C.

2320 2500 requested Main Control Station Battery 2339-5.

2350 ASSUMED THE SHIFT.

2400 NO FURTHER ENTRIES THIS DATE

11/3/87

0745 Manned the shift

PNPP UNIT 1

SS Henry Kelly
US Joe Harter
US Dave Goedken
SO Scott Davis
SO John Mikolaj
SO Les Stevens

EXTRA LICENSED OPERATORS

Pat Curran

0807 Commenced [illegible]
Battery [illegible]
0924 Commenced [illegible]
Completed [illegible]
1012 Commenced [illegible]
1025 Placed 24 [illegible]
1041 Completed [illegible]
1st Verif.
2nd Verif.
1046 Commenced CIV testing for STI N31-0024
1105 Entered OPDRVS for plant levels 0, intended 15 to 1 inch decrease
1107 Completed CIV testing, Commenced next decrease
1127 Placed G30 A+B in Load
1150 Commenced drain timing for MSIVs w/ Engineering
L73-R733V Cal due 11-24-87
1151 Closed E31-F022B 3 sec
1156 Closed E31-F022C
1157 Closed E31-F022D 12 sec

1158 US Declared MSL D Inoperable (B21-F022D)
Opened B21-F022D
1159 Closed B21-F022D 3.0 DEC
1200 Opened B21-F022D
US Declared MSL D Operable
1201 Closed B21-F022A 3.1 DEC
1202 Opened B21-F022A
1203 Closed B21-F022C 3.6 DEC
1204 Opened B21-F022C
1206 Closed B21-F028B 4.0 DEC
1207 Opened B21-F028B
1208 Closed B21-F028D, B21-F032D Opened
Closed 2 min 4 DEC Logic placed B21-F032D in Auto at 1210
1213 Closed B21-F028D 3.4 DEC
1214 Opened B21-F028D
1215 Closed B21-F028B 3.6 DEC
1217 Opened B21-F032D
1219 Closed B21-F021A 3.6 DEC
1220 Opened B21-F021A
1221 Closed B21-F021C
1225 Opened B21-F021C
1226 Closed Pump A
1227 Commenced C51-F0026 Fast Fill Vessel
1233 RW commenced Xfer of FOSTA to the CST
1235 Started RHR pump A in S.P. Cooling
1236 Opened E12-F024A at 1000 gpm
1245 Commenced Xfer of S.P. water to RW
1255 Completed pumping the Suppression Pool. Xfered 5500 gallons to Radwaste
1327 SVI C51-F0026 Completed Sat
1330 Inbound SOC operator reminds of Intended plant S/D
1335 S/D RHRA Closed E12-F021A 2000 gpm
1337 Commenced FWR Vessel, S/D ECCS
1341 Commenced SVI C51-F026 Pressure Fast
1353 Closed B21-F022D 3.7 DEC

PERRY NUCLEAR POWER PLANT COPY UNIT LOG Unit 1 – Vol. 22 № 82

1354	Closed B21-F022D 3.3 [illegible]
1359	Placed GSO 'B' F/C in service
1418	Removed N23 "C&F" and N24 "A&B" from serv[illegible]
1431	Commenced SVI C11-T1022 RPC [illegible]
1436	SVI C11-T1022 Completed Sat
1447	S/D CBP "C"
1453	S/D RFBP "D"
1503	Rate [illegible] 115F US declared [illegible]
	due to [illegible] closing time on B21-F022D
1510	RW completed [illegible] FDSTA [illegible]
1519	Commenced SVI C51-T0030C APRM C [illegible]
	replacement of LPRM 48-24[illegible]
1537	Placed the MFP [illegible] & placed [illegible]
	Man Flow Control [illegible]
[illegible]	[illegible]
1515	[illegible]
1516	[illegible] PPM [illegible]
1555	[illegible] GB [illegible]
1555	[illegible] RCP Power #478 [illegible]
1603	Informed SOS [illegible] of [illegible]
[illegible]	[illegible]
1630	[illegible]
[illegible]	[illegible]
[illegible]	[illegible] Power [illegible]
1640	[illegible] FDST "B" [illegible]
1701	Commenced SVI – C11 – T1019 [illegible]
1711	Completed SVI – C11 [illegible] Not SAT
1729	Shifted steam seals to the Aux Boiler,
	Shutdown the SSE
1732	Shifted In-house loads to Startup [illegible]
1735	Commenced raising Rx Press to 980# per US [illegible]
1736	Informed SOS "Jeziorski" of impending [illegible]
1746	Shut down RFPT "B" to Turning Gear [illegible]
1805	Commenced SVI – C11 – T1006, RPS [illegible]
1806	Started the MFP
1814	Shifted the MFP to the S/U [illegible]
1820	Manually scrammed the Rx [illegible] UNIT – C71 –
1823	[illegible] "C" HWA [illegible]

PERRY NUCLEAR POWER PLANT

PLANT LOG Vol. 8 No. 92

00-08 THUR 10-29-87

0125 Started 'B' - RFP

0142 Started 'C' - CRP

0216 MSR - Started on MSR Drains Pumping Forward, Chemist

0449 Rx Pwr 78.9%, Rod Line 114.6%, GMWT 0204

Core Flow 55.5%, ENTERED MODE Boundary at TC-7.

Prep. to Commence ST1-C91-01A, P.1 - Thermal Power Determination and P.2 - Thermal Limit Determination.

0455 C01- CRDS-ED. - Holding this Power Level ≈ 79%

0520 C01- Control & Service

0533 Ex-Core Noise Vol., RPV Cond. .220 units +.

0553 Commenced to Decrease Core Flow to min. Fc. setting in Fast Speed Pumps.

0607 Completed B/U H_2 Purge

0627 Core Flow 44.5%, ENTERED T.S. 3.4.1.1, MUST Perform ST1-033-1 SV33 and 108 & thereafter within 30min of exception if SR margin at least 5% of Rated flow.

Rud Hyll

0830

0835 Started RCIC in Inspection Mode (STI) to make

1027 Verified closed all "A" LOOP "A".

1033 Placed A Pwr. Reg. in Cont. for ST-185-01A/B.

1110 Restored RHR A to standby readiness

1130 Placed B Pwr. Reg in control for ST-185-022/B

1230 Insp. RHR B in prep. for going into SPCU returning Valve 1E12-F024B.

1305 Started SPCU pump in recirculation mode to improve Supp. Pool Chemistry.

1340 Opened 22 bypass valves as prep. for ST-185-22A: Verified requirements of T.S. 3.1.4.1.

1431 All bypass closed, STI C85-22/8.3 complete, min. Reactor temp. was 345°F (originally 360°F).

1837 Closed 1B21-F022D for ST 1B21-T025A/B.3. Valve took an extremely long time to close.

1842 Reopened 1B21-F022D.

1900 Declared 1B21-F022D INOP - closure time during ST data was 77.8 secs.

CR and TER notified. Rx Pwr = 75%

OK-TD

10/29/87

1930 cont. Core Flow = 53% - limiting plant conditions in these values until TER is issued. OK Lee

20.2✓

1940 B33 → Flux MAN.

1955 Reduced Core Flow to 53%, Power Rod to 100% Rod Line, 66% Pwr.

2055 STARTED A CRD Pump, STOPPED B CRD Pump.

~~2102 STARTED B33 → FLUX MAN, Rx Pwr 10.2%~~

2103 STARTED FO22D, Fast Close - 3.21 sec and Reopened.

2106 STARTED FO22D, Fast Close 2.97 sec, and Reopened.

2114 STARTED FO22D Fast Close 77 Sec. and Reopened.

2132 STARTED FO22D Fast Close 3.19 sec and Reopened.

2221 Decision made by plant management to stroke all MSIV. to check for Common mode Fail.

Found in addition to FO22D, FO28D having inital slow stroke timer that BAL. FO28B (11.9 sec) inital fast stroke time but later stroked out 3.9 sec.

2247 ISOLATED D MSL. TOC to Atm.

2330 ALL MSIV were VERIFIED to STROKE within 3-5 sec & Could not Repeat the inital condition causing MSIV to stroke close. Stroking the MSIV has Resolved the SOL/PNEUMATIC valves which control MSIV stroking. Engineering will make a recommendation in 5 to 7 Days. MSIV 100% Stroke TEST is scheduled. if this is delayed will Fast Stroke the MSIV again to see if condition is repeatable.

DECLARED FO22D, FO28D and FO28B OPERABLE.

0340 Restored D MSL to Service

R. McFetridge

DAH 10/30/87

Now

Ag

00.00 FRI 10-30-87

0000 MADE 4 hr Report (50.72 .b.2.iii.d) on Slow Closing of MSIV initially.

0114 Started RV in the Pipe. SV on in Intern mode in prep to TS/Bundle 626 A RD.

0145 Authorized Release of FDST-B

0230 While Energizing Light Box in PY2 B Cabinet - Chiller Trip Loss of PNL Pwr, → M25/26 B inop (Noise Spk.)

0245 Isolation RCIC due to ~~E31 Isolation on~~ Failed SV1 Bad Relay (SV1 Pwr Removed) (Relay order for replacement)

0245 INSERTED TRIP Parts/S ~~for E31 Modify work~~ in 10-31-87 - Relay 1E31A-K4A INOP.

0320 PY7B Removed, M25/26 now Operable.

0330 TCV 47-1 (SM-621-0274/Main Steamline) Reactor Bldg closed. NO Retardion to going Back with TC-7

0410 MADE 4 hr Report ON ISO. RCIC SYS. ALL Notified Resident Inspector of this Act. & 0010 Notification.

LE 03:7. Comm. Raising Pwr to Continue TC-7 Testing

0415 Pwr ↑ on Hold - Rev out at Pull sheet, RE on way in to Generate Additional Rod Pull Sheets to continue with TC-7 Testing. (Rx Pwr at 23% Load to not to 95% for Next test.

0452 Relay in E31A-K4B (which was replaced) is set, waiting for Closure Pulse to Reset E31.

0533 RE-Commenced Pwr Increase to 95%.

0544 Completed FDST-B Release

0555 At 83% Pwr, 58% Core Flow, in TC-7 validation.

0600 PPA Reports EHC Oil Leak on "D" TSV. Maint. on scene. Chem + Rw informed., N32. Oil Sump (-45°), making Preps to add Oil to Sump. (Need Hot)

0618 Maint. Leak stopped (Tape on TS Drain) D TSV Informed R.P. + Plant Helper Supervisor to coordinate Clean up of Equip.

0627 Completed STI - N27-023A/B.S Low Steam Chamber +5" -6"

0649 N32 Oil Has stabilized from well in 620' TB E Down to 577' Elev. Rwm on P Pattern at 577 and 0/L has cleared the 577 Elev. Started to plug FW Rw Positions)

00-08 11/3/87
0032- Placed RHR A in Supp Pool Cooling
0510- Secured Supp Pool Cooling, Placed RHR A in Std-by W/ M.S. Isolation

08-16
→ 1145 Decreased Rx pressure to 50# to stroke MSIVs
→ 1157 B21-F022D ~~is~~ ½ closed to stroke -
→ 1159 Restroked F022. time 3.0 sec
→ 1212 B21-F028D did not close in the 2 min 49 sec ~~+/-~~ the valve control switch was in close lock switch back to flow back to close valve shut in 34 sec
→ 1230 Declared D MSL penetration INOP based on received failure of F022D and F028D to stroke in required time (SEE ENTRY 10-29-87 20-24 shift)
→ 1237 Commenced a normal Rx shutdown
→ 1355 Shut B21-F022D and F028D, out of TS 3.4.7 and 3.6.4 made 4 hour report on B21-F022D and 28D being INOP
1500 Authorized discharge of EDST 'B'

16-24
1540 REMOVED RFPT "B" FROM THE MASTER LEVEL CONTROLLER AND IDLED IT AT 1100 RPM.
1600 COMMENCED POWER REDUCTION FROM 45% POWER.
1630 REACTOR POWER AT 35%. DOWNSHIFTED RECIRC PUMPS TO SLOW. RECEIVED BOTH WITHDRAW AND INSERT ROD BLOCKS WITH POWER LESS THAN THE LOW POWER SET POINT. VERIFIED PULL SHEET ROD SEQUENCE CORRECT.
1640 DISCUSSION WITH REACTOR ENGINEERING (STILES & DONOVAN) ROD PATTERN CONTROL BLOCKS DUE TO RODS BEING OUT OF SEQUENCE FOR THE RPCS THOUGH CORRECT BY THE PULL ~~SHEET~~ * 11-3-87 SHEET. ROD PULL SHEET SPECIFIED THAT BEYOND A CERTAIN STEP, RODS WOULD BE OUT OF THE RPCS PATTERN CONSTRAINTS. RODS HAD NOT YET BEEN INSERTED BEYOND THIS STEP WHEN POWER WENT LESS THAN THE LPSP. CONDITION REPORT TO BE PRODUCED BY REACTOR (CONT

UNIT 1
SHIFT TECHNICAL ADVISOR LOG

BERRY NUCLEAR POWER PLANT

DATE	TIME	KEYWORD	REMARKS
10-29-97	~~1100~~ 1100	Continued	74% with 45% loop flow. Left Loop Auto Recirc. in alarm.
	1635	MSIV's	Fast stroke valve FOZ2D for startup. For ERIS the valve did not start to move for 16 seconds and then took 2 seconds to close. Limit ~~Flow~~ TRL written limits 75% power 53% flow.
	OFF GOING [illegible]		DATE 10-29-97 TIME 2007
	OC 1	PRESS 910	MG BPV POS POWER 66 % CORE FLOW 55 MLB/HR
	GEN 771	DRIVE FOIG	S/R HPCS S/R DIV 3 DG S/R
	LPCI A S/R	LPCI	S/R SLC A S/R ADS A S/R DIV 1 DG S/R
	LPCI B INOP	LPCI C	S/R SLC B S/R ADS B S/R DIV 2 DG S/R
	REMARKS RHR A IN	SPCU	ON COMING [illegible]
10-29-97	2230	MSIV's	1821-F022D was restroked in less than 3 seconds twice 1821-F028D and 1821-F023B experienced long stroke times of 1 min 17 sec and 11.9 seconds when tested. These were stroked again with stroke times of approx. 3 sec. The 1821-F022 and F023 solenoid lights de-energized in all cases indicating the slow stroke times exceed most probably from slow

ERRY NUCLEAR POWER PLANT

UNIT 1
SHIFT TECHNICAL ADVISOR LOG

DATE	TIME	KEYWORD	REMARKS
10-29-87	2250	MSIV's	movement of one of the air solenoid control valves. MSL D was isolated per T.S actions and a 4 hr report was generated.
10-30-87	0015	4 hr notif	4 hour notification completed.
	0130	E31	During E31 SVT, Relay KUD failed RCIC was declared INOP in exceeding 2 hr time limit
	0300	MSIV's	TER 451.1 for msiv closure time down has been approved. All msiv's are restored.
	0400	Plant	Raising power to 85%.
	[illegible]	[illegible]	[illegible]
10-30-87	0820	Chemistry	Reactor Water Conductivity is greater than .3 entered ACT.
10-30-87	1315	G36	Both G36 fuses are now back inservice.
10-30-87	1545	Plant	Completed TC 7 testing. reduced rod line from 115% to 100% and increasing power to 100% until entry into TC-8 is approved.

UNIT 1
SHIFT TECHNICAL ADVISOR LOG

PERRY NUCLEAR POWER PLANT

DATE	TIME	KEYWORD	REMARKS
11-2-87		R Steele	DATE 11-2-87 TIME 2342
		957	92 73
	1106	S/R	S/R S/R
		S/R	S/R S/R S/R S/R
		S/R	S/R S/R S/R S/R
		Reviewed Unit Log	
11-3-87			11-3-87 0300
		1000	90 70
	1106		
11-3-87	1230 ~~1130~~ TC 11-3-87	MSIV's	Fast started each MSIV. The F022A took 16 seconds and the F028A ~~took~~ did not close after 2 minutes and 46 seconds. On the second stroke the F022A took 3.0 seconds and the F028A took 3.4 seconds. Recommended to the Shift Supervisor & OSO. A. The valves not be called operable B. The STE Restore Full Isolation - not be performed. Do not want to challenged the MSIV's with a known problem.

DATE	TIME	KEYWORD	REMARKS
11-3-87	1520	MSIVs	Both FCV26 and FCV86 have been declared inoperable and isolated and de-energized. Current plans are to shutdown and investigate.
			DATE 11-3-87 TIME 1540
			950 ... 45 ... 53
			488 ... S/R ... S/R ... S/R
			S/R ... S/R ... S/R ... S/R ... S/R
			S/R ... S/R ... S/R ... S/R ... S/R
			ON COMING R Stokes
11-3-87	1543	Stokes	Normal plant shutdown in progress. RFP A is on the MLC, RFP B is idling and the MFP control switch is in OFF. Recirc control is Flux Manual.
	1626	B33	Transferred Recirc pumps to slow.
	1741	Stokes	Preparing to manually scram the reactor. After Recirc pumps were transferred and FCV's opened power was below LPSP. Unknown to the Operators when the LPAP was reached was that the control rod sequence steps had the rods out sequenced by the RPC. So now that the plant is below LPSP RCIS has insert inhibits. (This crew had to realize that the rod sequences sheets deviate from RPC sequence

PHPP NO. 6440
Rev. 5/87

CONDITION REPORT

(Use back of form for additional space.)

UNIT NO.		PAGE 1 OF ___
1	CR - 87 - 503	

EVENT DATE/TIME	DISCOVERY DATE/TIME	METHOD OF DISCOVERY
10-28-87 / ~~1055 EST~~ 1977	10-29-87 / ~~1055~~ 1977	IWIS-PL01 INDICATIONS

EVENT DESCRIPTION (10-30-87)

DURING PERFORMANCE OF STP-82N-025A WHILE FAST CLOSING 1821-F022D, OPERATORS OBSERVED AN APPROX. 19 SEC TIME DELAY BEFORE THE VALVE BEGAN TO STROKE ONCE THE CONTROL SWITCH WAS PLACED IN THE "CLOSE" POSITION. THE VALVE THEN STROKED CLOSE IN LESS THAN 3 SEC. AT 2103 THE VALVE WAS STROKED SUCCESSFULLY 2 TIMES, USING STP-82.

(EVENT DESCRIPTION CONTINUED ON ATTACHED SHEET)

IMMEDIATE CORRECTIVE ACTION (INCLUDE SVI'S)

REDUCED POWER TO ≈ 75% AND FLOW ≈ 53%

TER 87-1 (LEVEL 1 FAILURE)

SYSTEM COMPONENTS AFFECTED (INCLUDE #)	REDUNDANT EQUIPMENT IN SAME SYSTEM AVAILABLE
1821-F022D, 1821-F023D, 1821-F028B	1821-F022 A, B, C 1821-F023 A, C

ACTIVITIES AND CONDITIONS PRIOR TO EVENT

PERFORMING STP-82N-025A, 9.3 IN TC 7

OPERATIONAL CONDITION: 1 2 3 4 5
REACTOR POWER (MWT): 2700
REACTOR PRESSURE: 985 1010
RX WATER TEMP (IF NONSATURATED):

INITIATION CRITERIA	ORIGINATOR	DATE	SECTION
1.W	D.G. Palmer	10-29-87	PSO-Test. Eng.

TECH SPEC INVOLVED	LER INITIATED (ATTACH COPY)	WORK INITIATED? (INCLUDE NO.)
3.6.4 3.4.7	☒ ACTUAL ☐ POTENTIAL	☐ WR ☒ WO 87-9?? (WO-1)

US REVIEW	DATE	STA REVIEW	DATE
[signature]	10/30/87	[signature]	10-30-87

NOTIFICATION (INCLUDE REPORTING REQUIREMENT) (ATTACH ENF)

- ☐ IMMEDIATE _____
- ☐ ONE HOUR _____
- ☒ FOUR HOUR 2012 10-29-87 [illegible]
- ☐ 24 HOUR _____

REPORTS

- ☒ POTENTIAL LER (PHP-0407)
- ☐ POTENTIAL RSF (PHP-1602A)
  RSF: _____
- ☐ MANAGEMENT PRELIMINARY REPORT (CS-OPERATIONS NOTIFIED)

TECH SPEC VIOLATION ☐ YES ☒ NO

REMARKS

SEE PLANT AND UNIT LOGS FOR STROKE TIMES.

REVIEWED, REQUIRED ACTIONS TAKEN SS	DATE
[signature]	10-30-87

COMPLIANCE REVIEW	DATE	LER NO.	ASSIGNED SECTION

REVIEW	DATE	PORC ☐ YES ☐ NO	REVIEW/APPROVED	DATE

PORC REVIEW MEETING NO.	APPROVED	DATE	APPROVED	DATE

CR CLOSED	DATE	REMARKS	CAUSE CODE
			P

EVENT DESCRIPTION (continued)

PER THE SCI AND US(S) DIRECTION (WITNESS OPERATIONS CONCURRENCE) THE REMAINING MSIV'S WERE FAST CLOSED. ALL MSIV'S STROKED SATISFACTORILY EXCEPT 1B21-F028B AND 1B21-F028C. AT 2134 1B21-F028C FAST STROKED CLOSE UNSATISFACTORILY IN 1 MINUTE, 17 SECONDS. AT 2152 THE VALVE WAS RESTROKED WITH A CLOSURE TIME OF APPROX. 3 SEC. AT 2216 1B21-F028B FAST STROKED CLOSE UNSATISFACTORILY IN 11.2 SECONDS. AT 2218 THE VALVE WAS RESTROKED WITH A CLOSURE TIME OF APPROX. 3 SEC. DURING ALL MSV CLOSURES THE SOLENOID LIGHTS ON 1H13-P682 AND 1H13-P623 WERE OBSERVED TO EXTINGUISH INDICATING THAT POWER WAS DEENERGIZED TO THE SOLENOIDS AT THE AFFECTED VALVE.

PNPP NO. 6912
Rev. 4/86

Page 1

EVENT NOTIFICATION

Perry Nuclear Power Plant
Unit 1

Caller's Name: [illegible] Title: SS

Event Time: 0700 Zone: ☒ EST ☐ EDT Event Date: 10-29-87

EVENT CLASSIFICATION	
	GENERAL EMERGENCY
	SITE AREA EMERGENCY
	ALERT
	UNUSUAL EVENT
X	50.72 NON-EMERGENCY
	SECURITY/SAFEGUARDS
	TRANSPORTATION EVENT
	OTHER:

Y	N	EVENT CATEGORY	INITIATION SIGNAL
		REACTOR TRIP/SCRAM	
		ESF ACTUATION	
		ECCS ACTUATION	
		SAFETY INJECTION FLOW	
		LCO ACTION STATEMENT	
X		OTHER:	

INITIATION SIGNAL: F022D, F078D and F029D FAST STROKED CLOSED TOO SLOW >5 sec

CAUSE OF FAILURE	
X	MECHANICAL
	ELECTRICAL
	PERSONNEL ERROR
	PROCEDURE INADEQUATE
	OTHER:

SYSTEM: B21

COMPONENT: F022D F078D B-21-C

EVENT DESCRIPTION
(Use CR if completed) (☒ see CR)

POWER PRIOR TO EVENT(S): 64%	DID ALL SYSTEMS FUNCTION AS REQUIRED? ☒ YES ☐ NO	IF "NO", EXPLAIN ABOVE
CURRENT POWER OR MODE: 1/1 64%	ANYTHING "UNUSUAL" OR NOT UNDERSTOOD? ☐ YES ☒ NO	IF "YES", EXPLAIN ABOVE

OUTSIDE AGENCY OR PERSONNEL NOTIFIED			
STATE(S): NO			
LOCAL: NO			
RESIDENT	YES	NO	WILL BE
OTHER: NO			
PRESS RELEASE NO			

CORRECTIVE ACTION(S)

① Restricted MSIV LCO's - SAT -, FREED UP SOL/Pneumatic MSIV which caused MSIV stroking.

② Looking at possibility of increasing SOL FREED UP stroking MSIV's.

MODE OF OPERATION UNTIL CORRECTION: (1) ESTIMATE TIME TO RESTART: NA

OTHER INFORMATION REQUESTED BY NRC:

① What was cause of slow stroke? ② Possibly SOL/Pneumatic MSIV which Up Bot ex sufficient stroke FREED up. Corrective Report action Condition on Subsequent stroke

TIME/DATE OF CALL:	0010	10-30-87	CR NO.: CR- 87 - 503 pg 5 of 5
NAME OF INDIVIDUAL CONTACTED:	MARKSBERRY		CALLER'S SIGNATURE: [signature]

00

KOZY
FOX8G

CLST - 503

TIME

22:11:05	C	B21 - FOX8G	CLOSURE TIME	3:57 SEC
22:11:45	C			
22:13:20	C	B21 FOX8A		3:37
22:13:30	C			
22:15:45	C	B21 FOX8C		3:45
22:15:55	C			
22:16:45	C	B21 FOX8B		11:9
22:17	C	FOX8D		
22:18:10	C	FOX8D		3.96
22:18:40	C	FOX8D		
22:19:07	C	B21 FOX8A		3:48
22:19:55	C			
22:20:57	C	B21 FOX8C		4.12
22:21:40	C			

ACTIVE LCO TRACKING SHEET 872031

T.S. SECTION	UNIT(S)	OPERATIONAL CONDITION
3.6.J ; 3.0.7	B21	1

ENTRY TIME/DATE 1900 10/29/87

IMPACT TIME/DATE 2300 10/29/87

TECH SPEC 3.0.3 ☒ YES ☐ NO

TECH SPEC 3.0.4 ☐ YES ☒ NO

DCP WORK RELATED ☐ YES ☒ NO

PROBLEM DESCRIPTION

(B21 - F022) while closing during the performance of ST= B21-0274/8.2 valve closure was slow (22 sec. by ST calculation) & valve was the last (Also it appeared that valve was hesitating when it started moving & [illegible])

ACTION REQUIREMENT

3.6.J with one or more MSIV's not maintaining at least one MSIV operable in each affected main steam line that is open and within 8 hrs, either:

a) Restore the inoperable valve to operable status, or

b) Isolate the affected main steam line by use of a deactivated MSIV in the closed position

3.6.J maintain at least one isolation valve operable in each affected penetration that is open within 4 hrs either

1) Restore valve to operable status, or

2) Isolate each affected penetration by use of at least one deactivated automatic valve closed in the isolation position.

REFERENCE FORMS

CR87-503 page

ADDITIONAL INFORMATION		STARTED SAT
B21 F022D	FAILED 2144 10/29/87	2152 10/29/87
B21 F028B	FAILED 2216 10/29/87	2218 10/29/87

ENTRY REVIEW

DRG [illegible] 10/29/87 TIME DATE

SS

GSO

CLEARANCE

2310 10/30/87 TIME DATE

SS

GSO

PHPO NO. 6440
Rev. 5/87

CONDITION REPORT

(Use back of form for additional space)

UNIT NO. 1 | CR - 87 - 513 | PAGE 1 of ___

EVENT DATE/TIME 11-3-87 / ~~1150~~ 1230 | DISCOVERY DATE/TIME 11-3-87 / ~~1150~~ 1230 | METHOD OF DISCOVERY Operation

EVENT DESCRIPTION
Fast stroked MSIV F022D closed the valve took 18 seconds to close.
Fast stroked MSIV F028D closed the valve did not move after ~~11-3-87~~ 2 minutes and 49 seconds.

IMMEDIATE CORRECTIVE ACTION (INCLUDE SWI'S#)
Retested both valves
F022D closed in 3.0 seconds.
F028D closed in 3.4 seconds.

SYSTEM/COMPONENTS AFFECTED (INCLUDE WP.)
MSIV's F022D
F028D

REDUNDANT EQUIPMENT IN SAME SYSTEM AVAILABLE

ACTIVITIES AND CONDITIONS PRIOR TO EVENT
TC-6 Testing
Power 60% to 90% Full Reactor Isolation Test

OPERATIONAL CONDITION: (1) 2 3 4 5
REACTOR POWER (WITH): 60
REACTOR PRESSURE: 900
RX WATER TEMP (IF NONSATURATED): NA

INITIATION CRITERIA 3 | ORIGINATOR [signature] | DATE 11-3-87 | SECTION Test

TECH SPEC INVOLVED 3.6.D / 3.4.7 | LCO INITIATED (ATTACH COPY) ☒ ACTUAL ☐ POTENTIAL | WORK INITIATED (INCLUDE NO.) ☐ WR ☒ NC

LC REVIEW [signature] | DATE 11/3/87 | STA REVIEW [signature] | DATE 11-3-87

NOTIFICATION (INCLUDE REPORTING REQUIREMENT) (ATTACH ENF)
☐ IMMEDIATE
☐ ONE HOUR
☒ FOUR HOUR 10 CFR 50.72 b 2 iii
☐ 24 HOUR

REPORTS
☒ POTENTIAL LER (PNP-0857)
☐ POTENTIAL RSF (PNP-1604)
RSF-
☐ MANAGEMENT PRELIMINARY REPORT (CS-OPERATIONS NOTIFIED)

TECH SPEC VIOLATION? ☐ YES ☒ NO

REMARKS

REVIEWED, REQUIRED ACTIONS TAKEN [signature] | DATE 11-3-87

COMPLIANCE REVIEW | DATE / | LER NO. | ASSIGNED SECTION

REVIEW | DATE | PORC ☐ YES ☐ NO | REVIEW/APPROVED | DATE

PORC REVIEW MEETING NO. | APPROVED | DATE | APPROVED | DATE

CR CLOSED | DATE | REMARKS | CAUSE CODE P

Form No. 6912
Rev. 4/86

Page 1

EVENT NOTIFICATION

Perry Nuclear Power Plant
Unit 1

Caller's Name: Wendy KELLY Title: SLCI Supv

Event Time: 1157 Zone: ☒ EST ☐ EDT Event Date: 11-3-87

EVENT CLASSIFICATION	
	GENERAL EMERGENCY
	SITE AREA EMERGENCY
	ALERT
	UNUSUAL EVENT
X	50.72 NON-EMERGENCY
	SECURITY/SAFEGUARDS
	TRANSPORTATION EVENT
	OTHER:

Y	N	EVENT CATEGORY	INITIATION SIGNAL
		REACTOR TRIP/SCRAM	
		ESF ACTUATION	
		ECCS ACTUATION	
		SAFETY INJECTION FLOW	
		LCO ACTION STATEMENT	
		OTHER:	

CAUSE OF FAILURE	
	MECHANICAL
	ELECTRICAL
	PERSONNEL ERROR
	PROCEDURE INADEQUATE
X	OTHER: UNKNOWN

SYSTEM: B21 (MSIV's) FO28D
COMPONENT: B21-F022D AND ~~F028D~~

EVENT DESCRIPTION
(Use CR if correlated) (☒ see CR)

POWER PRIOR TO EVENT(S):	80%	DID ALL SYSTEMS FUNCTION AS REQUIRED? ☐ YES ☒ NO	IF "NO", EXPLAIN ABOVE
CURRENT POWER OR MODE:	53%	ANYTHING "UNUSUAL" OR NOT UNDERSTOOD? ☐ YES ☒ NO	IF "YES", EXPLAIN ABOVE

OUTSIDE AGENCY OR PERSONNEL NOTIFIED			
STATE(S):	N/A		
LOCAL:	N/A		
RESIDENT	(YES)	NO	WILL BE
OTHER:	NONE		
PRESS RELEASE			

CORRECTIVE ACTION(S)

commencing RX shutdown
If shut both MSIVs (FO22D & FO28D) at 75%
Valves shut @ 1355

MODE OF OPERATION UNTIL CORRECTION: 4 ESTIMATE TIME TO RESTART: UNKNOWN

OTHER INFORMATION REQUESTED BY NRC:
Estimate Time of Valves
History - was O.C. control in Command & problem Fri? - No, indications with Region on Fri valves were not considered INOP - 1970 review of log showed that at the shift was made - I informed the NRC O.C. control

TIME/DATE OF CALL: 1355 11-3-87	CR NO.: CR-87-513.
NAME OF INDIVIDUAL CONTACTED: Ron Young	CALLER'S SIGNATURE: Wendy Kelly

CR 87-512 8712120

ACTIVE LCO TRACKING SHEET

T.S. SECTION	MPL(S)	OPERATIONAL CONDITION
3.6.4 - 3.4.7	B21	1

ENTRY TIME/DATE 1155 11/3/87

IMPACT TIME/DATE 1155 11/3/87

TECH SPEC 3.0.3 ~~YES~~ NO

TECH SPEC 3.0.4 ~~YES~~ NO

DCP WORK RELATED NO YES ~~NO~~

PROBLEM DESCRIPTION

B21-F022D FAILED TO STROKE ONCE, BUT STROKED SUCCESSFULLY THE SECOND & THIRD TIME

B21-F028D STROKED @ 18 SECONDS 1ST & THEN STROKED 3RD

ACTION REQUIREMENT

ISOLATE PENETRATION OR

HOT S/D IN 12 HRS &

COLD S/D IN 24 HRS

REFERENCE FORMS

WO 87-5285

87-5293

T/O 1-87-4207

ADDITIONAL INFORMATION

B21-F022D & F028D DISABLED 1530 11/3/87

Transferred to PLCO @ 0050 11-4-87 qkm

ENTRY REVIEW

US

SS

CSO

CLEARANCE

0050 TIME 11-4-87 DATE qkm US

SS

CSO

Partial Sequence of Events

October 29, 1997

1837 Shut 1B21-F022D per STI-B21-025A 22.14 sec

1900 1B21-F022D declared inoperable

2103 1B21-F022D closed 3.24 seconds

2104 1B21-F022D closed 2.94 seconds

2144 1B21-F028D closed 1 minute 17 seconds

2152 1B21-F028D closed 3.19 seconds

2216 1B21-F028B closed 11.9 seconds

2218 1B21-F028B closed 3.96 seconds

2310 1B21-F022D, F028B, F028D declared Operable

October 30, 1997

0010 Notified NRC of slow closure of MSIVs

November 3, 1997

1152 Commenced stroke timing MSIVs

1157 Closed 1B21-F028D 18 seconds

1158 Declared 1B21-F022D Inoperable

1159 Closed 1B21-F022B 3.0 seconds

1200 1B21-F022D declared Operable

1208 Attempted to close 1B21-F028D, control switch held in shut position for 2 minutes 49 seconds

1212 1B21-F028D declared Inoperable

1213 1B21-F028D closed 3.4 seconds

1217 1B21-F028D closed 3.4 seconds

1330 Commenced plant shutdown

1354 Shut 1B21-F022D

1354 Shut 1B21-F028D

November 3, 1987

1358 Notified NRC of slow closure of MSIV's

1630 Shifted Reactor Recirculation Pumps to slow speed

Recieved withdraw and insert Rod Blocks from

Rod Pattern Control System

1819 Manually Scrammed the reactor - Reactor

Power 22 percent - rods inserted.

2120 Notified NRC of reactor scram

1334- NOTIFIED SOC (HEARLY) OF APPROX 100MWE LOAD DECREASE & SUBSEQ INCREASE DUE TO STI 1085-022

1343- DECREASED LOAD SET TO OPEN 2.5 BYPASS VALVES INITIAL 1044 603MWE, POWER 2453 MWTH.

1347- COMPLETED SUI-C51-T0028F-SAT

1350- DISABLING AUTO SHIFT OF CBS PRESSURE CONTROL

1408- COMPLETED SUI 1831-T0087D-SAT

1417- RESTORED CBS SYSTEM TO DUAL CHANNEL OPERABILITY. SHIFTED CBS TO "B" CHANNEL, DISABLING AUTO SHIFT OF CBS SYSTEM

1313- LOAD RAMP. RW PERFORMING DISCHG OF CHEST A TO LAKE 33E

1416- RESTORED CBS SYSTEM TO DUAL CHANNEL OPERABILITY. NOTIFIED SOC (HEARLY) of POWER (LOAD) INCREASE TO 720-800 MWE

1455- RESTORED TURBINE LOAD SET TO 125 MWE = TURBINE LOAD, ALL 4 VALVES CLOSED - PLANT RPV POWER 2506 MWTH - NO CONTROL ROD MOTION WITH BYPASS VALVES OPEN - VERIFIED -

1457- COMMENCED PUMPING CST TO RADWASTE VIA SECU

1507- COMMENCED SUI: B21-T0180R-ECCS/HPCS - HIGH RW PRESSURE FUNCT. (B21-N667A).

1510- COMPLETED HARDENING WORK ON SP & RW - E600 cal transmitter

1457- DOUG SHELIGA (QA) ENTERED MAIN STEAM HOV/UV FOR INSPECTION

1500- COMMENCED SUI-E22-T1202-HPCS LOW FLOW FUNCT (E22-N656)

1510- SECURED MIH-INTERMITTENT MODE OPS - COMMENCED 3HR H2 PURGE

1509- DOUG'S Aliga entered MAIN STEAM TUNNEL

1527- COMPLETED SUI-B21-T0189R-SAT

1543- COMPLETED SUI-E22-T1202-SAT

1557- SHIFTED B33 TO FLUX MANUAL

1602- COMPLETED STI N32 P001 - UNSAT FOR ESOP DATA

1604- CORE FLOW > 45%

1705- COMMENCED SUI G50-T9266 - LRW RELEASE PERMIT FOR FDST B

1716- SHIFTED B33 TO FLUX AUTO

1721- RW STANDING BACK FROM FDST A TO CST

1725- SHIFTED B33 TO FLUX MANUAL

1737- COMMENCED SUI M16-T2001-DW PURGE EXH ISOL VLV OPT TEST

1748- SHIFTED B33 TO FLUX AUTO

1813- SECURED ADDING H_2 to GENERATOR

1828- COMMENCED SUI B21-T0287R HPCS/ECCS L2/L8 RPV LEVEL FUNCTIONAL (B21-N

1837- SHUT B21-F022D - FAST CLOSURE PER STI B21 025A SEC 8.3

1842- OPENED B21 F022D - VALVE DID NOT APPEAR TO CLOSE WITHIN 5 SEC CRITERIA - EVALUATING DATA

MIN 0.29% 0.00 191

10/23/87

1937 Completed SVI - B21 - T01872 - SAT

A00 - LATE ENTRY - B21 - F022D DECLARED INOP, LIMITED TO 75% FWE, 55%

1940 - SHIFTED B33 TO FLUX FOLLOW

1955 - CORE FLOW REDUCED to 53%, DROOP 200S IN to 100% ROD LINE

1957 Assumed the Shift

2055 Started CRD pump A Secured CRD pump B

2103 CLOSED B21-F022D FOR STROKE TEST PER SOI-B21 3.24s Stopwatch LTC 1

2105 OPENED B21-F022

2106 CLOSED B21-F022D FOR STROKE TEST PER SOI-B21 2.94s Stopwatch LTC 1

2107 OPENED B21-F022D

2107 Commenced SVI-M17-T2002

2144 Closed B21-F028D 10 17s Stopwatch LTC N302C

2145 Opened B21-F028D

2152 Closed B21-F028D 3.57s Stopwatch LTC N302C

2153 Opened B21-F028D

2211 Closed B21-F022B 3.07s LTC N302P

2211 Opened B21-F022B

2213 Closed B21-F022A 3.37s LTC N302P

2213 Opened B21-F022A

2215 Closed B21-F022C 3.45s LTC N302P

2215 Opened B21-F022C

2216 Closed B21-F028B 11.9s LTC N302P

2218 Opened B21-F028B

2218 Closed B21-F028B 3.96s LTC N302P

2218 Opened B21-F028B

2219 Closed B21-F028A 3.48s LTC-N302P

2219 Opened B21-F028A

2220 Closed B21-F028C 4.12s LTC-N302P

2221 Opened B21-F028C

2236 Closed B21-F028D and B21-F067D

2240 Deenergized 1E32-F001N - closed position and 1B21-F067D Closed & deenergized

2250 Deenergized B21-F028D Solenoids by lifting leads

2310 Attended Mod to B21-F028D, Declared B21-F022D B21-F028D and B21-F028B operable

2322 Alarm Fault 22-59 for 48

2323 Completed SOI-M14-T2001 & SVI-M17-T2002

2340 Opened 1821-F028D

2343 Accumulator Fault Rod 22-55 Clear pressure was good Inst Mech had small amount of water

2400 Continued the Shift No Further entries this date

1/3/89

0745 Assumed the shift

PNPP UNIT 1

SS Henry Kelly
US Joe Harkey
US Doug Goedken
SO Scott David
SO John Mikolaj
SO Jeff Stewart

EXTRA LICENSED OPERATORS

STA Pat Curran

0007 Commenced F.I. on P54 - P8027 in Vessel & Surveillance Battery test
0029 Commenced SVI on B21 - T0369A SRV Pilot Actuation Channel Functional
0041 Informed SOC Operator Jerks of intended 50 MWe increase
0929 SVI B21 - T369A Completed Satisfactorily
0944 Informed SOC Operator Jerks of intended turbine valve surveillance
1018 Commenced BPV testing per STI N31-0024
1025 Reduced 24 Hz Pool S/D Engrs roll on DIV II
1041 Completed BPV testing, 1/4 rod motion Verified by
1st Verif. [signature]
2nd Verif. [signature]
1046 Commenced CIV testing per STI N31-0024
1105 Informed SOC Operator Jerks & intended 15 MWe increase
1107 Completed CIV testing, Commenced turbine Jerks
1127 Placed G36 A+B in Hold
1150 Commenced drain timing of MSIVs w/ Diagnostic L73-R833V Calibrated 11-24-87
1151 Closed B21-F022B 3.2 sec
1156 Opened B21-F022B
1157 Closed B21-F022D 15 sec

1158 US Declared MSLD Inoperable (B21-F022D)
Opened B21-F022D
1159 Closed B21-F022D 3.0 DC
1200 Opened B21-F022D
US Declared MSLD Operable
1201 Closed B21-F022A 3.1 DC
1202 Opened B21-F022A
1203 Closed B21-F022C 3.6 DC
1204 Opened B21-F022C
1206 Closed B21-F028B 3.0 DC
1207 Opened B21-F028B
1208 Closed F21-F031D, B21-F032D
Closed 2 min 49 DC Loss Closed B21-F
via Auto at 1211
1212 US Declared MSLD Inop (B21-F022D)
1213 Closed B21-F022D 3.4 DC
1214 Opened B21-F028D
1217 Closed B21-F028D 3.4 DC
1218 Opened B21-F021D
1219 Closed B21-F021A 3.6 DC
1220 Opened B21-F021A
1221 Closed B21-F021C
1222 Opened B21-F021C
1226 Started ECC pump "A"
1227 Commenced C51-F0026 Torus/Rad Vent
1233 RW commenced Xfer of F051A to the CST
1235 Started RHR pump A in S.P. Cooling
1238 Opened E12-F024A at 1000 gpm
1245 Commenced Xfer of S.P. water to RW
1255 Completed pumping the Suppression Pool. Xfered
5500 gallons to Radwaste
1327 SVI C51-F0026 Completed Sat
1330 Informed SOC operator Details of Intended
plant S/D
1335 S/D RHR A Closed E12-F021A 2000 gpm
1337 Commenced RW Drained, S/D ECC A
1341 Commenced SVI C51-F026 Inoperable First
1353 Closed B21-F022D 3.4 DC
1354 Closed B21-F028D

Reportable Event Number 20515

Facility : PERRY
Unit : 1
Region : 3
Vendor : GE,GE
Facility Contact : Tom Matkowsky
NRC Notified By : ROBIN SMITH
Rep Medium : Dl
Cause : Unknown
Component :

Date Notified : 10/31/85
Time Notified : 01:15
Date of Event : 10/31/85
Time of Event : 01:44
Classification : 10 CFR 50.72
Category 1 : ESF Actuation
Category 2 :
Category 3 :
Category 4 :

EVENT DESCRIPTION :

WITH THE REACTOR AT 42%, FULL CLOSURE TESTS ON MSIV'S FOUND SEVERAL VALVES
CLOSING WHEN EXCEEDING THE 5 SECOND LIMIT. THE FIRST MSIV, B21-F
CLOSED IN 22 SECONDS. AFTER TWENTY SIX THE CLOSURE TIMES WERE
WITHIN 3-5 SECONDS. AT THE START OF THE TEST, THE OUTBOARD MSIV
SEAL WAS A CRITICAL PART OF THE ALIGNER. THE VALVE WAS CLOSED
WITH SEATS ALIGNED WITHIN 3-5 SECONDS. ALL OTHER MSIVS WERE TESTED
ONE OTHER VALVE, F1-26-2, CLOSING AT 22 SECONDS AND FOUNDED DURING
SLOW CLOSURE TIMES COULD NOT BE REPEATED. SUSPECT WATER IN ACTUATOR
CYLINDER AND SLIGHTLY SLOW AIR WHILE THE CYCLING TEST WAS BEING PERFORMED.
CONTINUING INVESTIGATION OF SURVEILLANCE PROCEDURE TO FIND CAUSE OF
THE 4 MSIV'S NOT MEETING 3-5 SECOND CLOSURE.

-- END OF ...

(3) Clinic Tests

- STI Package for Tests on 10/24/97

Valve	Time/Date	Closure Time	
1B21-FC224	2213 10/29	3.37 seconds	
	1201 11/3	3.1 seconds	
1B21-FC223	2211 10/29	3.07 seconds	
	1154 11/3	3.2 seconds	
1B21-FC222	2215 10/29	3.45 seconds	
	1207 11/3	3.6 seconds	
1B21-FC221	1837 10/29	22.14 seconds	per STI-B21-L25A
	2103 10/29	3.24 seconds	
	2106 10/29	2.94 seconds	
	1157 11/3	18 seconds	
	1159 11/3	3.5 seconds	
	1353 11/3	3.4 seconds	
1B21-FC25A	2219 10/29	3.48 seconds	
	1219 11/3	3.6 seconds	
1B21-FC25B	2216 10/29	11.9 seconds	
	2218 10/29	3.96 seconds	
	1206 11/3	4.0 seconds	
1B21-FC25C	2220 10/29	4.12 seconds	
	1221 11/3	Not recorded	

Valve	Time / Date	Closure Time
1821-F225	2144 10/29	1 minute 17 seconds
	2152 10/29	3.19 seconds
	2236 10/29	Not recorded
	1209 11/3	Did not close
	1213 11/3	3.4 seconds
	1254 11/3	Not recorded

Startup Test Results Package Cover Sheet
Perry Unit 1 Startup Test Program

Rev.: 4
Form: PAP-1104-7

S.T. No./Rev.	S.T. Title	S.T. Section No./Title	Date
B21-025A/3	MSIV FUNCTION TEST	8.3/Full Cl. of Fastst MSIV @70% 45[illegible]	10/30/87

Reason for Test:

■ Scheduled Test [] Retest per TER _____ [] Other _____

Initial Conditions

Test Plateau: [] OV [] HU [] Low Pwr [] Mid Pwr ■ Hi Pwr
Test Condition: [] OV [] HU [] 1 [] 2 [] 3 [] 4 [] 5 [] 6 ■ 7 [] 8

Core Pwr 75 % Plant MWe 885 Other: _____
Core Flow 53 % Rx Press 962 psig _____

TER'S (List) Attach all open and closed TER's	STCV'S (List) Attach all applicable STCV's
451-01, 02, ___, ___, ___, ___, ___, ___, [] cont	C25A - 3 - 1, 2, 2, ___, ___ [] cont
TER	(STCV) (Rev)

Acceptance Criteria Results				Resp. Vendor	Results Package Index Comp.
Level 1: []	Sat.	■ Exceptions	[] N/A	■ GE	■ Proc/Inst Sat or None Used
Level 2: ■	Sat.	■ Exceptions	[] N/A	[] GAI	M & TE USED:
Level 3: []	Sat.	[] Exceptions	■ N/A	[] Other	[] Yes, M&TE Report submitted
Other Analysis	Sat	Exceptions ■	N/A	_____	■ None Used

Summary of Test and Test Results (inc. results of any unsat plant proc./inst.eval.)

This test closed the fastest MSIV as determined from previous testing at approximately 75% power. The valve, 1B21 F022D was slow to start closing (time from solenoid deenergization to valve movement indicated by limit switch) however closing time (time from 90% to 10% limit switch actuation extrapolated to 100%) was within specification. TER 451-01 was generated to address this. This TER was resolved before testing was secured. All other analysis was satisfactory.

TEST Status: [] Complete ■ Complete/TER's(Ck if any TER's) [] Cancelled

Prepared By/Date	Reviewed By TD/Date	S/U Ele Supr/Date	Sup. SU Pr Dr/Date/Time
[illegible] 10/30/87	[illegible] 10/30/87	John Austin 10/30/87	[illegible] 10/31/87 1401

Approval Status: ■ Approved [] Approved with Comments | Open TER's [] Yes ■ no

PORC Meeting No: 87-234 | GE SCM: Date [illegible] | Plant Tech Mgr/Date: [illegible] | Plant Ops. Mgr/Date: [illegible]

...TEST COPY

STARTUP TEST CHANGE NOTICE

Rev.: 4
Form: PAP-1104-3a

Sheet 1 of 1

ST. No./Title	Rev.	STCN No.	Date
B21-OOSA / MSIV Function Test	3	1OOSA.5-3	10/29/87

Reason for change

To utilize most recent data on stroke time and limit switch positions.

Affected steps, sections, or paragraphs

6.6.3, 8.3.2.1.c

Change

Change 6.6.3 to read:

From the ~~fastest~~ LATEST SVI-B21-T2001, record the MSIV with the fastest stroke time. Then record the actual valve positions ΔP_{10} and ΔP_{40} associated with the fastest MSIV, from the instrument file folder (filed by MSIV number). Obtain the maximum isolation instrumentation delay time from the completed Attachment 1 of Section 8.1, completed during TC 3. Attach copies of the SVI and file folder data.

Does STCN change intent of the ST (if yes is checked, conditional approval is not allowed)	[ ] Yes	■ No	Originator/Date
			M.A. Burch 10/29/87

Conditional Approval	Test Director/Date	Shift or Unit Supervisor/Date
	10-29-87	10/29/87

50.59 Applicability Ck Completed per PAP-0305 (Attach Applicability Ck Form)	STCN Log
Yes [ ] No ■	■ Updated

S/U Test Ele Supr/Date	S/U Prog. Director/Date	GE SCM:
	OQS:	

Final Approval:	PCRC Meeting No.	Plant Tech. Manager/Date:
[ ] Approved [ ] Disapproved	N/A As 10-2-87	Plant Ops Manager/Date:

TSN 4151

STATION TEST CHANGE NOTICE

Sheet 1 of 1

Rev.: 4
Form: ZAP-1104-1

Test No./Title: RZ1-025F / MSIV Function Test	Rev.: 3	Sheet No.: 025F-3-2	Date: 5-17-87

Reason for change:
Delete the requirement to evacuate containment. The Unit Supervisor feels this is unnecessary.

Affected steps, sections, or paragraphs:
6.3.3, 6.5.3, 8.1.2.2.c, 8.2.2.2c

Change:
Delete the above steps. Mark "Deleted" adjacent to the steps and in signoffs of 8.1.2.2c and 8.2.2.2.c.

Does STCN change intent of the Test? [ ] Yes ■ No
(If yes is checked, conditional approval is not allowed)

Completed/Date: W. C. Young / 5-17-87

Conditional Approval	Test Director/Date	Shift or Unit Supervisor/Date
	[illegible] / 5-17-87	[illegible] 5/17/87

10.59 Applicability Ck Completed per ZAP-1105 (Attach Applicability Ck Form)
Yes [ ] No ■

STCN Log Updated ■

S/U Test Eng Sign/Date	S/U Prog Director/Date	QA SCN:
John Cantini / 5-20-87	[illegible] 5-21-87	[illegible] 5-22-87

Final Approval:	PORC Meeting No.	Plant Prog Manager/Date:	
■ Approved [ ] Disapproved	87-114	[illegible]	5/21/87
		Plant QA Manager/Date: [illegible]	5/21/87

TSN 401

STARTUP TEST CHANGE NOTICE

Sheet 1 of 1

Rev.: 4
Form: PAP-1104-3a

STP No./Title	Rev.	STCN No.	Date
STP-821-025A/MSIV Function Test	3	025A-3-1	5/14/87

Reason for change
To transfer testing per Sections 8.1 and 8.2 from TC-2 to TC-3. This change previously approved by PORC via STCN-203-2-5 and S.E. 887-260.

Affected steps, sections, or paragraphs
2.0, 6.1, 6.1 note 2, 6.3.1, 6.4.2, 6.5.1, 6.6.3, 6.8.2, 8.1.2.2.a, 8.1.39.4.a.2, 8.2 (note), 8.2.2.1.b, 8.2.2.2.a, 8.2.3.1, 8.3.2.1.c, 8.4.2.1.b, Attachment 7 - No. 1.

Change

For the above steps change Test Condition 2 to Test Condition 3.

Does STCN change intent of the STP [ ] Yes [■] No (if yes is checked, conditional approval is not allowed)

Originator/Date: W.E. Knight 5-15-87

Conditional Approval

Test Director/Date: 5-15-87

Shift QC Supervisor/Date: 5/15/87

50.59 Applicability CK Completed per PAP-0305 Yes [ ] No [■]

(Attach Applicability CK Form)

STCN Log [■] Updated

S/U Test File Supr/Date: John H. Conlin 5-20-87

S/U Prog. Director/Date: 5-20-87

QA SCV: 5-22-87

Final Approval: [■] Approved [ ] Disapproved

PORC Meeting No.: 87-114

Plant Tech Manager/Date: 5/21/87

Plant Ops Manager/Date: 5/21/87

TSN 451

8.3 Full Closure of the Fastest MSIV at 70% Power

8.3.1 Precautions Applicable to All Sections

1. Reviewed (5.1)

RJB 10/29/87
Init/Date

8.3.2 Prerequisites and Initial Condition

1. Prerequisites

   a. ERIS sample plan (6.6.1)

   RJB 10/29/87
   Init/Date

   b. Scram and isolation margins verified. (6.6.2)

   RJB 10/29/87
   Init/Date

   c. Record (6.6.3):

   Fastest MSIV F022D, t_d .28 sec.

   AP_{10} 9.8 %, AP_{90} 91 %.

   RJB 10/29/87
   Init/Date

   Verified By/Date

2. Initial Conditions

   a. Test Condition 7, reactor power 70-75% (6.7.1)

   Init/Date/Time

   b. Recirculation system in Master Manual Mode (6.7.2)

   RJB 10/29/87 1453
   Init/Date/Time

   c. Evacuate Containment (6.7.3)

   RJB 10/29/87 1531
   Init/Date/Time

8.3.3 Authorization to test

1. Test Condition 7 and Test Plateau HP are approved per STI- HP - 204, High Power Plateau.

   RJB 10/29/87
   Init/Date

Serial No. 451

2. Test included in TPOD

Init/Date

or:

Test not in TPOD, approved to test (and QA notified)

NA

Startup Test Program Director Date

3. Approved

Unit Supervisor Date Time

NOTE: All controls and indicators used in this section are located on panel 1H13-P601, unless specified otherwise.

8.3.4 Record the following:

P680 Instrument	Parameter	Data		Alternate Inst./Units
APRM	Core Power		%	
1N41-R018	Plant MWe		MWe	
1C34-R609	Reactor Press		psig	
1B33-R613	Core Flow		Mlb/hr= %	
1C34-P601	NF Rx Level A/B (Circle Channel Used)		inches	

Init/Date

NOTE: Starting and stopping of ERIS and archiving of ERIS data is at the discretion of the Test Director.

8.3.5 Start ERIS recording at least 10 seconds prior to the MSIV closure.

Init/Date

OFFICIAL TEST COPY

8.3.6 Manually close the fastest MSIV (recorded in step 8.3.2-1c) by turning its control switch to the "CLOSE" position.

Init/Date

8.3.7 When the reactor pressure and power transient has stabilized, stop ERIS. Archive the ERIS data and record the information necessary for data retrieval.

Tape No. 45121 (LABEL) 449

Init/Date

8.3.8 Plant Restoration

1. Open the tripped MSIV by returning its control switch to the "AUTO" position.

Init/Date

2. Plant operations may continue as directed by the Unit Supervisor.

Init/Date

8.3.9 Level 1 Analysis

1. Times t'_0, t_{10}, and t_{90} equal the time the MSIV pilot valve solenoid is de-energized and actuation of the 10% and 90% closed limit switches, respectively.

From the ERIS data (ERIS signals B21EC069 through B21EC[illegible]), record values for t'_0, t_{90}, and t_{10}.

t'_0 = [illegible] sec.

t_{90} = [illegible] sec. t_{10} = [illegible] sec.

Init/Date

2. Calculate the valve stroke time t_s.

$$t_s = \frac{(t_{90} - t_{10})}{(AP_{90} - AP_{10})} \times 100\%$$

$$t_s = \frac{([illegible]\ \text{sec} - [illegible]\ \text{sec})}{([illegible]\% - [illegible]\%)} \times 100\%$$

t_s = [illegible] sec.

Serial No. 45

NOTE: Values for ΔP_{10} and ΔP_{90} are from step 8.3.2-1.

J.O 12/29/87
Init/Date

3. Verify the MSIV stroke time (t_s) is greater than or equal to 2.5 seconds and less than or equal to 5.0 seconds: Acceptance Criteria 3.1.1.

J.O 12/29/87
Init/Date

4. Calculate closure time t_{sol} from the following:

$$t_{sol} = (t_{90} - t_o') + \frac{(t_{90} - t_{10})}{(\Delta P_{90} - \Delta P_{10})} (100\% - \Delta P_{90})$$

t_{sol} = (11.42 sec - 32.998 sec) + (20.52 sec - 11.424 sec) / (91 % - 9.2 %) (100% - 91 %)

t_{sol} = 21.76 sec.

J.O 12/29/87
Init/Date

5. The total effective MSIV closure time equals t_{sol} plus the maximum instrumentation delay time (i.e., $t_{sol} + t_d$). Calculate the total effective closure time.

Total Effective Closure Time = $t_{sol} + t_d$

Total Effective Closure Time = 21.76 sec. + .29 sec.

Total Effective Closure Time = 22.14 sec.

NOTE: The value for t_d is from Step 8.3.2-1.

J.O 12/29/87
Init/Date

6. Verify the total effective closure time, is not greater than 5.5 seconds. Acceptance Criteria 3.1.1.

$t_{sol} + t_d$ is less than or equal to 5.5 sec.

TCA 451.1 J.O 12/29/87
Init/Date

12/29/87
Level I Analysis Verified By/Date

Serial No. 451

8.3.10 Secure from Test

1. Approved

Test Director — Date

2. Approved

Unit Supervisor — Date — Time

8.3.11 Level 2 Analysis

1. Verify the reactor did not scram or isolate during the MSTV closure: Acceptance Criteria 3.2.1.

Init/Date

2. Scram Avoidance - Flow Biased Scram

a. Determine the Peak transient value for simulated thermal power (STP). The Peak Transient STP is the value at point of closest approach of ERIS Heat Flux channels CS1EA019 or 20 to either of ERIS channels C71A0003 or C71A0004, respectively.

Peak Transient STP = 78.209 %

Using: CS1EA019 / CS1EA020 (Circle)

dSTP = Peak Transient STP - Initial STP

dSTP = 78.209 - 76.292

dSTP = 1.917

Init/Date

b. Determine AFRM Upscale Simulated Thermal Power Trip Setpoint. The Setpoint is the value of ERIS Channels C71A0003 or C71A0004 at the point of the Peak Transient STP. 92.929

Setpoint = %

Init/Date

Serial No. 451

c. Compute the Simulated Thermal Power margin to scram:

Margin to Scram = Setpoint - Peak Transient STP

Margin to Scram = 92.929 % - 78.209 %

Margin to Scram = 14.72 % 10/3/07
Init/Date

d. Verify the simulated thermal power (STP) margin to scram for each channel is greater than or equal to 5.0%. Acceptance Criteria 3.2.2. 10/3/07
Init/Date

3. Scram Avoidance - Reactor Pressure

a. Calculate the transient reactor pressure margin to scram.

Initial Pressure = 964.00 psig (ERIS C34EA028)

Margin to Scram = Scram Setpoint - Peak transient pressure (ERIS signal C34EA028 or C34EA030 as appropriate)

Margin to Scram = 1064.7 psig - 984.81 psig

Margin to Scram = 80.09 psi 10/3/07
Init/Date

b. Verify the reactor pressure margin to scram is greater than or equal to 10 psi: Acceptance Criteria 3.2.2. 10/3/07
Init/Date

4. Scram Avoidance - Neutron Flux

a. Calculate the transient neutron flux margin to scram:

1) From the ERIS data, determine the peak transient neutron flux. Use highest of ERIS signals C51EA003 thru C51EA010 and record the channel used.

Using ATTM B :

Peak Flux = 84.08 %

10/3/07
Init/Date

Serial No. 451

2) Compute the margin to Scram as follows:

Margin to scram = Setpoint - Peak Flux

Margin to scram = 118% - 84.08 %

Margin to Scram = 33.92 %

10/3/87
Init/Date

b. Verify the neutron flux margin to scram is greater than or equal to 7.5% Acceptance Criteria 3.2.2.

10/3/87
Init/Date

5. Main Steam Line Isolation Avoidance

a. Calculate the transient individual MSL flow margin to isolation:

$$\text{Margin to Isolation} = \text{Isolation Setpoint} - \frac{\text{Peak Individual MSL Flow}}{\text{Rated MSL Flow}} \times 100\%$$

NOTE: The Peak Individual MSL flow in the above equation is the maximum steam flow observed in all unisolated steam lines.

$$\text{Margin to Isolation} = 137\% - \frac{3.4 \times 10^6 \text{ lbm/hr}}{3.85 \times 10^6 \text{ lbm/hr}} \times 100\%$$

Margin to Isolation = 39.16%

Where: Peak transient individual MSL Flow is determined from ERIS signals C34EA014, C34EA015, C34EA016 and C34EA017.

$3.85 \times 10^6 \frac{\text{lbm}}{\text{hr}}$ is one fourth of rated steam flow,

$15.4 \times 10^6 \frac{\text{lbm}}{\text{hr}}$.

10/2/87
Init/Date

b. Verify the margin to isolation to greater than or equal to 10%: Acceptance Criteria 3.2.2.

10/3/87
Init/Date

10/30/87
Level 2 Analysis Verified By/Date

Serial No. 451

8.3.12 Verify that any ERIS printouts, other computer or recorder printouts, and any other plant data required is available for inclusion in the Test Results Package.

DBM 10/30/87
Init/Date

********** END OF SECTION 8.3 **********

(INTENTIONALLY BLANK)

Attachment 6

EPIS Sample Plan

Function ID	Function Description	Scan Interval (msec)
B21EA001	Rx Wide Range Level C	8
B21EA002	Rx Wide Range Level A	8
B21EA003	Rx Wide Range Level L	8
B21EA004	Rx Wide Range Level B	8
B21EC013	RPS Isolation Status Channel A	5
B21EC014	RPS Isolation Status Channel B	5
B21EC015	RPS Isolation Status Channel C	5
B21EC016	RPS Isolation Status Channel D	5
*B21EC021	SRV Initiation Status	4
*B21EC022	SRV Initiation Status	4
*B21EC023	SRV Initiation Status	4
*B21EC024	SRV Initiation Status	4
*B21EC025	SRV Initiation Status	4
*B21EC026	SRV Initiation Status	4
*B21EC027	SRV Initiation Status	4
*B21EC028	SRV Initiation Status	4
*B21EC029	SRV Initiation Status	4
*B21EC030	SRV Initiation Status	4
*B21EC031	SRV Initiation Status	4
*B21EC032	SRV Initiation Status	4
*B21EC033	SRV Initiation Status	4
*B21EC034	SRV Initiation Status	4
*B21EC035	SRV Initiation Status	4
*B21EC036	SRV Initiation Status	4
*B21EC037	SRV Initiation Status	4
*B21EC038	SRV Initiation Status	4
*B21EC039	SRV Initiation Status	4
B21EC042	SRV Position	10
B21EC043	SRV Position	10
B21EC044	SRV Position	10
B21EC045	SRV Position	10
B21EC046	SRV Position	10
B21EC047	SRV Position	10
B21EC048	SRV Position	10
B21EC049	SRV Position	10
B21EC050	SRV Position	10
B21EC051	SRV Position	10
B21EC052	SRV Position	10
B21EC053	SRV Position	10

TSN 451

Attachment 6 (Cont.)

ERIS Sample Plan

Function ID	Function Description	Scan Interval (msec)
B21EC054	SRV Position	10
B21EC055	SRV Position	10
B21EC056	SRV Position	10
B21EC057	SRV Position	10
B21EC058	SRV Position	10
B21EC059	SRV Position	10
B21EC060	SRV Position	10
*B21EC069+	INBD MSIV Solenoid Status (22A)	4
*B21EC070+	INBD MSIV Position (22A)	4
*B21EC071+	INBD MSIV Position (22A)	4
*B21EC072+	INBD MSIV Solenoid Status (22B)	4
*B21EC073+	INBD MSIV Position (22B)	4
*B21EC074+	INBD MSIV Position (22B)	4
*B21EC075+	INBD MSIV Solenoid Status (22C)	4
*B21EC076+	INBD MSIV Position (22C)	4
*B21EC077+	INBD MSIV Position (22C)	4
*B21EC078+	INBD MSIV Solenoid Status (22D)	4
*B21EC079+	INBD MSIV Position (22D)	4
*B21EC080+	INBD MSIV Position (22D)	4
*B21EC081+	OUTBD MSIV Solenoid Status (28A)	4
*B21EC082+	OUTBD MSIV Position (28A)	4
*B21EC083+	OUTBD MSIV Position (28A)	4
*B21EC084+	OUTBD MSIV Solenoid Status (28B)	4
*B21EC085+	OUTBD MSIV Position (28B)	4
*B21EC086+	OUTBD MSIV Position (28B)	4
*B21EC087+	OUTBD MSIV Solenoid Status (28C)	4
*B21EC088+	OUTBD MSIV Position (28C)	4
*B21EC089+	OUTBD MSIV Position (28C)	4
*B21EC090+	OUTBD MSIV Solenoid Status (28D)	4
*B21EC091+	OUTBD MSIV Position (28D)	4
*B21EC092+	OUTBD MSIV Position (28D)	4
*B33EA021+	Reactor Core Flow	8
*B33EA028	Recirc Pump Elbow Tap 14A DP	4
*B33EA029	Recirc Pump Elbow Tap 14C DP	4
*B33EA030	Recirc Pump Elbow Tap 24A DP	4
*B33EA031	Recirc Pump Elbow Tap 24C DP	4
B33EC003	LFMG Set Gen CB 2A Status	5
B33EC004	LFMG Set Gen CB 2B Status	5
B33EC009	LFMG Set Gen CB 5A Status	4
B33EC010	LFMG Set Gen CB 5B Status	4

TSN 451

Attachment 6 (Cont.)

ERIS Sample Plan

Function ID	Function Description	Scan Interval (msec)
*C34EA013+	Total Reactor Steam Flow	8
*C34EA014+	Steam Line A Flow	8
*C34EA015+	Steam Line B Flow	8
*C34EA016+	Steam Line C Flow	8
*C34EA017+	Steam Line D Flow	8
*C34EA019	Feedwater Flow A	8
*C34EA020	Feedwater Flow B	8
*C34EA024	Rx Narrow Range Level A	8
*C34EA025	Rx Narrow Range Level B	8
*C34EA026	Rx Narrow Range Level C	8
*C34EA028+	Narrow Range Rx Dome Pressure	8
*C34EA030+	Wide Range Rx Dome Pressure	8
C34EA031	Turbine Steam Flow	8
C34EC001	TDFP A Trip Status	5
C34EC002	TDFP B Trip Status	5
*C34EC003	MDFP C Trip Status	5
*C51EA003+	APRM A Flux	8
*C51EA004+	APRM B Flux	8
*C51EA005+	APRM C Flux	8
*C51EA006+	APRM D Flux	8
*C51EA007+	APRM E Flux	8
*C51EA008+	APRM F Flux	8
*C51EA009+	APRM G Flux	8
*C51EA010+	APRM H Flux	8
*C51EA019+	Heat Flux A	4
*C51EA020+	Heat Flux B	4
*C71EC001	Channel Scram A Status	2
*C71EC002	Channel Scram B Status	2
*C71EC003	Channel Scram C Status	2
*C71EC004	Channel Scram D Status	2
C71EC009	RPT Logic A Status	4
C71EC010	RPT Logic B Status	4
C85EA011	Main Turbine Total BVP Valve Position	4
E22EA001	HPCS Flow	8
E22EC001	HPCS System Initiation Status	5
E51EA004	RCIC Pump Flow	8
E51EA014	RCIC Turbine Speed	8
E51EC001	RCIC System Initiation Status	10
N21EA019	Condenser Pressure A	100
N21EA020	Condenser Pressure B	100
N21EA021	Condenser Pressure C	100

TSN 451

Attachment 6 (Cont.)

ERIS Sample Plan

Function ID	Function Description	Scan Interval (msec)
*N31EA002	Main Turbine Total CV Position	4
*N32EA005	Main Turbine Cont Valve A Position	4
*N32EA006	Main Turbine Cont Valve B Position	4
*N32EA007	Main Turbine Cont Valve C Position	4
*N32EA008	Main Turbine Cont Valve D Position	4
*C71A0003+	Flow Bias Simulated Thermal Power Trip Setpoint A	8
*C71A0004+	Flow Bias Simulated Thermal Power Trip Setpoint B	8

*Required point for test.
+Printout required in Test Results Package.

TSN 451

TC-7 Margin Verification

1. From the completed level 2 analysis of section 8.2 performed at TC-~~7~~ 3, record the following:

   a) From 8.2.11.2a (Simulated Thermal Power) record the largest transient change in simulated thermal power (STP).

   dSTP = ,55 %

   b) Verify the following:

   10% - dSTP ≥ 5%

   10% - ,55 % ≥ 5%

   9.45 % ≥ 5%

   c) From 8.2.11.3 (Reactor Pressure) record the following:

   1. Initial Pressure = 939 psig

   2. Peak Transient Pressure = 948 psig

   ΔP = Initial Pressure - Peak Transient Pressure = 9 psig

   d) Verify the following:

   55 psig - ΔP ≥ 10 psig

   55 psig - 9 psig ≥ 10 psig

   46 psig ≥ 10 psig

   e) From 8.2.11.4 (Neutron Flux) record the following:

   dAPRM = 2 %

   f) Verify the following:

   38% - dAPRM ≥ 7.5%

   38% - 2 % ≥ 7.5%

   36 % ≥ 7.5%

TC-7 Margin Verification

g) From 8.2.11.5 (MSL Isolation Avoidance) record the following:

Initial MSL flow = 1.44×10^6 lbm/hr
Peak Individual MSL flow = 1.98×10^6 lbm/hr

$$\Delta MSL\ Flow = \frac{\text{Peak Individual MSL Flow} - \text{Initial MSL flow}}{3.85 \times 10^6\ \text{lbm/hr}}$$

h) Verify the following:

52% - ΔMSL Flow $\geq$ 10%

52% - 14 % $\geq$ 10%

38 % $\geq$ 10%

Robert J. Burch 4/6/87
Completed By/Date

[signature] 4/6/87
Verified By/Date

Reportability Review

Date/Time	Event
10-29-87/2144	Both MSL D Isolation Valves Failed.
10-30-87/0010	4 hour ENS call made to NRC regarding slow MSIVs. *Call made within the Requirements of 10 CFR 50.72 (b)(2)(iii) - Loss of a safety function.
11-03-87/1212	Both MSL D Isolation Valves Failed.
11-03-87/1337	Commenced Plant Shutdown.
11-03-87/1355	ENS call made on Plant shutdown and slow MSIVs. *Call satisfied 4 hour requirements of 10 CFR 50.72 (6)(2)(iii) and 1 hour requirement of 50.72 (b)(1)(i)A - Plant shutdown required by Technical Specification.
11-3-87/1819	Plant scrammed to shutdown.
11-03-87/2130	ENS call made on RPS/ESF Actuation. *2130 call was unnecessary since the plant scram was planned, not unexpected. Never-the-less call was within 4 hour requirement per 10 CFR 50.72 (b)(2)(ii) - RPS/ESF Actuations.
Conclusion:	Three calls were made. All immediate Notification Requirements were satisfied. One call was made unnecessarily. A 30 day written report, in accordance with 10 CFR 50.73, was initiated and is forthcoming.

1. History

On October 29, 1987 at 1900, Main Steam Isolation Valve (MSIV) 1B21-F022D exceeded it's allowable stroke time during performance of a startup test and was declared inoperable. Technical Specification 3.6.4 Action (a) then became applicable and the penetration was to be isolated within 4 hours unless the valve could be returned to Operable status. At 2103 and 2106, 1B21-F022D was cycled and stroked closed within the 5 second isolation time required by 3.6.4.

Subsequent to the 1B21-F022D valve testing, all MSIVs were cycled in order to verify adequate stroke times. At 2144, the 1B21-F028D failed it's stroke time test and was considered inoperable. At this point, Technical Specifications required the plant to be shutdown in 12 hours. (One other MSIV, 1B21-F028B, also failed it's first stroke time test at 2216).

By 2310, all MSIVs that failed their initial stroke times had successfully completed subsequent tests and an evaluation of the results was complete. The valves were now considered operable. The bases for this decision was that the cause of the slow closures was a one time deposit of debris in the respective solenoids causing a delay in their response. Once the valves were cycled and the stroke times passed, the debris was assumed to be blown away. This conclusion was consistent with known industry problems regarding air systems and MSIV solenoid valves. These previous experiences were considered heavily in the final decision. No further actions per Technical Specifications were required. None of the Technical Specification Limiting Conditions for Operation (LCO) were violated.

On November 3, 1987 another series of stroke timing tests were performed on the MSIVs. At 1157, the 1B21-F022D failed it's stroke time and was declared inoperable. At 1208 the 1B21-F028D failed to close. Both valves were subsequently recycled satisfactorily within minutes of their first tests. However, because the valves again failed to properly actuate on the first attempt, the original hypotheses for the isolated failures was no longer considered valid. The plant commenced a shutdown at 1330 and the D and B lines were isolated by 1354. At 1819, in order to complete the shutdown the reactor was manually scrammed. The plant was shutdown within the 12 hours required by Technical Specification 3.6.4 Action (a).

Since no LCO was violated during either event, the plant remained within the constraints of the analytical bases contained in the operating license. Consequently, the incidents resulted in no immediate safety significance.

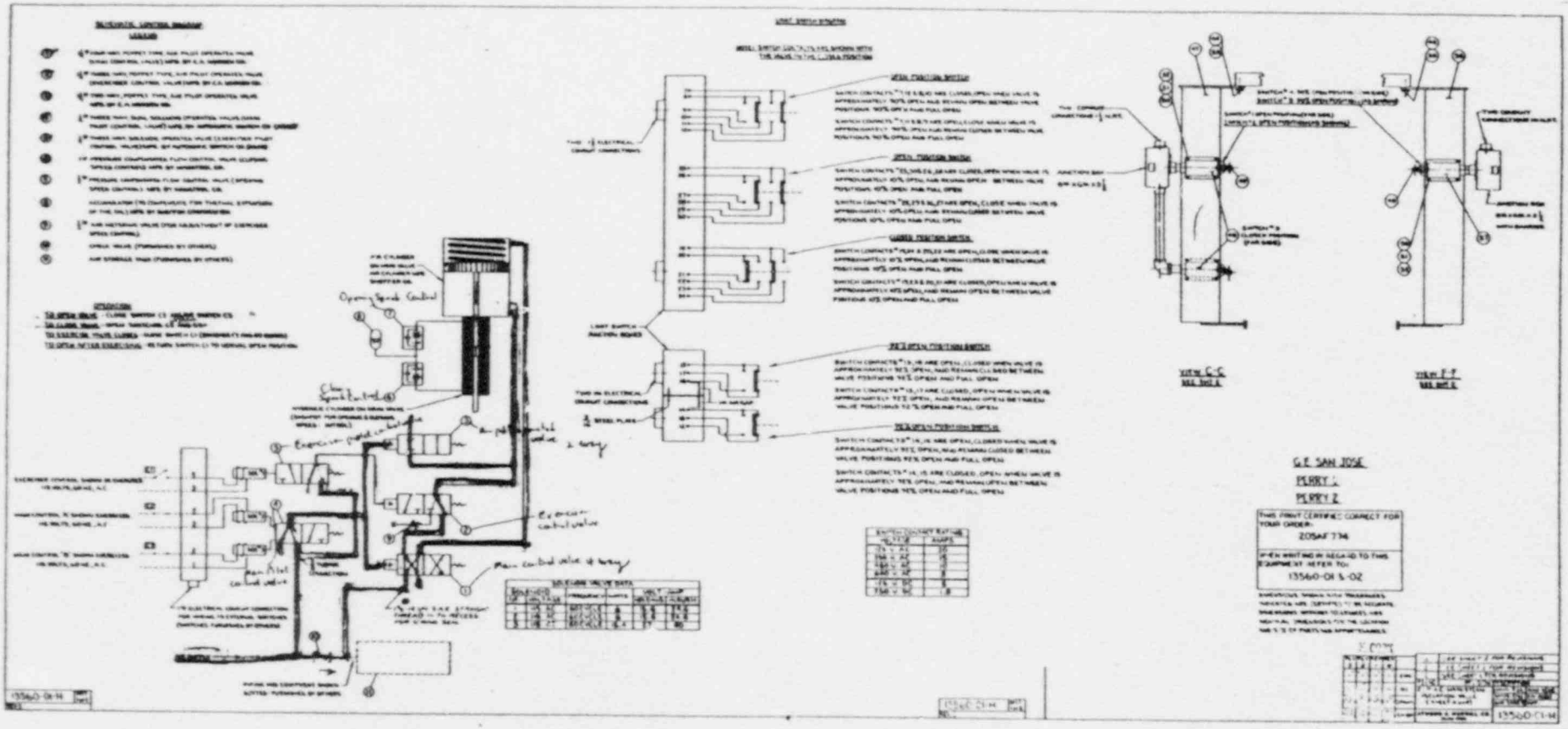
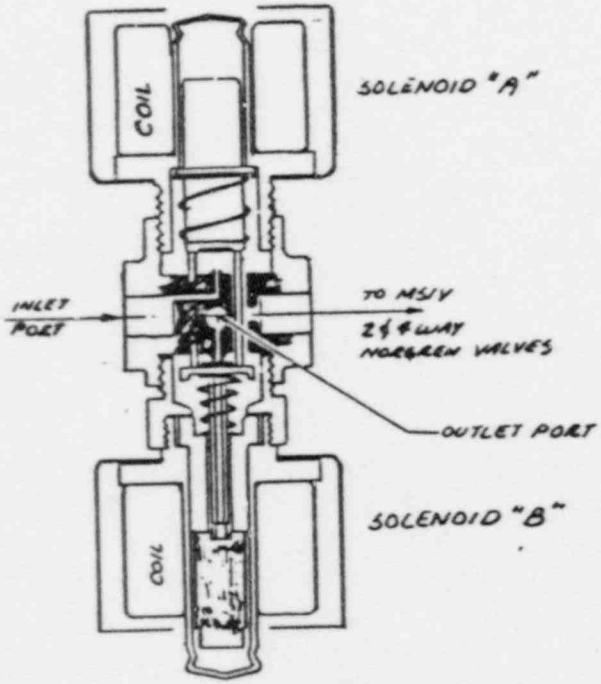
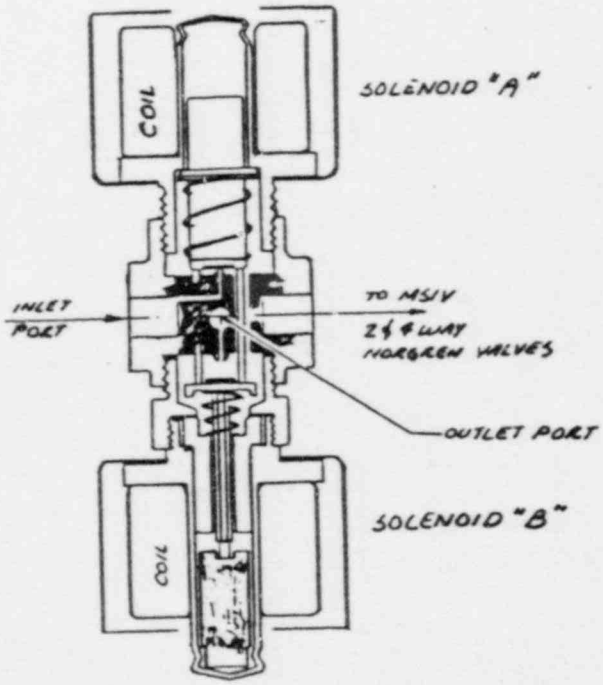

Open Speed Control
Exercise control valve
Main control valve 4 way
Exercise control valve
G.E. SAN JOSE
PERRY 1
PERRY 2
205AF734
13560-01 & -02
13560-01-M

Fig. 1 SHEET 4



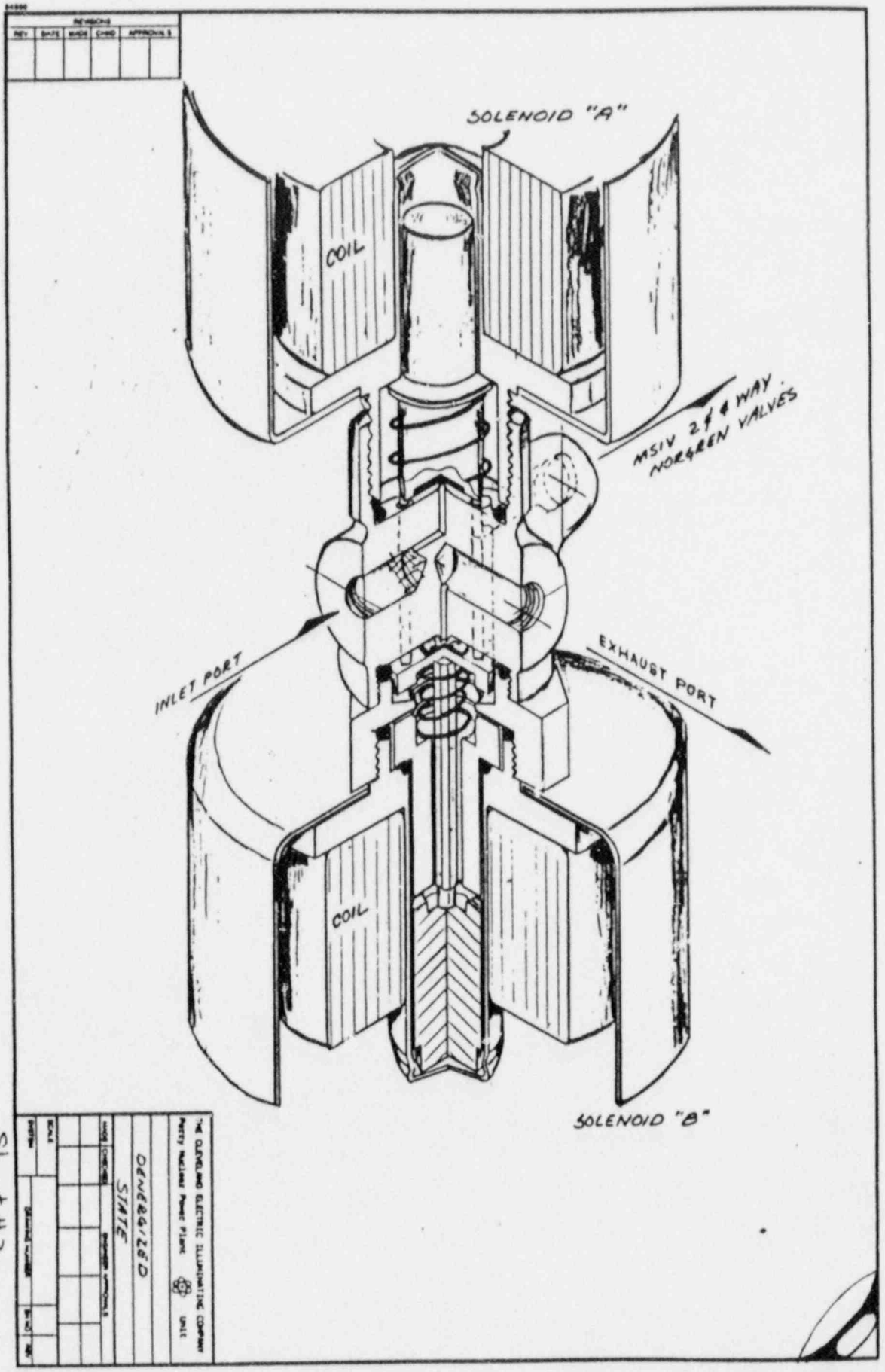
ENERGIZED



DENERGIZED

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
Perry Nuclear Power Plant UNIT

Sheet #1


SOLENOID "A"
COIL
MSIV 2 4 WAY
NORGREN VALVES
INLET PORT
EXHAUST PORT
COIL
SOLENOID "B"
THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
PERRY NUCLEAR POWER PLANT
UNIT
DENERGIZED
STATE

Sheet #2

W.O.	DESCRIPTION
85-12198	Nuclear Boiler NSSS - Repair Leaking Instrument Air Fitting.
86-312	Nuclear Boiler NSSS - Determined Sol Leads Form MSIV's.
86-512	Area Rad Monitor - Rework Local Meter.
86-806	Nuclear Boiler NSSS - Rework Swagelock Fittings on MSIVs.
86-12963	Nuclear Boiler NSSS - Sol currently reads "0" Panel 1H13-P622.
86-14977	Nuclear Boiler NSSS - Valve wouldn't slow close per SVI.
87-82	Nuclear Boiler NSSS - MSIV "C" will not close in Test position.
87-3153	Nuclear Boiler NSSS - Perform Test of Valve as per NR.
87-3156	Nuclear Boiler NSSS - Remove O-ring and Clean Valve Seats.
87-5841	Nuclear Boiler NSSS - Elect. Support (1B21-F0022C).
87-8290	Nuclear Boiler NSSS - Rework Valve to assure proper operation.

W.O.	SUMMARY
85-0572	Checked calibration of 1P52-N0140, Recalibrated.
85-3756	Machined valve poppet on 1B21-F0022B.
85-4174	Machined valve poppet on 1B21-F0022B.
85-4320	Machined valve poppet on 1B21-F0022B.
85-4413	Machined Stem Seat per NR P038-6105 for 1B21-F0022B.
85-5198	Machined Valve poppet on 1B21-F0022B.
85-11486	Performed loss of air test per GEN-M-038 on 1B21-F0022B.
85-11512	Performed loss of air test per GEN-M-038 on 1B21-F0022B.
85-11839	Performed loss of air test per GEN-M-038 on 1B21-F0028D.
85-11943	Installed flood & moisture seals in cable transits & MSIVs per DCP 85-618.
86-0312	Determined MSIV Solenoid leads to allow disconnection of conduit.
86-0522	Replaced 1B21 Solenoid valves with spares.
86-0806	Reworked Swagelock fittings on MSIVs (1B21-F022 B & D and F028 A, B, C & D).
86-7637	Replaced screws and gasket for 1B21-F0022b.
86-12734	Voided - to close out DAR-269.
86-12963	Troubleshoot Solenoid - replaced rectifier with new diode bridge on 1B21-F0022D (NR MMQS-1382).
86-14977	Troubleshoot - 1B21-F0022D wouldn't slow close per SVI-C71-T038D. Replaced relay 1B21-K0077D.
87-0729	Reworked 1B21-F0022B due to failed LLRT.
87-0735	Contingency W.O. - Not needed.
87-0763	Performed Repetitive Task R85-10868/DCP 87-216. Performed SVI-C71-T0038H, Rebuilt limit switches, & completed SVI-B21-T2001 all for 1B21-F0028D.
87-0769	Performed Repetitive Task R85-10954/DCP 87-216 for 1B21-F0022B. Rebuilt limit switches. Performed SVI-C71-T0038B & SVI-B21-T2001.

W.O.	SUMMARY
87-5839	Contingency W.O. - Not needed (See W.O. 87-769 for retest).
87-5842	Contingency W.O. - Not needed (See W.O. 87-770 for retest).
87-5846	Contingency W.O. - Not needed (See W.O. 87-763 for retest).
87-8149	1B21-F0022B stem threaded out of stem plate. Reworked per NR NEDS-2863. Performed SVI-B21-T2001.
87-8206	1B21-F0022B failed LLRT. Reworked, reassembled, and retest.
87-8236	Adjusted actuator stroke & calibrated limit switches for 1B21-F0022D.
87-8618	1B21-F0028D had no close indication due to loose terminal on switch #1.

P = Prior to startup

P 1. Solenoid Work - Fast Closure
Replace total air pack 28D – Worst actor
Replace whole solenoid on 22D – Rusty solenoid
Rebuild Kits for 6 additional Fast closure solenoids
Bisco on all spares in manner to allow rebuild (5) – Dual Asco's.
~~Replace any dual action solenoids showing other than normal temp. degradation (Rust, etc)~~

P 2. Solenoid work - Slow Closure
1 Replaced due to air pack replacement 28D
Bisco all spares (8)
~~Replace solenoids if fast closure solenoid inspection indicates need~~

3. Solenoid Research - Others experience & efforts
Excessive Aging (Temp., Brass, EPDM, Hydrocarbons)
Review Design for Improvement possibilities
Consider exhaust port screen installation
Replacement frequency
~~Inspection/Overhaul prior to next refueling outage~~

D-71

4. Air System Efforts

Provide sampling plan intent & results – offsite analysis

Continue Dewpoint & particle sampling – routine - already in-place.

Implement PM for periodic replacement of filters. Freq to be determined.

Implement generic caution in air system work packages for lubricants or sealants.

Examine reduction gear vent and compressor intake

More frequent replacement of filters on compressor intake.

5. Other ASCO Applications in Plant

50 class 1E, 40 Harsh Environment (with EQ rules), 2 in DW or Steam Tunnel

Energized state applications

Maintenance History

6. Other equipment impacts

vicinity of 22D, 28B&D.

EPDM applications in High Temp. areas

P 7. Additional Temp. Monitoring

Steam Tunnel

MSIV area

Solenoid body, coil etc.

Test solenoid

Evaluate DW potential – Study last inst. penetrations

P ≤ constant. 8. Additional Surveillance

Until 1st refuel

During monthly slow closure check full closure solenoids

Perform Quarterly timing regardless of shutdown condition

P ≤ constant 9. Inspection of ASCO dual solenoids prior to next refuel outage.

- Jan. / March / Oct. opportunities.
- Establish criteria.

- Water intrusion in F028 indicate problem potential with EQ, other EQ use problems (temp., etc.)
- Incorrect wiring diag (must list the as built, elementary login diag).
- ~~Retest~~ PM on IA/SA + other air actuated
- Complete analysis of sample.

F022D

WO 9323 Rev.1 – Airpack blow down *, visual & voltages
WO 9293 Rev. 2 – Removal of air pack
WO 9405 Rev. 1 – Blow down airline
WO 9372 Rev. 1 – Airpack disassy. except slow closure solenoid. Equivalent in EAC shop

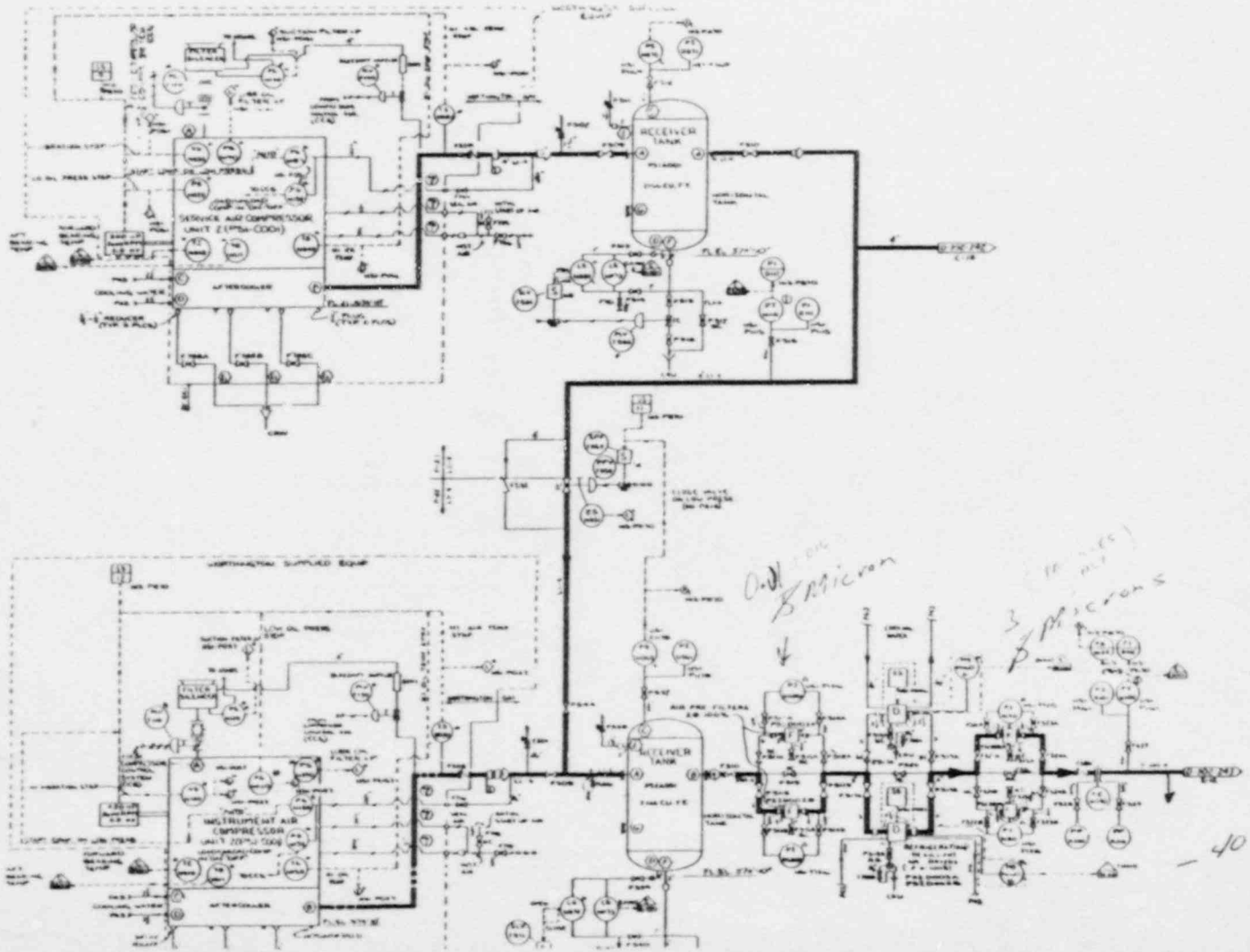
F028D

WO 9285 Rev. 3 – Removal of air pack
WO 9440 Rev. 0 – Blowdown airline
WO 9443 Rev. 1 – Complete air pack disassy.
~~WO 9284 Rev. 0 – Removal of air pack~~
WO 9456 Rev 0 – Bench Test Airpack

F028B

WO 9324 Rev 0 – Removal of air pack
WO 9439 Rev 0 – Blowdown Airline
WO 9433 Rev 4 – Airpack disassy. except slow closure solenoid

D-72



OPERATING DATA

	AIR			
	AIR			

SYSTEM DESIGNATION

DESIGN DATA

Am. 17 (

A30 12 Harsh

Ascom. 1.14

NP-8320-A185E
NP-8323-A20E

NP-8320-A185E
NP-8323-A20E

NP-8320 A185E
NP-8323 A20E

NP-8320 A185E
NP-8323 A20E

NP-8320 A185E
NP-8323 A20E

NP-8320 A185E
NP-8323 A20E

C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV D LOCATION SUPPORT ZONE M/H
*1B21 F 0460	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-INBOARD TEST/PILOT SOLENOIDS (3)	1B21H010 R D C 1/00-630 1B21 F 0022A DW-1 HARSH
NO WORK HISTORY		
*1B21 F 046	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-INBOARD TEST/PILOT SOLENOIDS (3)	1B21H010 R D C 1/00-630 1B21 F 0022B DW-1 HARSH
NO WORK HISTORY		
*1B21 F 0462	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-INBOARD TEST/PILOT SOLENOIDS (3)	1B21H010 R D C 1/00-630 1B21 F 0022C DW-1 HARSH
NO WORK HISTORY		
*1B21 F 0463	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-INBOARD TEST/PILOT SOLENOIDS (3)	1B21H010 R D C 1/00-630 1B21 F 0022D DW-1 HARSH
NO WORK HISTORY		
*1B21 F 0480	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-OUTBOARD TEST/PILOT SOLENOIDS (3)	1B21H011 S D AXC/05-620 1B21 F 0028A AB-7 HARSH
NO WORK HISTORY		
*1B21 F 0481	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-OUTBOARD TEST/PILOT SOLENOIDS (3)	1B21H011 S D AXC/05-620 1B21 F 0028B AB-7 HARSH
NO WORK HISTORY		

D-73

Asco mod. 1 A

C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV DIV LOCATION SUPPORT ZONE M/H
*1B21 F 0482	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-OUTBOARD TEST/PILOT SOLENOIDS (3)	1B21HO11 S D1 AXC/05-620 1B21 F 0028C AB-7 HARSH
	No work history	
*1B21 F 0483	NUCLEAR STEAM SUPPLY SHUTOFF SYSTEM MAIN STEAM ISOLATION VALVE-OUTBOARD TEST/PILOT SOLENOIDS (3)	1B21HO11 S D1 AXC/05-620 1B21 F 0028D AB-7 HARSH
	No work history	

NP-8320-A185E
NP-8323-A20E

NP-8320-A185E
NP-8323-A20E

Asco Model H

NP8316A75E

NP8316A75E

NP8316A75E

NP8316A75E

NP8316A75E

NP8316A75E

			ZONE M/H
*1M14 F 0043	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F040 SOLENOID		1M14 008 G D1 C 0/12-689 1M14 F 0040 CT-0 HARSH
	NO WORK HISTORY		
*1M14 F 0048	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F045 SOLENOID		1M14 008 G D2 C 0/12-689 1M14 F 0045 CT-1 HARSH
	WO B6-1698 Repl-Air Tube Leak		
*1M14 F 0058A	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F055A SOLENOID		1M14 009 K D1 C I/07-630 1M14 F 0055A DW-1 HARSH
	NO WORK HISTORY		
*1M14 F 0058B	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F055B SOLENOID		1M14 010 J D2 C 0/07-630 1M14 F 0055B CT-3 HARSH
	NO WORK HISTORY		
*1M14 F 0060A	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F060A SOLENOID		1M14 009 K D1 C I/16-630 1M14 F 0060A DW-1 HARSH
	NO WORK HISTORY		
*1M14 F 0060B	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F060B SOLENOID		1M14 010 J D2 C 0/16-630 1M14 F 0060B CT-3 HARSH
	NO WORK HISTORY		

ASCO M.I.I H

C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV LOCATION SUPPORT ZONE M/H
NP8316A75E *1M14 F 0068	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F065 SOLENOID	1M14 011 H C 0/12-652 1M14 F 0065 CT-7 HARSH
	NO WORK HISTORY	
NP8316A75E *1M14 F 0073	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F070 SOLENOID	1M14 012 G C 0/12-652 1M14 F 0070 CT-7 HARSH
	NO WORK HISTORY	
NP8316A75E *1M14 F 0088	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F085 SOLENOID	1M14 011 H C 0/12-664 1M14 F 0085 CT-7 HARSH
	NO WORK HISTORY	
NP8316A75E *1M14 F 0093	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F090 SOLENOID	1M14 012 G C 0/12-664 1M14 F 0090 CT-0 HARSH
	NO WORK HISTORY	
NP8316A75E *1M14 F 0192	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F190 SOLENOID NO WORK HISTORY	1M14 013 F C 0/12-685 1M14 F 019? CT-1 HARSH
NP8316A74E 1M14 F0197	NO WORK HISTORY	
NP8316A75E *1M14 F 0202	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F200 SOLENOID	1M14 013 F C 0/12-664 1M14 F 0200 CT-7 HARSH
	OPEN W.O. 86-3552 Tubing Air Leak	
NP8316A74E 1M14 F 0207		
	W.O. 86-3553. Tubing Air Leak (more holes void	

ASME XI.1 #

TABLE 1 EQUIPMENT LIST

C D S	EQUIPMENT NUMBER	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV D LOCATION SUPPORT ZONE M/H
NF3316A74E	*1M14 F 0197	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F195 SOLENOID	1M14 016 D D C 0/12-689 1M14 F 0195 CT-1 HARSH
		NO WORK HISTORY	
NF8316A74E	*1M14 F 0207	CONTAINMENT VESSEL AND DRYWELL PURGE OP AIR TO F205 SOLENOID	1M14 016 D D C 0/12-664 1M14 F 0205 CT-7 HARSH
		W.O. EC-3553 TO [illegible]	

AS of Mod. 1 B

SELECT :
SORT : 01
TITLE : EQPL/SP 607-000

AS OF 00761

C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV D LOCATION SUPPORT ZONE M/H
NP8320A185E *1821 F 0451	NUCLEAR BOILER SYSTEM SOLENOID FOR VALVE F069 SOLENOID	1B21A004 U D AXB/04-620 1B21 F 0069 AB-7 HARSH
	W.O. 85-1674 [illegible]	
NP8320C94E *1B33 F 0419	REACTOR RECIRCULATION SYSTEM CONTROLS OPERATING AIR TO F019 SOLENOID VALVE	1B21H009 U D C 0/02-620 1B33 F 0019 CT-3 HARSH
	W.O. 86-3559 [illegible]	
NP8320 94E *1B33 F 0420	REACTOR RECIRCULATION SYSTEM CONTROLS OPERATING AIR TO F020 SOLENOID	1B21H009 U D C 0/02-620 1B33 F 0020 CT-3 HARSH
	NO WORK HISTORY	
NP8320A185E *1E12 F 0451A	RESIDUAL HEAT REMOVAL SYSTEM CONTROLS OPERATING AIR TO F051A SOLENOID VALVE	1E12A041 F D AXB/06-620 1E12 F 0051A AB-4 HARSH
	[illegible]	
NP8320A185E *1E12 F 0451B	RESIDUAL HEAT REMOVAL SYSTEM CONTROLS OPERATING AIR TO F051B SOLENOID VALVE	1E12A042 H D AXB/04-620 1E12 F 0051B AB-4 HARSH
NP8320A185E *1E12 F 0465A	RESIDUAL HEAT REMOVAL SYSTEM CONTROLS OPERATING AIR TO F065A SOLENOID VALVE	1E12A041 F D AXB/06-574 1E12 F 0065A AB-4 HARSH
	NO WORK HISTORY	

DSCA M.1.1 A

TITLE : EQPL/SP 607-000

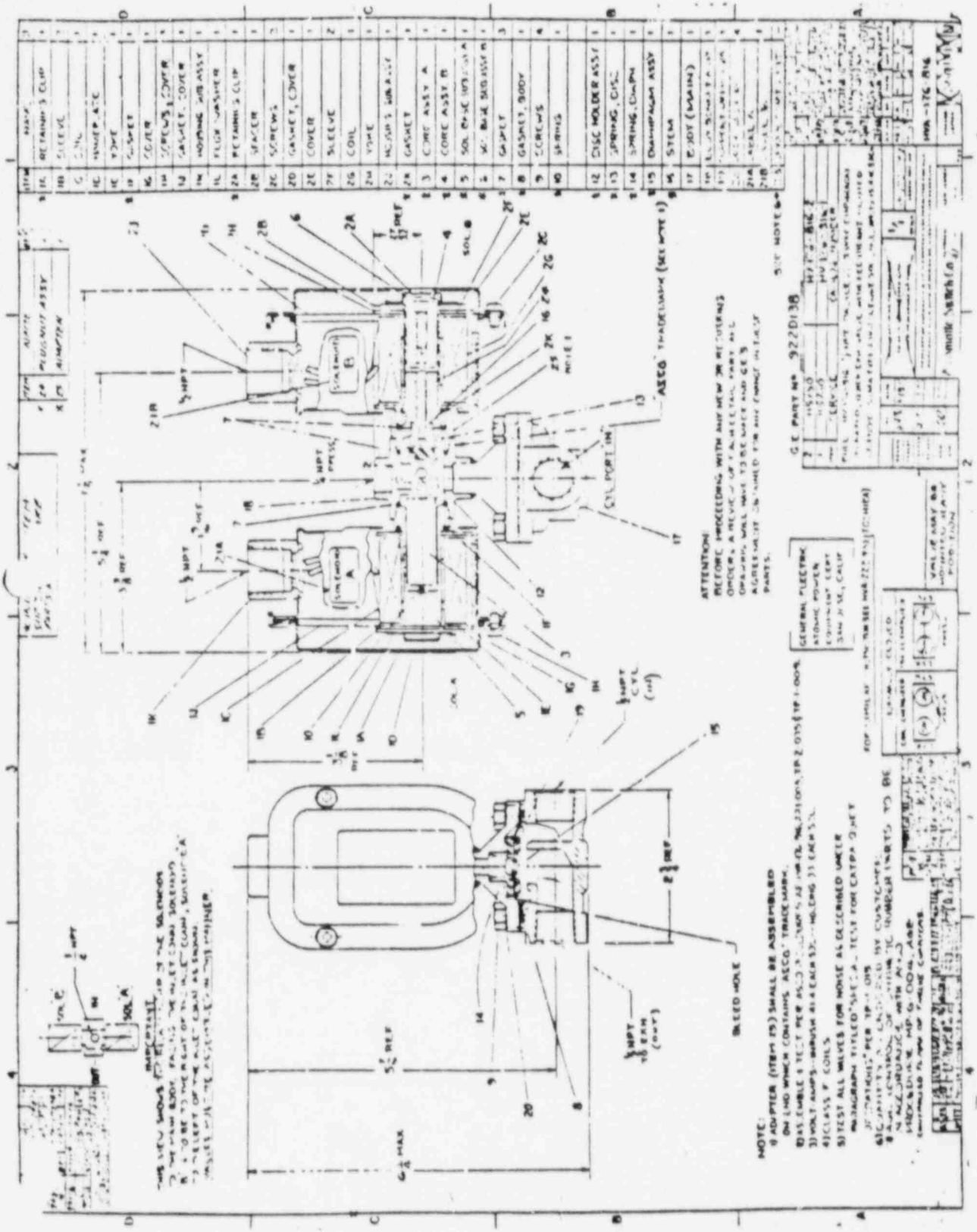
C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV LOCATION SUPPORT ZONE M/H
NP 8320 A155E *1E12 F 0465B	RESIDUAL HEAT REMOVAL SYSTEM CONTROLS OPERATING AIR TO F065B SOLENOID VALVE NO WORK HISTORY	1E12 042 F AXC/04-574 1E12 F 0065B AB-4 HARSH
NP 8320 A185E *1E51 F 0404	REACTOR CORE ISOLATION COOLING CONTROLS OPERATING AIR TO F004 SOLENOID VALVE NO WORK HISTORY	1E51A007 P AXB/05-574 1E51 F 0004 AB-3 HARSH
NP 8320 A155E *1E51 F 0405	REACTOR CORE ISOLATION COOLING CONTROLS OPERATING AIR TO F005 SOLENOID VALVE NO WORK HISTORY	1E51A007 P AXB/05-574 1E51 F 0005 AB-3 HARSH
NP 8320 A185E *1E51 F 0425	REACTOR CORE ISOLATION COOLING CONTROLS OPERATING AIR TO F025 SOLENOID VALVE NO WORK HISTORY	1E51A007 P AXC/05-574 1E51 F 0025 AB-3 HARSH
NP 8320 A185E *1E51 F 0426	REACTOR CORE ISOLATION COOLING CONTROLS OPERATING AIR TO F026 SOLENOID VALVE NO WORK HISTORY	1E51A007 P AXC/05-574 1E51 F 0026 AB-3 HARSH
NP 8320 A185E *1E51 F 0454	REACTOR CORE ISOLATION COOLING CONTROLS OPERATING AIR TO F054 SOLENOID VALVE NO WORK HISTORY	1E51A007 P AXC/05-574 1E51 F 0054 AB-3 HARSH

TITLE : EQRL/SUM-ENV

C EQUIPMENT D NUMBER S	DESCRIPTIONS SERVICE (2) EQUIPMENT (2)	DIAGRAM REV D: LOCATION SUPPORT ZONE M/H
*1C11 D 0001	REACTOR PROTECTION SYSTEM	1C71A010 H VA
	CRD-HCV/SCRAM SOLENOID PILOT VALVE	C 0/14-620
	SOLENOID(TYPICAL-177	LOCAL-CF
	CRDS-2 SSPV PER CRD)	CT-3 HARSH

ASCO MODEL # HVA-176-816-1

Computer search results for
Identify Solenoid Valve



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PRODUCTION SPECIFICATION
BILL OF MATERIAL

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CATA. NO. HV176-816-1 & HV176-816-2

SHOP ORDER NO

BULL NO. HV176-816, 1/2 NPT, PACKLESS, 3 WAY DIAPHRAGM OPERATED, QUICK EXH. VALVE WITH REDUNDANT PILOTED SOLENOID, NEMA TYPE 4 WATERTIGHT SOL. ENCL. WATTS: 15.4 AC (FT) EACH.

NO OF PARTS LIST PER ASSY: 1

ASSEMBLY REF: HVA-176-816

CHG LTR	ER NO	CHG LTR	ER NO	CHG LTR
	73832	H		
	70577	F		
	69132	D		
	68347	C		
	67826	B		

FVP-176-816

ITEM	PART NUMBER	CHG LTR	NOTE	MATERIAL	PART NAME	QUANTITY UNIT	REQD	DELVD
1	HVA-176-464	F	1		SOL. ASS'Y A (M-12)	1		
1A	GV-176-593-1	H		ST. STEEL	RETAINING CLIP	1		
1C	FV-99-033-1	H		STEEL	SLEEVE	2		
1D	GV-172-739-1	E		ALUM.	NAMEPLATE	1		
1K	HV-96-815-1	N		STEEL	YOKE	1		
1F	GV-39-619-5-HT	CV		ETHYLENE PROPYLENE	GASKET, HOUSING	1		
1G	FV-168-808-1	F		STEEL	COVER	1		
1H	FV-172-788-1	C		STEEL	SCREW, COVER	3		
1J	FV-172-759-1	D		BUNA-N	GASKET, COVER	1		
1L	FV93-233-1 ~~FV-176-336-1~~	B		STEEL	FLUX WASHER	1		
2	HVA-176-730	A	2		SOL. ASS'Y. B (M-12)	1		
2A	GV-176-593-1	H		ST. STEEL	RETAINING CLIP	1		
2B	FV-176-337-1	C		STEEL	SPACER	1		
2C	FV-172-788-1	C		STEEL	SCREW, COVER	3		
2D	FV-172-759-1	D		BUNA-N	GASKET, COVER	1		
2E	FV-168-808-1	F		STEEL	COVER	1		
2F	FV-99-033-1	H		STEEL	SLEEVE	2		
2H	HV-96-815-1	N		STEEL	YOKE	1		
2K	FV-180-769-3	B		ETHYLENE PROPYLENE	GASKET, HOUSING	1		
7	GV-39-619-6-VI	DU		VITON-A	GASKET	3		
9	GH-70-022-9C1	P		ST. STEEL	WASHER	4		
9	GH-73-102-3C1	N		ST. STEEL	SCREW	4		
8	GH-88-224-133A	Y		BUNA-N	GASKET			

NOTICE
THIS INFORMATION IS SUPPLIED IN ACCORDANCE WITH ARTICLE XVII OF THE NUCLEAR STEAM SUPPLY SYSTEM CONTRACT BETWEEN GENERAL ELECTRIC COMPANY AND CLEVELAND ELECTRIC ILLUMINATING COMPANY DATED JUNE 1, 1972. THE USE OF THIS INFORMATION BY ANYONE OTHER THAN AGENTS OR EMPLOYEES OF CLEVELAND ELECTRIC ILLUMINATING COMPANY FOR ANY PURPOSE OTHER THAN THE DESIGN, CONSTRUCTION, LICENSING OR OPERATION OF THE PERRY NUCLEAR POWER PLANT IS NOT AUTHORIZED BY THE GENERAL ELECTRIC COMPANY.

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PRODUCTION SPECIFICATION
BILL OF MATERIAL

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PAGE 2 OF 4 PAGE

CHG LTR

CATA. NO. HV176-816-1 & HV176-816-2

SHOP ORDER NO

BULL. NO. - HV176-816

NO. OF PARTS LIST PER ASS'Y 1

ASSEMBLY REF HVA-176-816

ER NO	CHG LTR	ER NO	CHG LTR
70577	F		
69132	D		
68347	C		
67826	B		

FVP-176-816

ITEM	PART NUMBER	CHG LTR	NOTE	MATERIAL	PART NAME	QUANTITY UNIT	REQ'D	DEV'D
3	GV-89-653-5	EA			CORE ASS'Y. SOL. A	1		
	FV-91-084-1	G		ST. STEEL	CORE	1		
	GV-60-452-9	EM		VITON-A NEOPRENE	DISC	1		
	~~CV-89-653-1~~	~~F~~			~~ADAPTER/PLUGNUT ASSY.~~	~~1~~		
	~~FV-91-083-1~~	~~D~~		~~BRASS~~	~~ADAPTER~~	~~1~~		
	~~FV-91-038-1~~	~~F~~			~~PLUGNUT ASS'Y.~~	~~1~~		
	~~FV-91-039-1~~	~~E~~		~~CT STEEL~~	~~PLUGNUT~~	~~1~~		
	~~FV-158-243-1~~	~~E~~		~~COPPER~~	~~SHADING COIL~~	~~1~~		
12	FV-101-749-4 K	Z			DISC HOLDER ASS'Y	1		
	GV100-820-4	R		VITON A	DISC	1		
	GV-174-682-1	C		ST. STEEL	DISC. HOLDER	1		
19	FV-160-219-2	C		ST. STEEL	SUPPORT	1		
13	FV-162-930	-		ST. STEEL	SPRING, DISC	1		
6	FV-96-678-4	H			SOL. BASE SUB-ASS'Y. B	1		
	FV-172-472-1	A		ST. STEEL	DISC, FORMING	1		
	FV-166-960-2	F		ST. STEEL	CORE TUBE	1		
	FV-96-677-3	H		ST. STEEL	BONNET	1		
14	FV-178-088	-		ST. STEEL	SPRING, DIAPH.	1		
23	FV-186-495	A	3	——	SPARE PARTS KIT	—		
5	GV-200-153-1	J		BRASS	ADAPTER	1		
	FV-206-048-1	F			PLUGNUT ASSY	1		
	FV-158-248-1	E		COPPER	SHADING COIL	1		
	GV-200-152-1	J		ST. ST.	PLU			

NOTICE
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PRODUCTION SPECIFICATION
BILL OF MATERIAL

AE | CH
CA | AJ
AL
AM
KA

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PAGE 3 OF 4 PAGE

CHG LTR			
70577	F		
69132	D		
60347	C		
67826	B		
ER NO	CHG LTR	ER NO	CHG LTR

CATA. NO. HV176-816-1 & HV176-816-2

SHOP ORDER NO

BULL. NO HV 176-816

NO. OF PARTS LIST PER ASS'Y 1

ASSEMBLY REF HVA-176-816

FVP – 176-816

ITEM	PART NUMBER	CHG LTR	NOTE	MATERIAL	PART NAME	QUANTITY UNIT	REQ'D	DELVD
15	FV-178-091-1	A			DIAPHRAGM/DISC SUB-ASS'Y.	1		
	FV-178-092-1	A		ST. STEEL	RIVET	1		
	FV-103-889-1	L			DISC, SUB-ASS'Y.	2		
	FV-103-888-2	B		ST. STEEL	INSERT	2		
	GV-164-054-34	S		BUNA-N	DIAPHRAGM	1		
13	FV-178-114-1	B		ST. STEEL	STEM	1		
	GV-178-122-1	A		BRASS	BODY, MAIN	1		
	FV-178-247-1	C			BODY & BONNET SUB-ASS'Y.	1		
	FV-178-110-1	B		BRASS	BODY	1		
	GV-178-089-1	C		BRASS	BONNET	1		
10	FV-178-547	B		17-7PH	SPRING	1		
5	GV-180-817-31	F			SOL. BASE SUB-ASS'Y. A	1		
	FV80-630-14	W			PLUGNUT SUB-ASS'Y.	1		
	FV180-422-1	-		ST. STEEL	PLUGNUT	1		
	FV-158-247-1	F		COPPER	SHADING COIL	1		
	FV-180-536-4	A		BRASS	BONNET	1		
	FV-164-996-1	E		ST. ST.	CORETUBE	1		
4	FV-182-125-1	-			CORE ASS'Y, SOL. B	1		
	FV-162-970-1	B		ST. ST.	CORE	1		
	FV-162-968-2	A		BRASS	GUIDE, SPRING	1		
	FV-180-347	A		ST. ST.	SPRING, CORE	1		
	FV-162-969-1	C		BRASS	PLUG, CORE	1		
2	FV-182-647-1	D		PLASTIC	LABELS A & B			
	FV-182-647-2			PLASTIC	LABEL C			

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PRODUCTION SPECIFICATION
BILL OF MATERIAL

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PAGE 1 OF 1 PAGE

CHG LTR

CATA. NO. HV 176-816-1 HV 176-816-2

SHOP ORDER NO

BULL NO. HV 176-816

NO. OF PARTS LIST PER ASSY 1

ASSEMBLY REF HVA-176-816

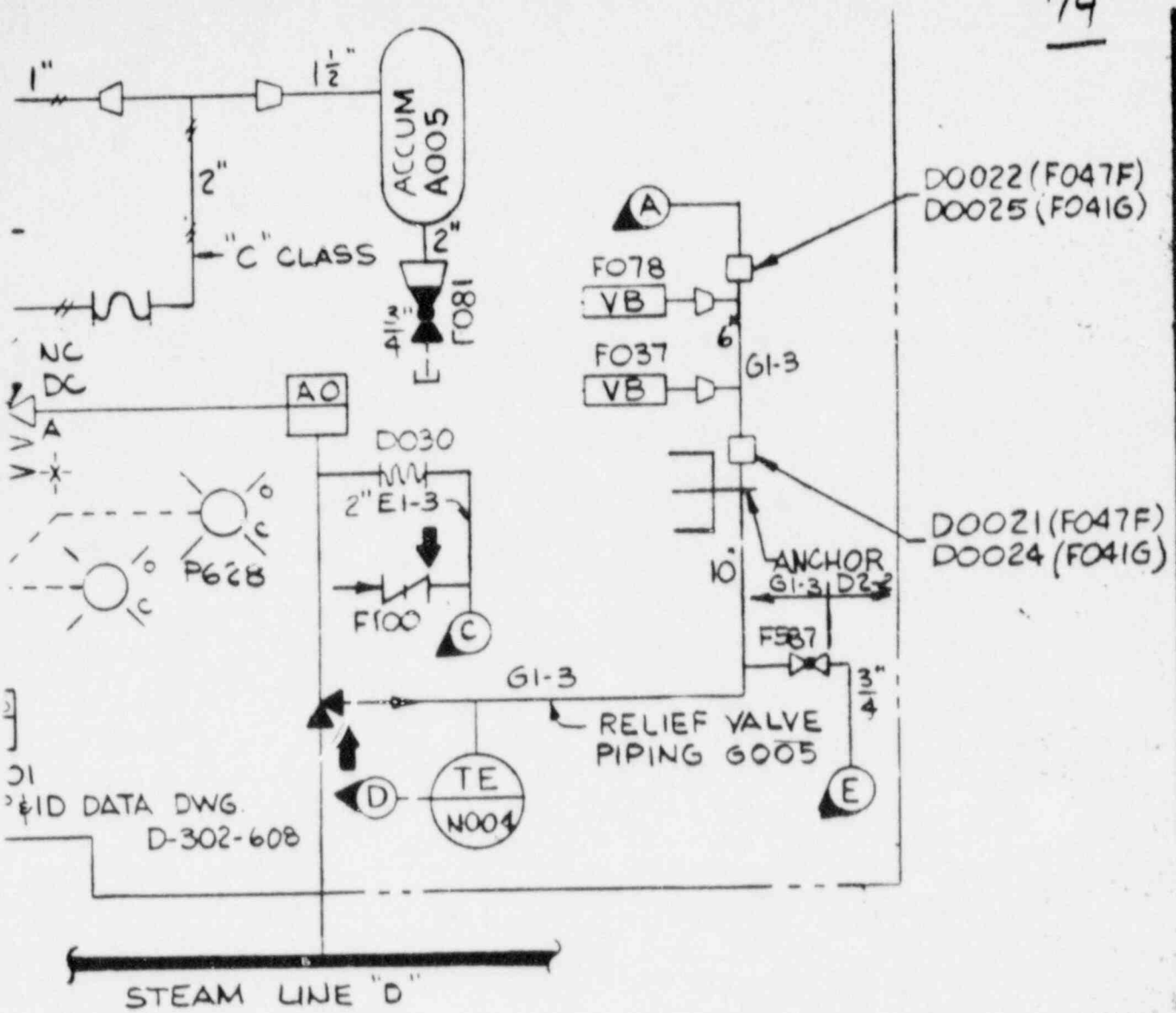
ER NO	CHG LTR	ER NO	CHG LTR
70577	F		
69132	D		
68347	C		
67826	B		

FVP— 176-P16

ITEM	PART NUMBER	CHG LTR	NOTE	MATERIAL	PART NAME	QUANTITY UNIT	REQ'D	DELV'D
	NOTES:							
	1. IN SOLENOID ASSEMBLY		A,	OMIT GROUND	SCREW AND SUBSTITUTE THE FOLLOWING:			
1C	GV-99-257-1G 115/60	AB			CATA HV 176-816-1 COIL - REMARK TO 115/60	1		
1C	GV-99-257-25G115/50	AB			CATA HV 176-816-2 COIL -	1		
1K	FV-172-444-6	C			HOUSING/CONDUIT ASSEMBLY	1		
	GV-168-736-6	H		STEEL	HOUSING	1		
	FV-33-103-1	X		ALUMINUM	CONDUIT CONNECTION	1		
	2. IN SOLENOID ASSEMBLY		B,	OMIT GROUND	SCREW AND NAMEPLATE AND SUBSTITUTE THE FOLLOWING:			
2C	GV-99-257-1G 115/60	AB			CATA HV 176-816-1 COIL - REMARK TO 115/60	1		
2C	GV-99-257-25G 115/50	AB			CATA HV 176-816-2 COIL -	1		
2J	FV-172-444-6	C			HOUSING/CONDUIT ASSEMBLY	1		
	GV-168-736-6	H		STEEL	HOUSING	1		
	FV-33-103-1	X		ALUMINUM	CONDUIT CONNECTION	1		
	3. QUANTITY AS ORDERED BY CUSTOMER.							

ATTENTION:

BEFORE PROCEEDING WITH ANY NEW OR RECURRING ORDERS A REVIEW OF EACH DETAIL PART AND DRAWING WILL HAVE TO BE MADE AND G.E.'S AGREEMENT OBTAINED FOR ANY CHANGE IN THESE PARTS.



DETAIL-1

-14
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TO
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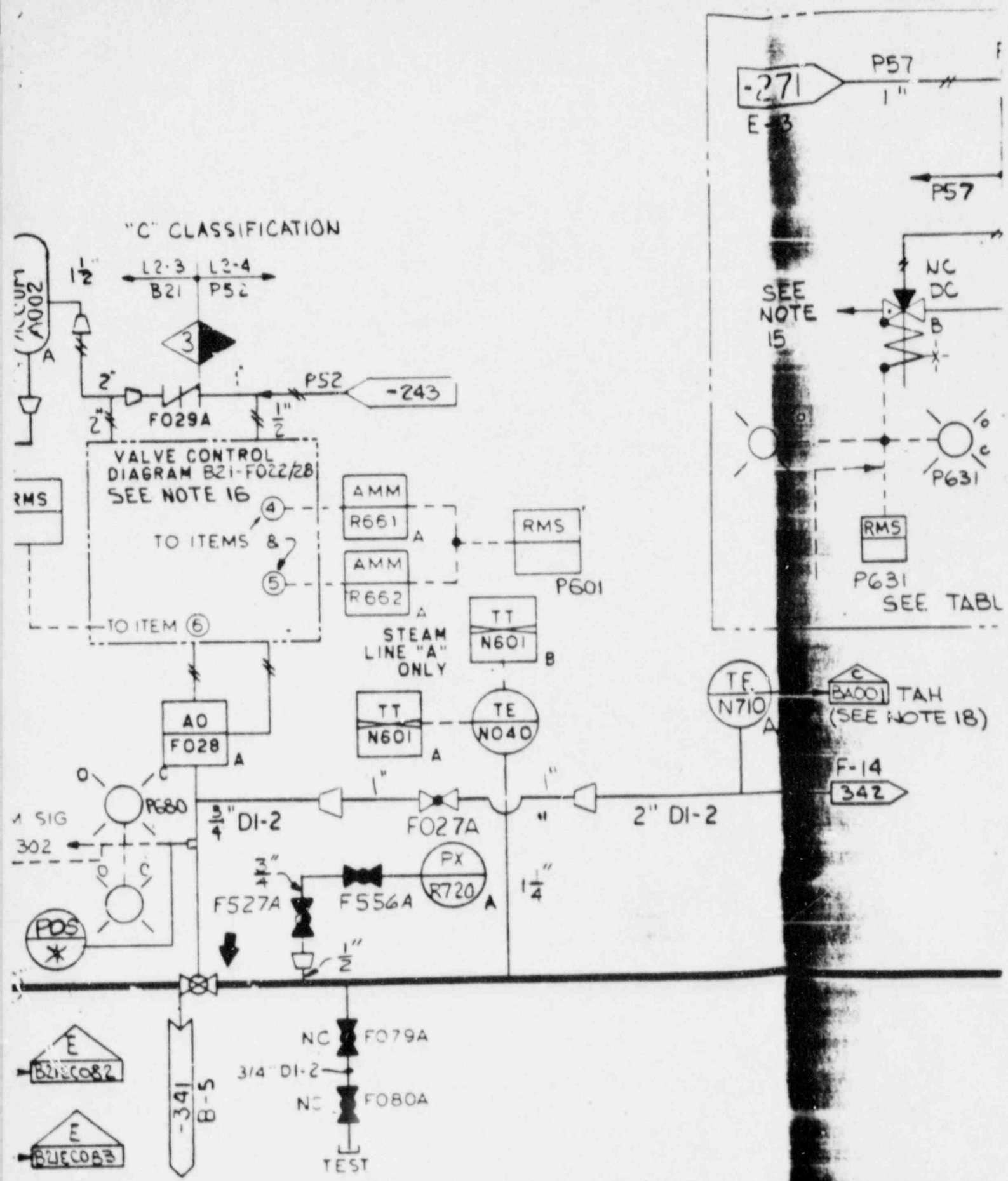
JRBINE

A
B
C
D

D-74

ENCLOSED IN BOXES SHALL HAVE PART NUMBERS CORRESPONDING TO THEIR RESPECTIVE LINE

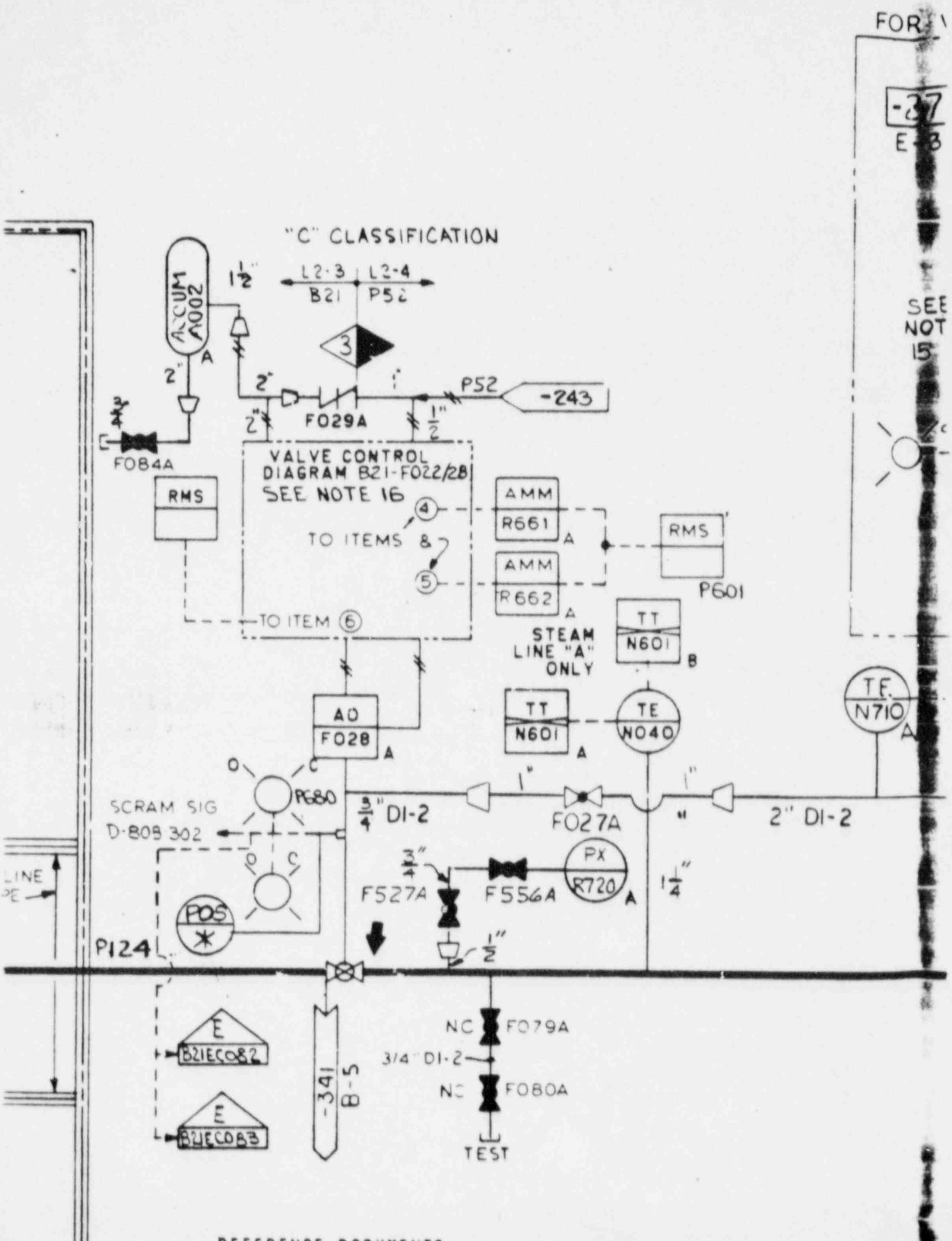


REFERENCE DOCUMENTS:-

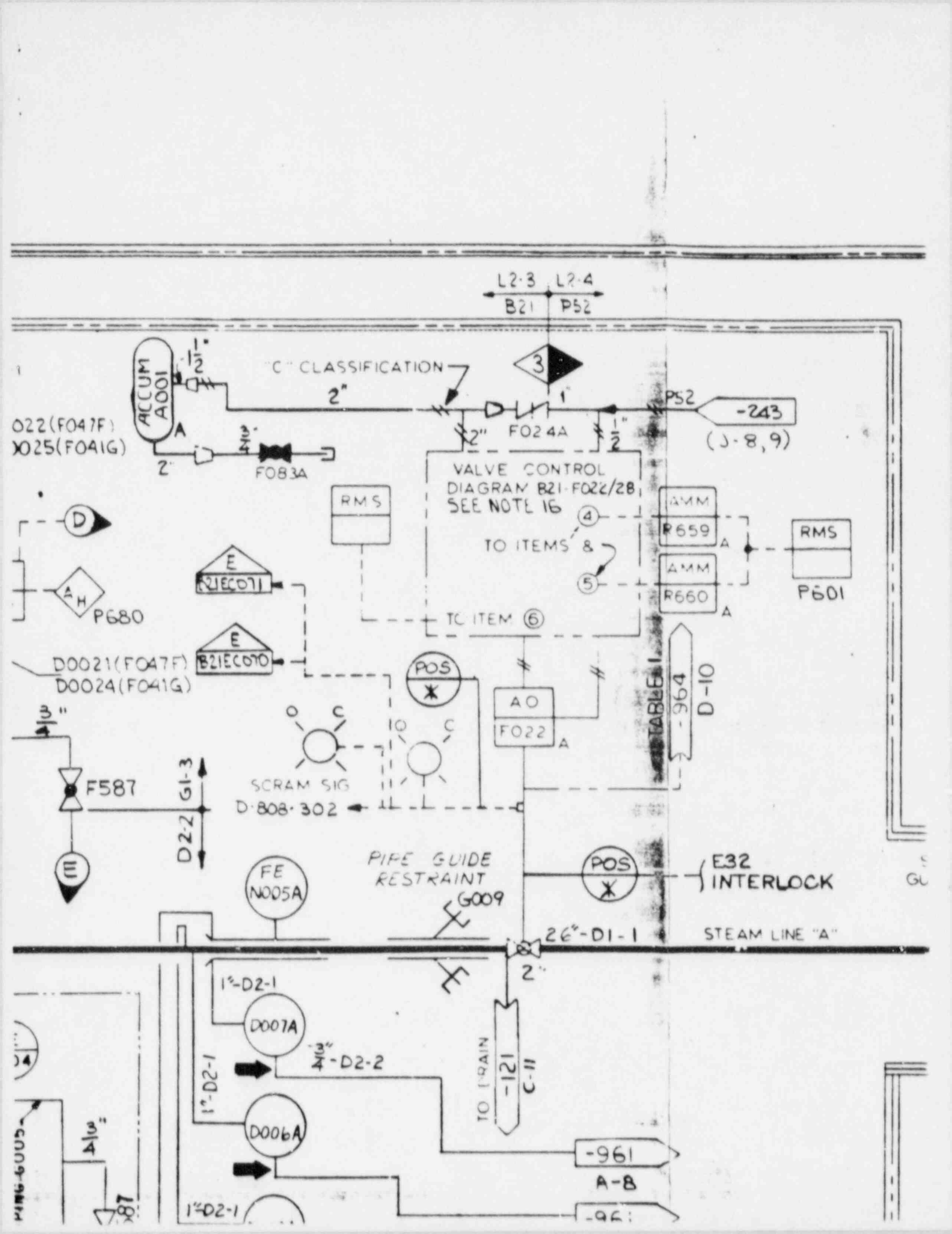
D-302-602 REACTOR RECIRCULATION SYSTEM

NOTES:-

1. STEAM



REFERENCE DOCUMENTS:-


L2-3 L2-4
B21 P52
ACCUM A001
1 1/2"
"C" CLASSIFICATION
2"
3
1"
P52
-243
(J-8,9)
022(F047F)
025(F041G)
2"
3/4"
F083A
2" F024A 1 1/2"
VALVE CONTROL DIAGRAM B21-F022/28 SEE NOTE 16
RMS
AMM R659 A
AMM R660 A
RMS
P601
TO ITEMS & 4 5
TC ITEM 6
D
AH
P680
E B21EC071
E B21EC070
D0021(F047F)
D0024(F041G)
POS
AO F022 A
TABLE B-1
-964
D-10
3/4"
F587
G1-3
D2-2
SCRAM SIG
D-808-302
PIPE GUIDE RESTRAINT
G009
FE N005A
POS
E32 INTERLOCK
26"-D1-1
STEAM LINE "A"
2"
1"-D2-1
D007A
3/4"-D2-2
TO DRAIN
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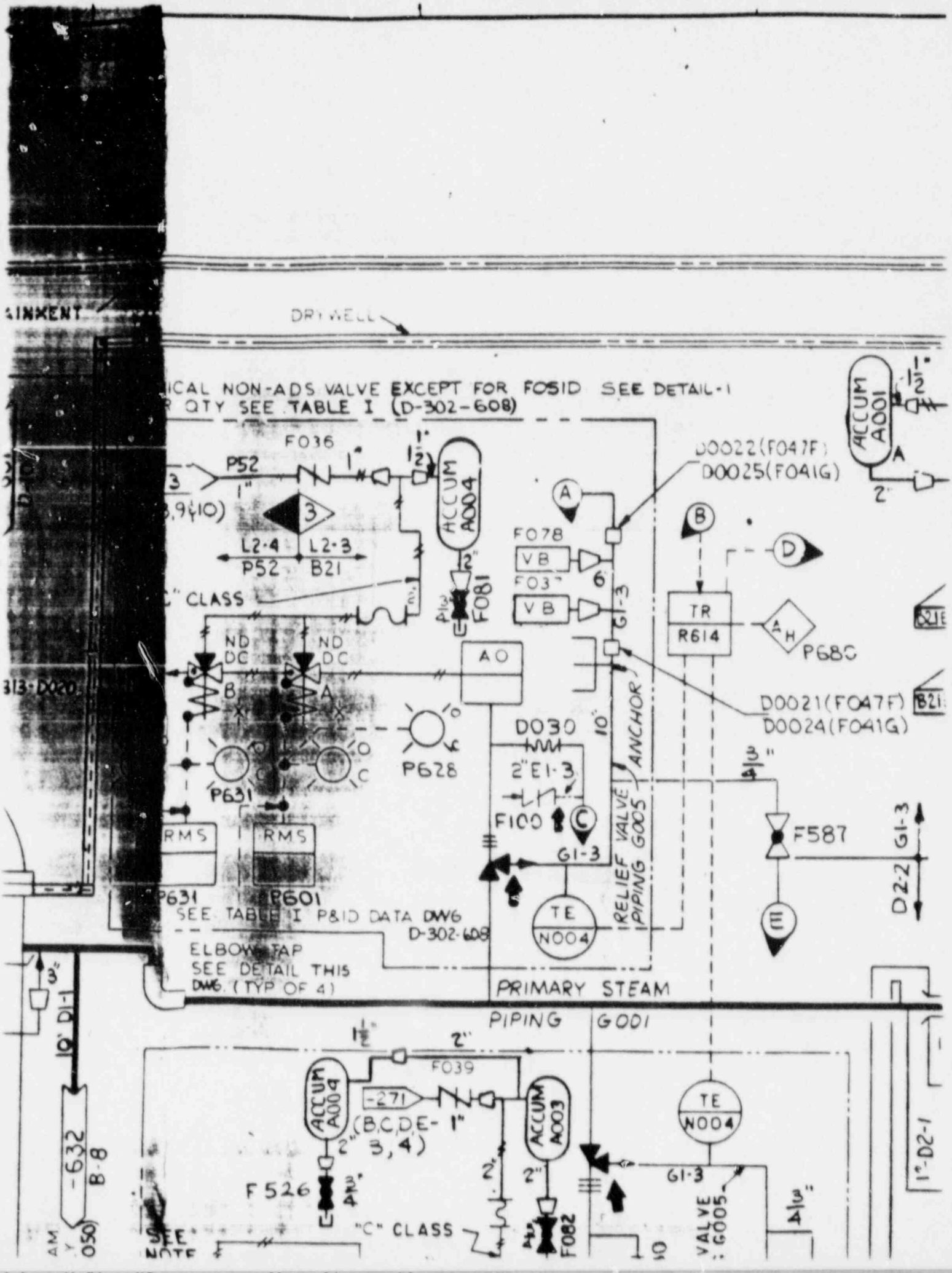
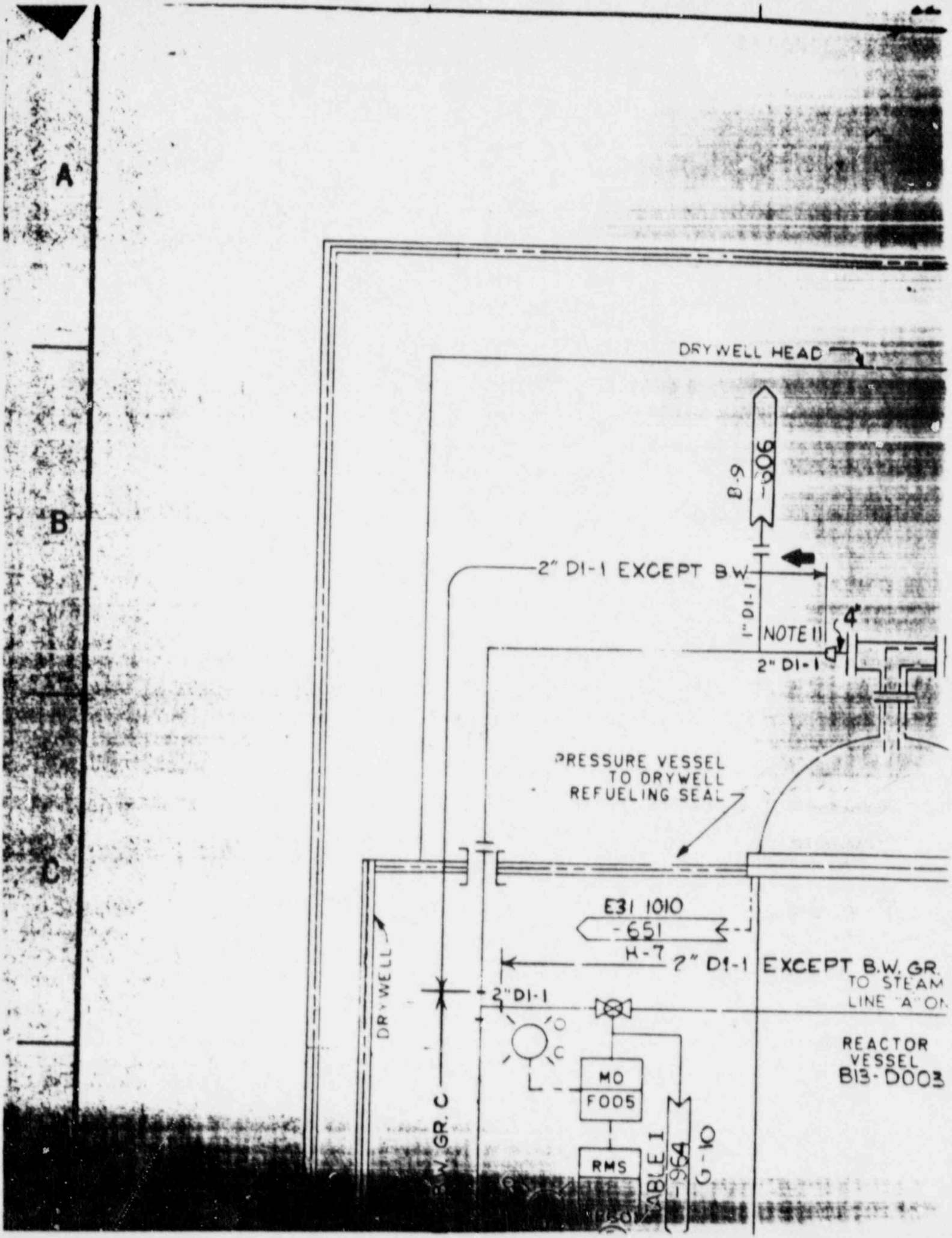
C-11
1"-D2-1
D006A
-961
A-8
1"-D2-1
-95
4 1/2"


DRYWELL
ICAL NON-ADS VALVE EXCEPT FOR FOSID SEE DETAIL-1
QTY SEE TABLE I (D-302-608)
F036
P52
ACCUM A004
ACCUM A001
D0022(F047F)
D0025(F041G)
F078
VB
F03
L2-4
L2-3
P52
B21
"C" CLASS
F081
ND DC
AO
TR R614
P680
D0021(F047F)
D0024(F041G)
D030
2"E1-3
F100
P628
P631
RMS
P601
F587
G1-3
D2-2
TE N004
RELIEF VALVE PIPING G005
ANCHOR
SEE TABLE I P&ID DATA DWG D-302-608
ELBOW TAP SEE DETAIL THIS DWG. (TYP OF 4)
PRIMARY STEAM PIPING G001
F039
-271
(B,C,D,E- 1" 2" 3,4)
ACCUM A003
F526
F082
"C" CLASS
VALVE G005
-632
B-8
D1-1
D2-1


A
B
C
DRYWELL HEAD
B-9
-906
2" D1-1 EXCEPT B.W.
1" D1-1
NOTE 11
4"
2" D1-1
PRESSURE VESSEL
TO DRYWELL
REFUELING SEAL
E31 1010
-651
H-7
2" D1-1 EXCEPT B.W. GR.
TO STEAM
LINE "A" OF
2" D1-1
DRYWELL
REACTOR
VESSEL
B13-D003
MO
F005
RMS
CABLE I
-954
G-10
B.W. GR. C

...G.

TATION OF SAFETY RELIEF VALVES AND ASSOCIATED

TMENT. F027 SHOULD BE ACCESSIBLE DURING NORMAL

BOILER SYSTEM PROCESS DIAGRAM AND PROCESS DATA G.E.

RUN OF PIPE DOWNSTREAM OF F026 WITH UPSTREAM AND
E TAP TO GIVE AS ACCURATE A PRESSURE MEASUREMENT AS
1964 "STEAM TURBINES" PARAGRAPH 4.74.

TRUMENT SENSING LINE BETWEEN POT (PART D003) AND THE
TO DRYWELL REFUELING SEAL. THE EXPANSION LEG AND
ALLOW FOR MAXIMUM CHANGE OF VESSEL LENGTH WITH
IPING OR THE SEAL OR DAMAGE TO THE INSULATION AROUND
, SHALL BE LOCATED ABOVE THE HEAD VENT CENTER LINE

HALL BE IN ACCORDANCE WITH CURRENT LICENSING PRACTICES.
STRUMENT LINE CONNECTED TO THE REACTOR COOLANT PRESSURE
SE AS FEASIBLE TO THE RCPB. ORIFICE SIZE IS 1/4" AND
E.

ARE AC OPERATED, UNLESS OTHERWISE SPECIFIED.

R VESSEL.

HLESS OTHERWISE SPECIFIED.

HD'RAD. IDENTIFICATION NUMBERS FOR INSTRUMENT, SEE THE

INSTRUMENT INDEX.

-D03. FOR SOLENOID IDENTIFICATION NUMBERS, SEE

F VALVES POSITION SWITCHES.

B, AND D TYPE D21BA002, BA013, AND BA004 RESPECTIVELY.

ION INSTALLATION DWGS. B-814-065 AND B-814-666.

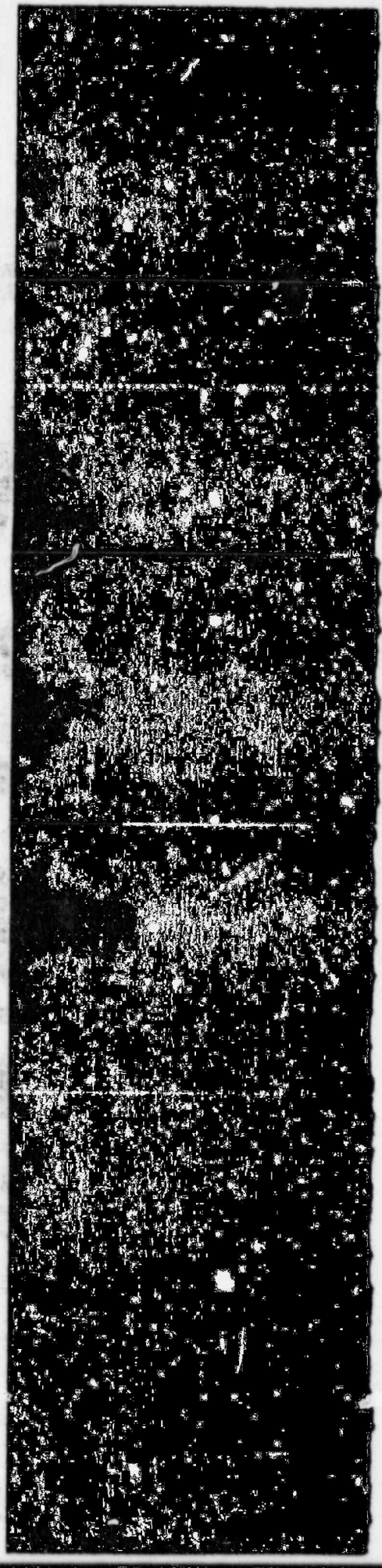
RECEIVED

E

F

G

H

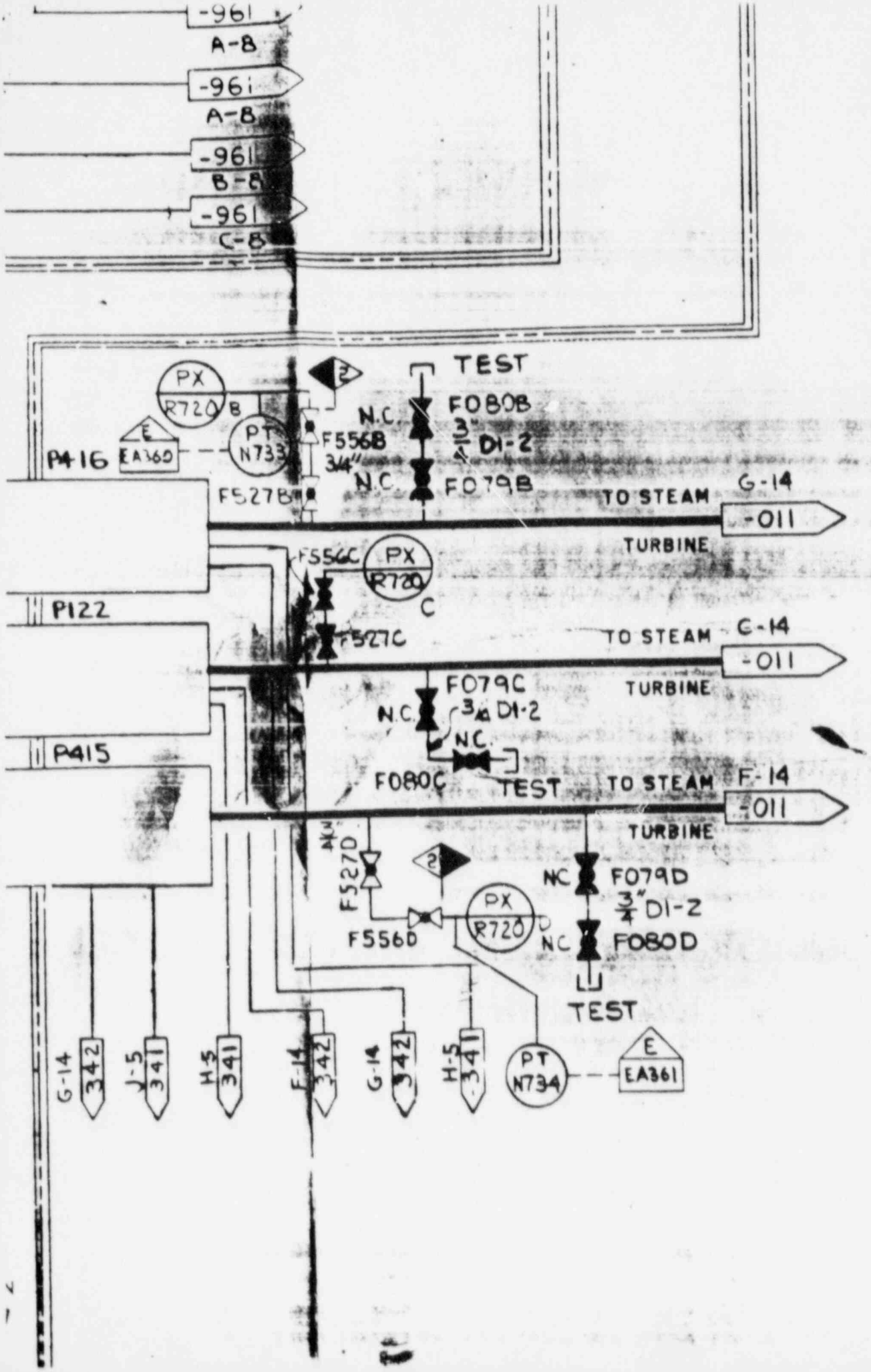


S: -

TOR RECIRCULATION SYSTEM
ROL ROD DRIVE HYDRAULIC SYSTEM
WATER CONTROL SYSTEM
DBY LIQUID CONTROL SYSTEM
IOR PROTECTION SYSTEM
DETECTION SYSTEM
SYSTEM
SYSTEM
TOR SYSTEM OUTLINE DRAWINGS
TOR WATER CLEANUP SYSTEM
TOR ICD
ATION VALVE INTERFACE CONTROL DRAWING
ANICAL EQUIPMENT SEPARATION
TE SHUTDOWN SYSTEM
TRICAL EQUIPMENT SEPARATION
I/O LIST
) COOLING SPRAY NOZZLE
ORMANCE MONITORING SYSTEM
-LCS
L PANEL DESIGN SPECIFICATION
CTOR RECIRCULATION SYSTEM P AND ID DATA
PUMP ELEMENTARY
EAR BOILER PROCESS INSTRUMENT ELEMENTARY
DESIGN SPECIFICATION
CTOR RECIRCULATION SYSTEM ELEMENTARY
N STEAM SYSTEM
N, REHEAT EXTRACTION, AND MISCELLANEOUS DRAIN
K DETECTION SYSTEM
POOL COOLING AND CLEAN-UP SYSTEM
CTOR RECIRCULATION SYSTEM
CTOR RECIRCULATION SYSTEM
LEAR BOILER PROCESS DIAGRAM
DUNDANT REACTIVITY CONTROL
DUNDANT REACTIVITY CONTROL
STEM ELEMENTARY
OCESS INSTRUMENTATION
SIGN SPEC.

NOTES: -

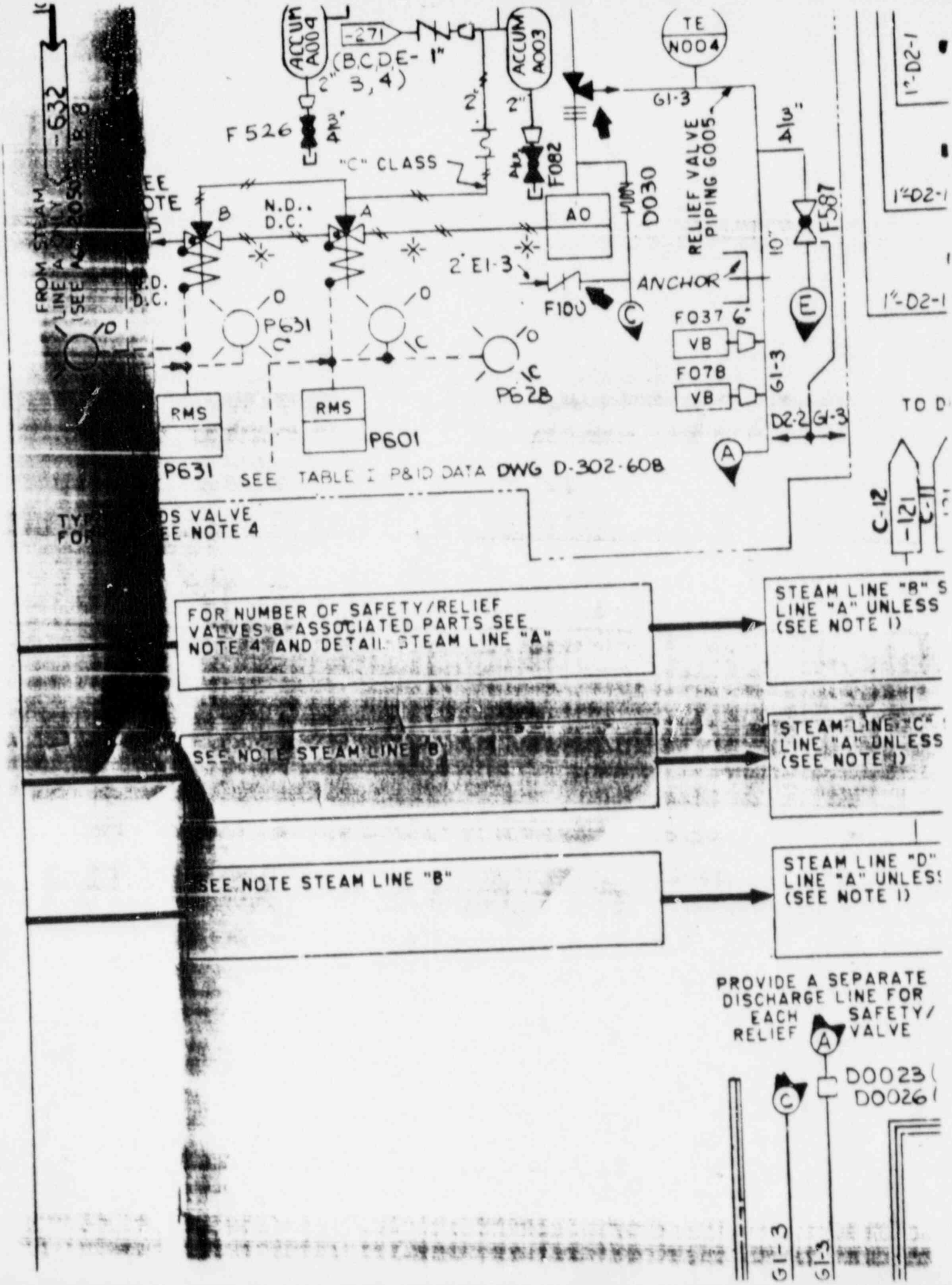
1. STEAM LINES, ENCLOSED IN BOXES
   NUMBERS UNLESS OTHERWISE NOTE
   EXAMPLE: XXXB IS ON LINE "B
   XXXC IS ON LINE "C
2. ALL EQUIPMENT AND INSTRUMENTS
   SYSTEM NUMBER [illegible] UNLESS OTH
3. [illegible]
4. SEE DWG. D-302-808 FOR QUANTI
   EQUIPMENT.
5. LOCATE IN AREA SERVED BY STAN
   OPERATION.
6. FOR OTHER MODES OF OPERATION,
   DWGS. 131C7911 AND 131C7911C.
7. PX — TO BE CONNECTED INTO TI
   DOWNSTREAM STRAIGHT LEN
   FEASIBLE. TAPS TO MEE
8. AN EXPANSION LEG SHALL BE PRO
   WATERTIGHT PENETRATION THROUG
   PIPING INSTALLATION SHALL BE
   TEMPERATURE TO AVOID OVER STR
   THE VESSEL. THE CONDENSING
   IN ACCORDANCE WITH SPEC. AC
9. PROVISION FOR INSTRUMENT LINE
   ONE ORIFICE SHALL BE INSTALLE
   BOUNDARY (RCFB). ORIFICE SHA
   MAXIMUM NUMBER OF ORIFICES PE
10. VALVE MOTOR OPERATORS AND PI
11. LOCATE TEE AS CLOSE AS POSSI
12. SEE TABLE IP AND ID DATA, DWG
13. ALL INDICATOR LAMPS LOCATED
14. FOR CONTROL ROOM, LOCAL OR R
    INSTRUMENT INDEX.
15. FOR SOLENOID IDENTIFICATION
16. VALVE CONTROL DIAGRAM SHOWN
    INSTRUMENT INDEX.
17. ANNUNCIATOR IS COMMON TO ALL
18. COMPUTER POINT I.D. NUMBERS
19. FOR PENETRATION NUMBERS, SEE

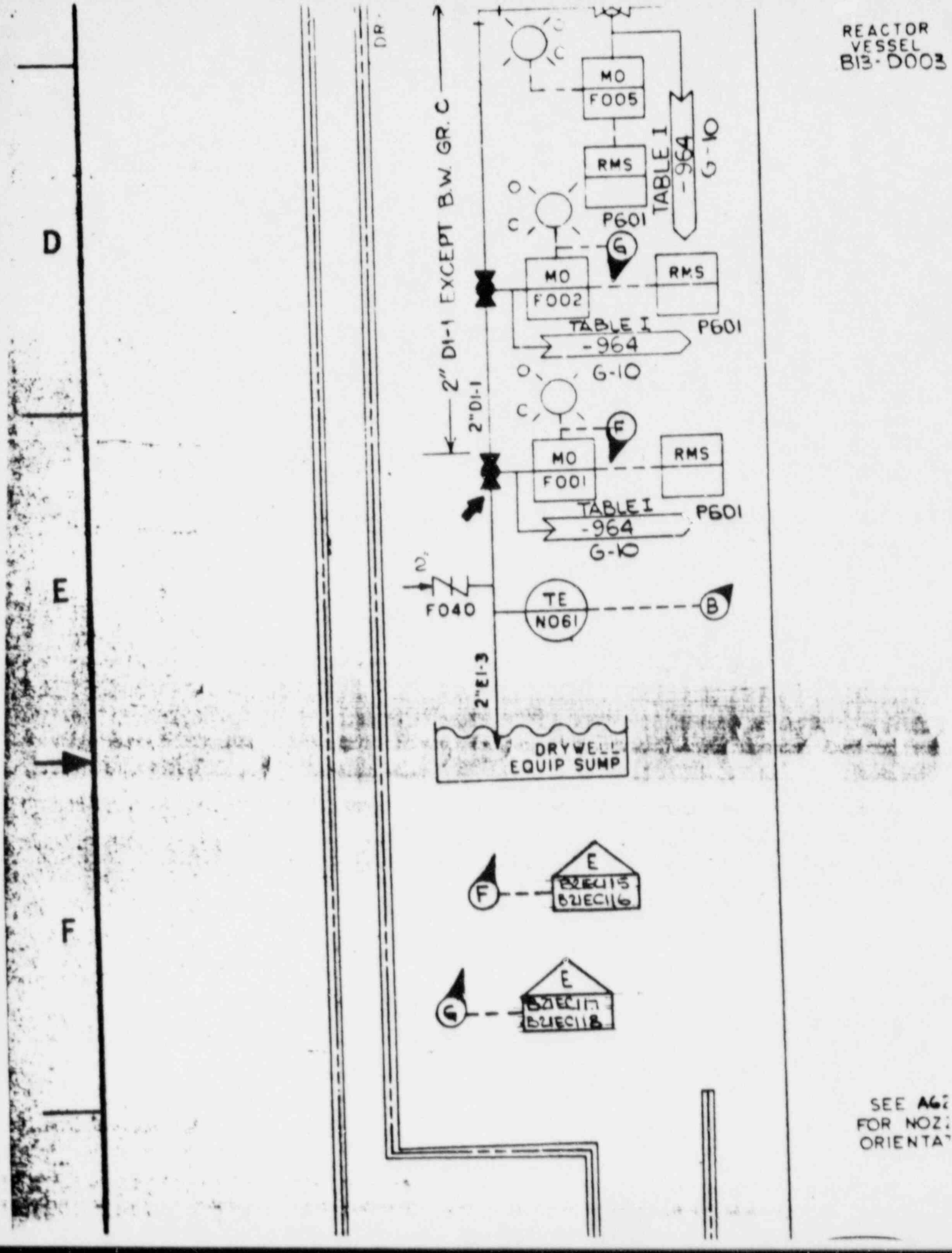


REFERENCE DOI

D-302-602
D-302-872
B-208-025
D-302-691
D-808-302
D-302-964
D-302-631
D-302-632
A62-2050
D-302-671
B13-2020
B21-F022/28
A62-4350
D-808-301
A62-4050
C94-4030
B13-D020
C91-4030
E32-1010
H22-4010
B33-1010
B33-1080
B21-1050
A62-4430
B-208-015
D-302-011
D-302-121
D-302-961
D-302-651
D-302-603
D-302-684
B21-1020
C22-4010
C22-D050

A62-407C


ACCUM A004
-271
(B,C,D,E- 1"
3, 4)
ACCUM A003
TE N004
F526
"C" CLASS
F082
D030
AO
RELIEF VALVE PIPING G005
F587
N.D.
D.C.
2" E1-3
ANCHOR
F100
F037
VB
F078
VB
P631
P628
P601
RMS
RMS
P631
SEE TABLE I P&ID DATA DWG D-302-608
FOR NUMBER OF SAFETY/RELIEF VALVES & ASSOCIATED PARTS SEE NOTE 4 AND DETAIL STEAM LINE "A"
SEE NOTE STEAM LINE "B"
SEE NOTE STEAM LINE "B"
PROVIDE A SEPARATE DISCHARGE LINE FOR EACH SAFETY/ RELIEF VALVE
D0023
D0026
G1-3
G1-3
D2-2
G1-3
TO D
C-12
-121
1"-D2-1
1"-D2-1
1"-D2-1


REACTOR VESSEL B13-D003
MO F005
RMS
P601
TABLE I -964 G-10
MO F002
RMS
TABLE I -964 G-10 P601
2" D1-1 EXCEPT B.W. GR. C
2" D1-1
MO F001
RMS
TABLE I -964 G-10 P601
F040
TE N061
2" E1-3
DRYWELL EQUIP SUMP
E B21C115 B21C116
E B21C117 B21C118
D
E
F
SEE A62 FOR NOZ ORIENTA

COMMON TO ... SAFETY RELIEF VALVES POSITION SWITCHES.

I.D. NUMBERS FOR B21N710F, P, AND T ... B21BA 72, B&D1C, AND PA601 RESPECTIVELY.

ON NUMBERS. SEE INSTRUMENTATION INSTALLATION DWGS. D-814-065 AND D-814-666.

NDER DESIGN
TION MANAGEMENT
G

RECEIVED
SEP 28 1987
DRAWING CONTROL

H

NUCLEAR SAFETY RELATED

NO	DATE	MADE	CHKD	APPROVALS

REVISIONS

D ON EXPIRES ON
1987 NOV 17 1987
WORKING COPY

ON EXPIRES ON
87

J

	CONSTRUCTION	
	LIMITED CONSTRUCTION: AS NOTED	
	PRELIMINARY NOT FOR CONSTRUCTION	
	BIDDING PURPOSES	
DATE	RELEASED FOR	ENGR.

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

PERRY NUCLEAR POWER PLANT UNIT 1

PIPING SYSTEM DIAGRAM

NUCLEAR BOILER SYSTEM

READING PA.

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS

GAI

DRAFTING MADE	CHECKED	ENGINEER APPROVALS ARCHITECTURAL	CIVIL	STRUCTURAL	ELECTRICAL
T.A.A. 12-29-87		NN	NA		
APPROVAL J.R. Gordon 1-26-88		MECHANICAL RHKoutz 1-26-88	ENVIRONMENTAL NA	NUCLEAR NA	

SCALE NONE | 04 | 4548 | D-302-

W.O. 0400003.000 | DRAWING NUMBER

VALVES (CED-10). REMOVED FE-N005 (C-7) & RELOCATED TIE (F-7). ADDED 2" LINE (G-9)

NO	DATE	MADE	CHKD	APPROVALS
A	2/9/88	N.Y.	RDW	DPP

REVISIONS

GE. DWG. NR. 7[illegible]

17. ANNUNCIATO
18. COMPUTER F
19. FOR PENETR

DRAWI
CONFIG
AS OF

SUPPORTING DOCUMENTS:-

1. PIPING AND INSTRUMENT SYM... A42-101(
2. PRESSURE INTEGRITY OF NUCLE... COMPONENTS A62-403(

EQUIPMENT

ISS
NOV

ISSU
NOV 0

B	[illegible]	[illegible]	JRC	[illegible]

ADDED REDUCERS (E-10)
ADDED ACCUM. ADD4 IN AREA D-11
REVISED ACCUM. TANKS AND ADDED RDCRS. IN [illegible]
B-6 B-9 B-10 & D-10
ADDED PEN. NO. 4 PLACES
ADDED CROSS REF. AND INST. IN AREA B-4
REVISED NOTE #4
DELETED OPERATION AND DESIGN DATA.
ADDED NOTES 12 THRU 16
ADDED NOTES TO REF.
ADDED NOTE 16 TO VALVE CONTROL DIAGRAM D21 IN AREA B-6 AND B-8
REVISED CROSS REF. 5
TABLE E-4 III WAS I IN 2 PLACES
ADDED PANEL No.
ADDED LIGHTS IN 6 PLACES
ADDED PIPING SPEC. CHANGES
REVISED REF. DOCUMENTS
UPDATED NOTES & REF.
ADDED LINE SPEC (TYP.)
ADDED REFERENCE TO NOTES (TYP. 3). REMOVED ARROW (D-9). F025A BECAME LOCK CLOSED, F007A BECAME NORMALLY CLOSED. ADDED LINE SIZE (C-8).
REVISED DETAIL (H-6)
[illegible]

(ROUTE C1B-6). ADDED PX (E-9)
E-7) 3/4" TEST LINES W/VALVES
F079B, C&D, F080B, C&D @
(E-8 & E-7). 1½" & 1" RDCRS @ (B-9 &
MATCH COOR ZONE (C-10) DOUBLE (C-10)

SUPPRESSION POOL

QUENCHER
321G024
ROVIDE RESTRAINT
AGAINST WATER
SCHARGE & BLOW-
WN REACTION FORCE

REACTOR VESSEL

1" D2-1

DETAIL
ELBOW TAP AND ASSOCIAT
(TYP OF 4)

P-601

P-601
(SEE NOTE 17)

D020AG,H,S-7)PER EQUIP. JSS
19989-90-1603 B.ARM
c 19354-11-6815 INTERFACE

D	85	G	G	H	H
		4	4	4	4
		V	D	T	R
		2	2	2	2

ADDED P.S. N410(H,J-9,10)
ADDED LINE SPEC. AND SIZE (C,D,E-9)
ADDED VALVE F587 TO ANNUNCIATORS (C,D-9)
REVISED GE DWG NO (K-1,2)
ADDED COMPUTER POINT ELEMENTS (D,E-10) (C-11)
REMOVED "D-302" IN 17 PLCS
ADDED "BRIDGEAK-D" (B-9)
REMOVED REDUCER (B-8,11)
ADDED DETAIL-1 (A,B-1,2,3,4)
ADDED (2) REDUCERS (C-4,5)
ADDED NOTES 17, 18, & 19
ADDED COORDINATES (D,E-13)
ADDED DWG. COORD. "E-11" (C-12) (C-4). REMOVED (2)
TEE CONN. (E,F-7) ADDED
MATCH MARKS FOR DWG -342 & COORD. IN AREA (F,G-7,8)
DOORS WAS "DOOR" 5. MFS 8.01.11
DOORS WAS "DOOR" INTERFACE

C	10	T	R	T	R
	82	4	4	4	4
		V	V	V	D
		2	2	2	2

ADDED REDUCER (C-5)
ADDED VALVES F556A,B,C,D
REVISED AREA R.C.-4
ADDED VALVE F527A, B,C,D (C,E,F-7)
CHANGE B13-2020 TO B13-D003 (D-2) MATCH COOR. DWG NOS 121 TO 341
C(G-8)D-(6) LINE SIZE 3/8" TO 1/2" (B-8,15) & COOR.
MATCH DWG. NO. D-302-914 TO D-302-914 REMOVED

POINTS (B-9 & D-9) PER DCN #366 & ECN 29721-86-2923/-, CHANGED NOTE 3 PER ECN 28396-86-2195/-

S.M.J.C
B.A.R.K
INTERFACE

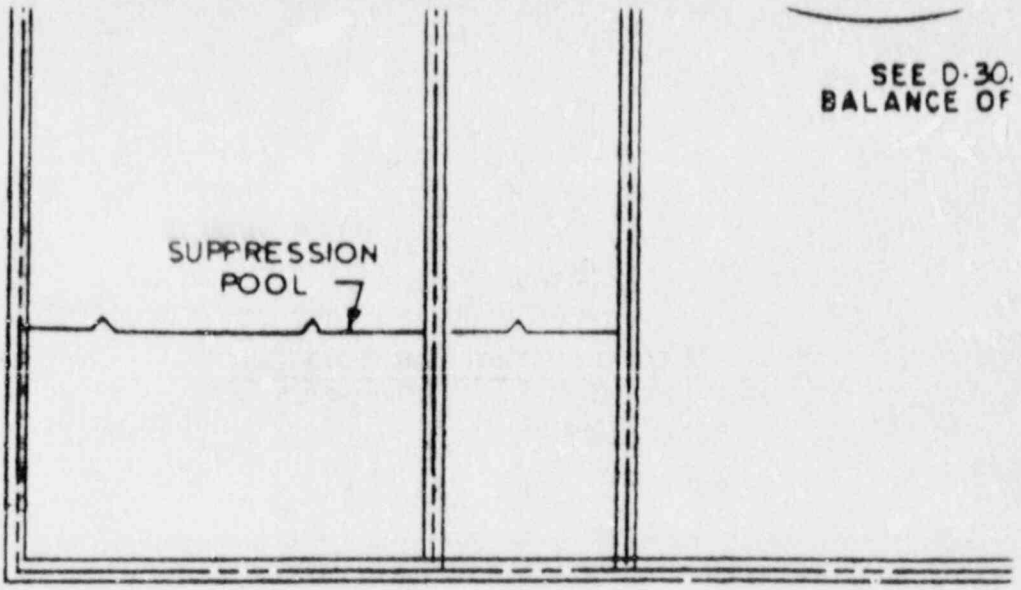
F | [illegible] | B.A.R.K | [illegible] | [illegible]

AS-BUILT FOR SYS. 1B13 1B21A, B, C & INIIB SCOPING PKG: ADDED 3"X2" REDUCER (C-12) PER ECN 16165-44-5131/C. ADDED PT N733, PT N734, ERIS PTS. EA360, EA361, & PIPING CLASS BREAK; VALVES F527B, F527D, F556B & F556D WERE SHOWN NORMALLY CLOSED, (E, G-8, 7) PER ECN 06630-48-158/A. DELETED ZS N437, ZS N478 COMPUTER POINT & NOTE 4 (TYP ~ 3 PLACES) (A, B, C, E-11, 10, 2, 1) PER ECN 25691-86-1050 STEAM LINE 'D' WAS 'A' (C-2).

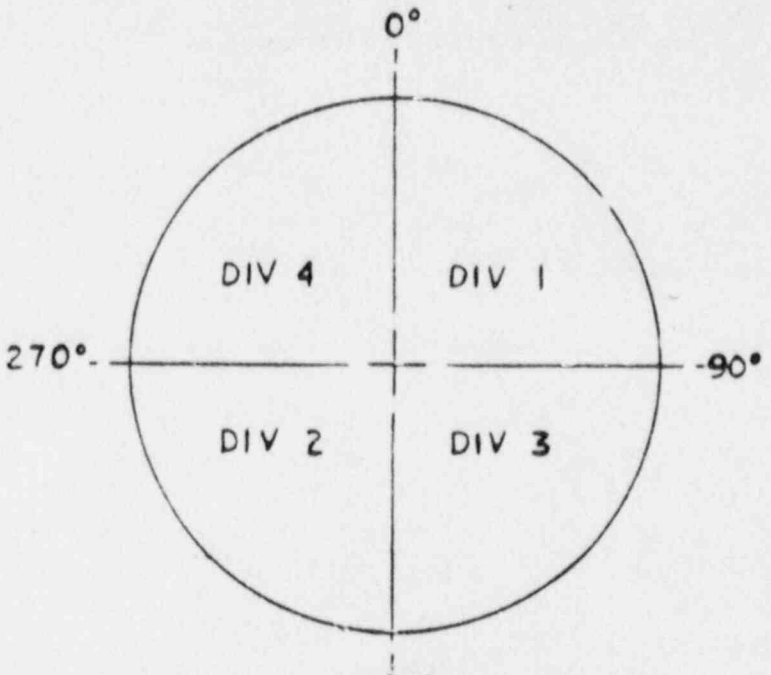
S.M.J.C
B.A.R.K
INTEFACE

E | [illegible] | DA | [illegible] | [illegible] | HRR

ADDED POSITION INDICATING SWITCHES 3 PLACES (C-6, C-8) & REV'D G.E. DWG. No PER IDCI 883. ADDED SAFETY CLASSIFICATION TO PIPING AT (B→E-13, B-12) PER ECN 16165-44-5131.



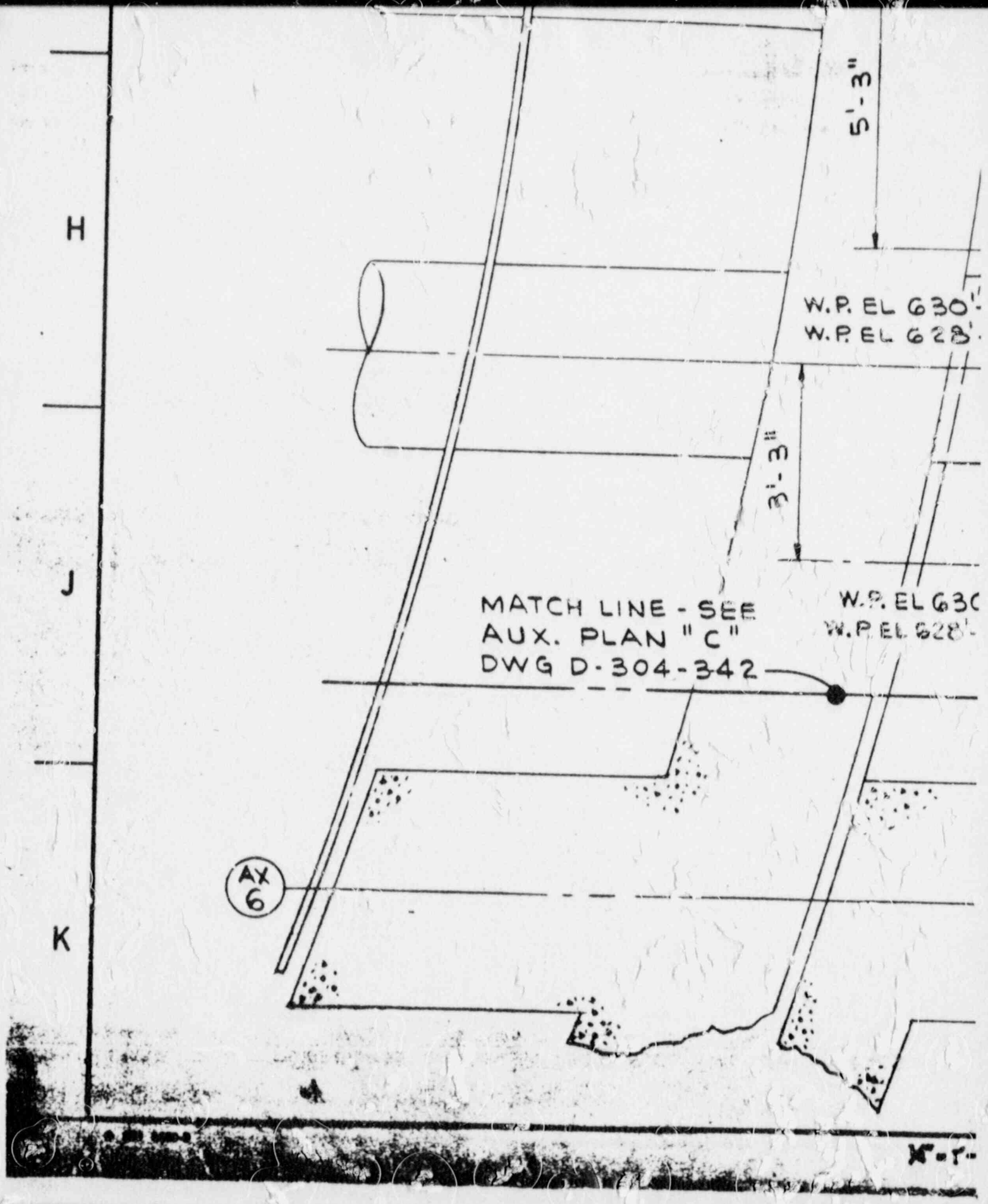
SEE D-30.
BALANCE OF

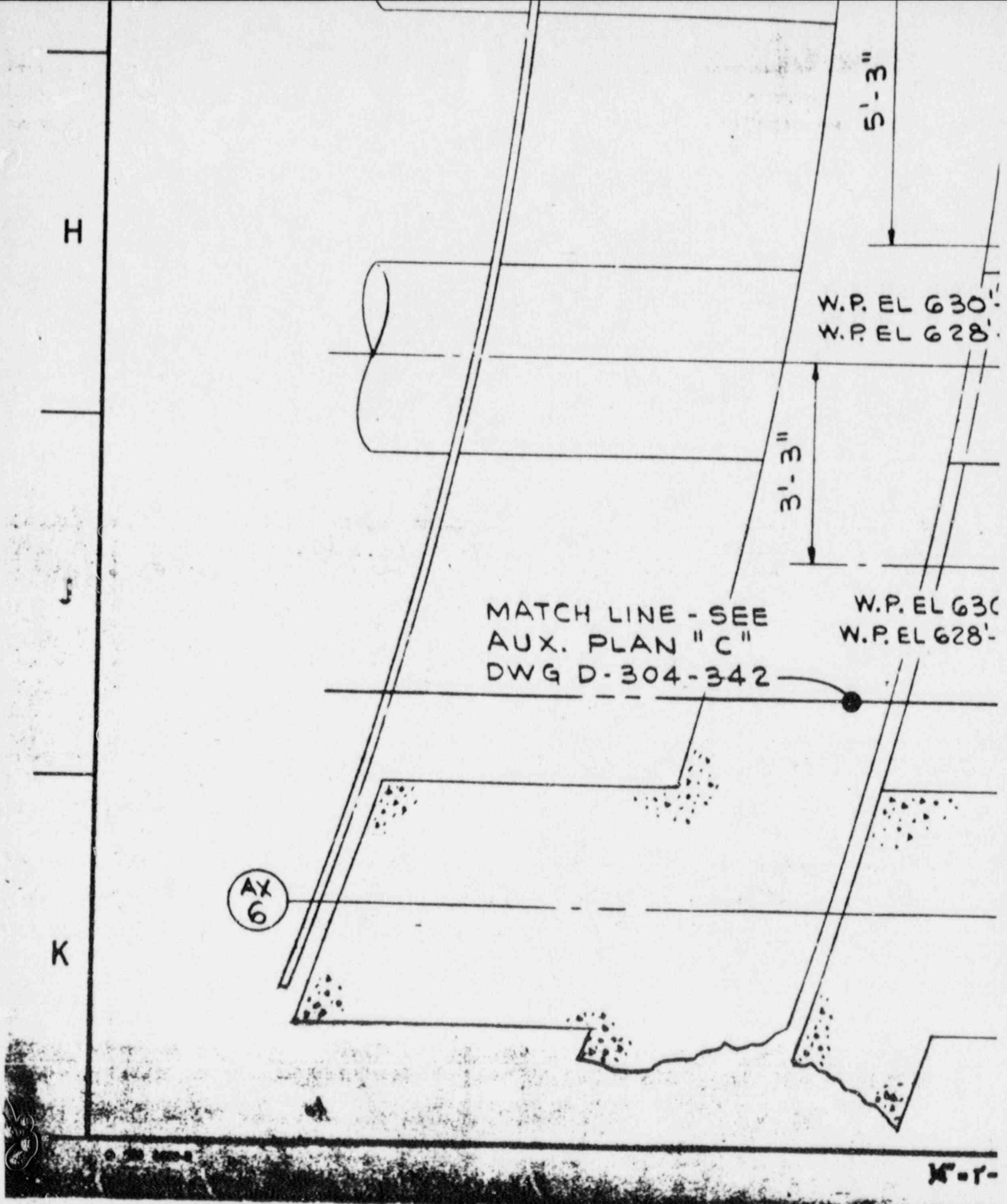


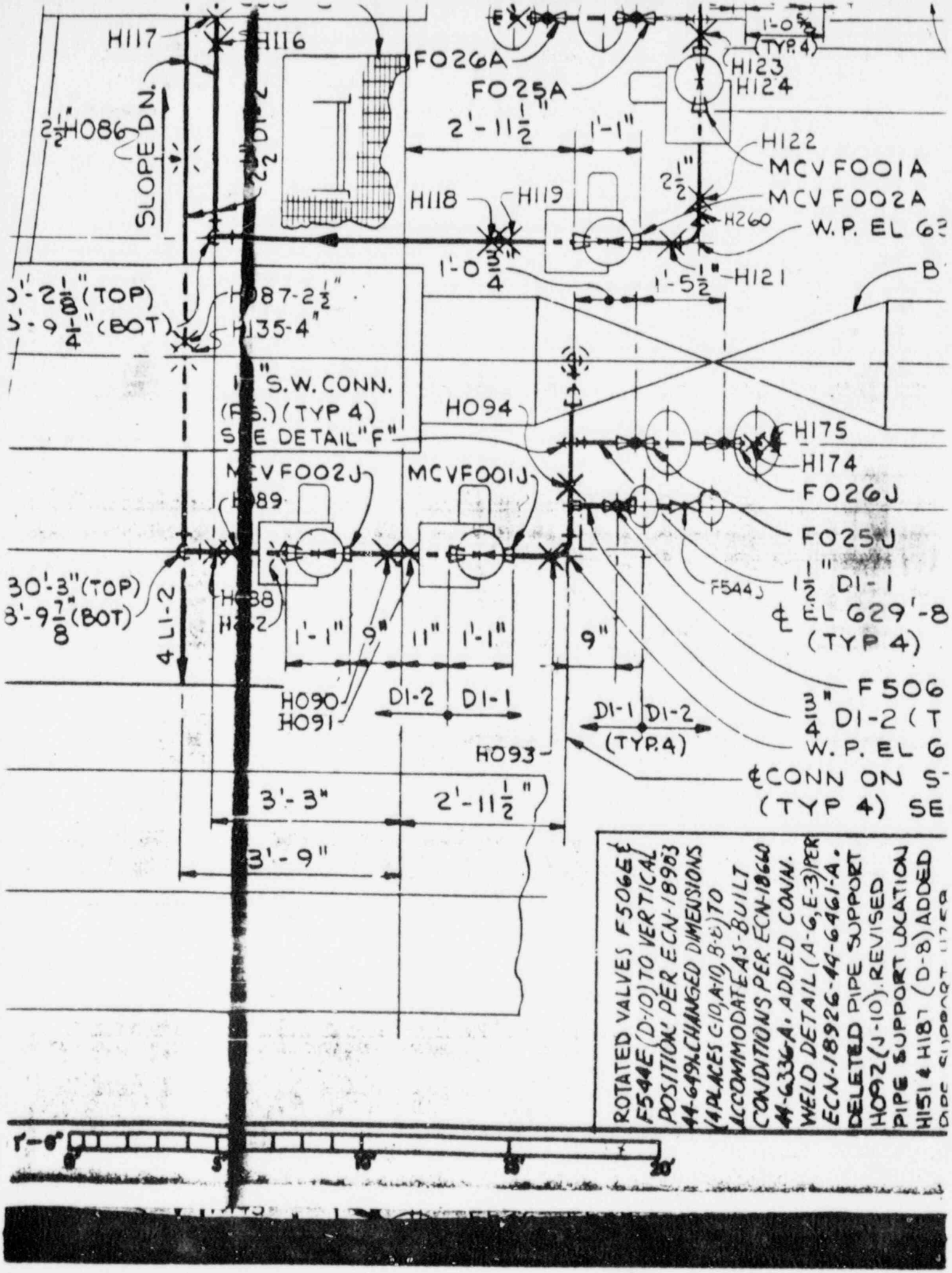
DIVISION ORIENTATION
OF THE VESSEL
INSTRUMENTATION
& NOZZLES
(SEE A62-4350 & H22-4010)

J	AS-BUILT PER DCN 1841		
	AS-BUILT PER DCN 1691 REMOVED NOTE 3. COORDINATE: E-3	RJT INTERFACE	
H	DESIGN CONFIGURATION MANAGEMENT AS-BUILT PER DCN 7511 REF. ECN 23995-EC-31685-1; ADDED REFERENCE DOCUMENTS; COORD. G-5,10; REVISED NOTE 8 & DELETED MATCH MARK IDENTIFICATION COORD. E-13	RJT INTERFACE	
G	AS-BUILT REVISED		

H J K


H
J
K
5'-3"
W.P. EL 630'-
W.P. EL 628'-
3'-3"
MATCH LINE - SEE
AUX. PLAN "C"
DWG D-304-342
W.P. EL 630
W.P. EL 628'-
AX
6


H
K
5'-3"
W.P. EL 630'-
W.P. EL 628'-
3'-3"
MATCH LINE - SEE
AUX. PLAN "C"
DWG D-304-342
W.P. EL 630
W.P. EL 628'-
AX
6


H117
H116
F026A
F025A
H123
H124
H122
MCV F001A
MCV F002A
H260
W.P. EL 62
H086
SLOPE DN.
H118
H119
H121
H087-2½"
H135-4"
S.W. CONN.
(RS.) (TYP 4)
SEE DETAIL "F"
H094
H175
H174
F026J
F025J
MCV F002J
MCV F001J
H089
H088
H092
F544J
DI-1
EL 629'-8
(TYP 4)
F506
DI-2 (T
W.P. EL 6
CONN ON S
(TYP 4) SE
H090
H091
H093
DI-2
DI-1
(TYP.4)
3'-3"
2'-11½"
3'-9"
1'-1"
9"
11"
4 LI-2
1'-0"
(TYP. 4)
2'-11½"
1'-1"
1'-5½"
B
30'-3" (TOP)
8'-9⅞" (BOT)
0'-2⅛" (TOP)
5'-9¼" (BOT)
ROTATED VALVES F506E & F544E (D-10) TO VERTICAL POSITION PER ECN-18903
44-649 & CHANGED DIMENSIONS (4 PLACES G-10, A-10, B-6) TO ACCOMMODATE AS-BUILT CONDITIONS PER ECN-18640
44-6336-A. ADDED CONN. WELD DETAIL (A-6, E-3) PER ECN-18926-44-6461-A.
DELETED PIPE SUPPORT H092 (J-10). REVISED PIPE SUPPORT LOCATION H151 & H187 (D-8) ADDED

	D.W. ROCK (E-2), & BW. TEE (E-2) PER ECN 12997-44-3299-A				PPA-7. JGS 8. N/I INTERFACE	
3	H	7 27 84	E. L. K. K.	R C D S		JET
	INDICATED TOP OR BOT. LINE ON THE FOLLOWING SUPPORTS H145, H227, H140, H139, H138, H137, H167, H154, H153, H152 & H151. INCORPORATED PIPE SUPPORTS 14 PLACES. DELETED SUPPORT H099 (D-10) RELOCATED SUPPORT H150 (D-8).				PPA- N/I 7. 8. N/I INTERFACE	
3	G	6 19 83	C B R	R C C		JET
	DELETED NOTE 9 INCORPORATED PIPE SUPPORT LOCATION FOR H189 (B-3), H194 (D-6), H195 (H-7), H211 (D-13), H213 (D-12), H223 (B-14) H226 (D-7) & H227 (D-11) RELOCATED PIPE SUPPORTS H117 (G-11) & H152 (D-8)				PPA- N/I 7. JET 8. N/I INTERFACE	
2	F	4 5 83	C B R TWT RAD	R D S C C		
	REVISED 4" PIPING (D,E-11). ADDED LINE SPECS D1-1 & D1-2 @ (J-10), (C-1). ADDED VALVES F544J (J-10), F544A (G-10), F544N (F-10) & F544E (D-10). REMOVED LINE SPEC. D1-2 & D1-1 AREA (C-2)					
	REVISED PIPE SUPPORT H104 AREA (F-10)				PPA JT 2 7. JET 8. N/I	

1) 3 5/8" M LINE VALVES = TAIL "E"

PLAN ABOVE EL. 620'-6"

SCALE: 1/2" = 1'-0"

W.P. EL. 629'-1 9/16"

W.P. EL. 629'-1 13/16"

7'-4"

1'-6"

20'-0" TO COLUMN (AX G)

N11
MCV-F020C
-SEE DETAIL "A"
(TYP 4)

& 614'-6"

REFERENCES:-

D-302-341 MSIV LEA
D-302-342 MSIV LEA
D-302-605 NUCLEAR

FVA #
4071.44.582
6202.44.940
7898-44-1265

FVA #
6066.44.906
8644.866.214

ECN #	REV
20234.44.7150	—
24176.44.8122	—
26177.45.2128	—

THIS DRAWI
OUTSTANDIN
(ECN'S, FVA'
FOR THAT
INCORPORA
HAVE BEEN
BE CONSI
AS BUILT DRA

C
OF

E
JRG SG
JD S
CB
12/82
REMOVED HOLD ON BLOWER FLEX CONN.(B-11) REV PIPING IN AREA(B-11)

PPA JT2
REROUTED 2"GI-2 PIPE AREA (D-10). REVISE SECTION 7-7.
7. JET
8. RPM:

D
INTERFACE
JRG
JD S
ADDED 8" PIPING (D-10) PIPE WAS 2" (C-1). ADDED DIM (C-1) INCORPORATED PIPE SUPPORT LOCATIONS. REMOVED HOLDS ON MCV-F001 A,E,J,N AND MCV-F008 A,E,J,N (D, J,N3-10,11); MCV- ADDED 4" PIPING (D,E-11). ROTATED #5066 (D-9).
PPA- SEE
7. JCM
8. N/Z

C
INTERFACE
JRG
JD S
DWG RECRAWN & RECHECKED.
PPA- SEE
8. RPM=

B
INTERFACE
JRG
JCM
R. D.
PLACED ON DWG BY DCN-2-633

IV LEAKAGE CONTROL

CO IN CONJUNCTION WITH DWGS. D-304-342 AND D-304-343.

JUN 25 1986
DRAWING CONTROL

PRINTED
JUL 05 1986
CONTROLLED PNPP REPRO SERV.

NTROL SYSTEM - FLOW DIAGRAM
NTROL SYSTEM - FLOW DIAGRAM
- FLOW DIAGRAM

RECORD AS BUILT
This Dwg. May Not Reflect
The As Built Condition.
As Built Information Is
Available in The Records
Management System

NUCLEAR SAFETY RELATED

NOT AS-BUILT.
NCE DOCUMENTS
AND
VOE BEEN
THIS DRAWING
PORATED ONTO
DETAIL AS-

NG UNDER
ONTROL AS
K

CEI CONTROL				
REV	DATE			CEI
K	6-2-86			94

ADDED STAMP FOR DESIGN RESPONSIBILITY TRANSFER TO CEI	7 JGS for 8 N.I. INTERFACE

NO	DATE	MADE	CHKD	APPROVALS	
J	1-3-86	HRM	BP		JGS for RJS

REVISIONS

1/24/79	CONSTRUCTION	
	LIMITED CONSTRUCTION: AS NOTED	
	PRELIMINARY NOT FOR CONSTRUCTION	
	BIDDING PURPOSES	
DATE	RELEASED FOR	ENGR.

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

PERRY NUCLEAR POWER PLANT — UNIT 1

PIPING — SYSTEM E32

MSIV LEAKAGE CONTROL SYSTEM

AUX BLDG EL. 620'-6" AND EL. 614'-6" - PLAN AND SECTIONS

READING PA. — GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS

DRAFTING		ENGINEER APPROVALS			
MADE	CHECKED	ARCHITECTURAL	CIVIL	STRUCTURAL	ELECTRICAL
TRESSLER 12-21-78	DR	1. NA	2. NA	3. NA	4. NA
APPROVAL		MECHANICAL	ENVIRONMENTAL	NUCLEAR	
J.R. Gordon 12-21-78		5. NA	6. NA	DH Earl 1-16-79	

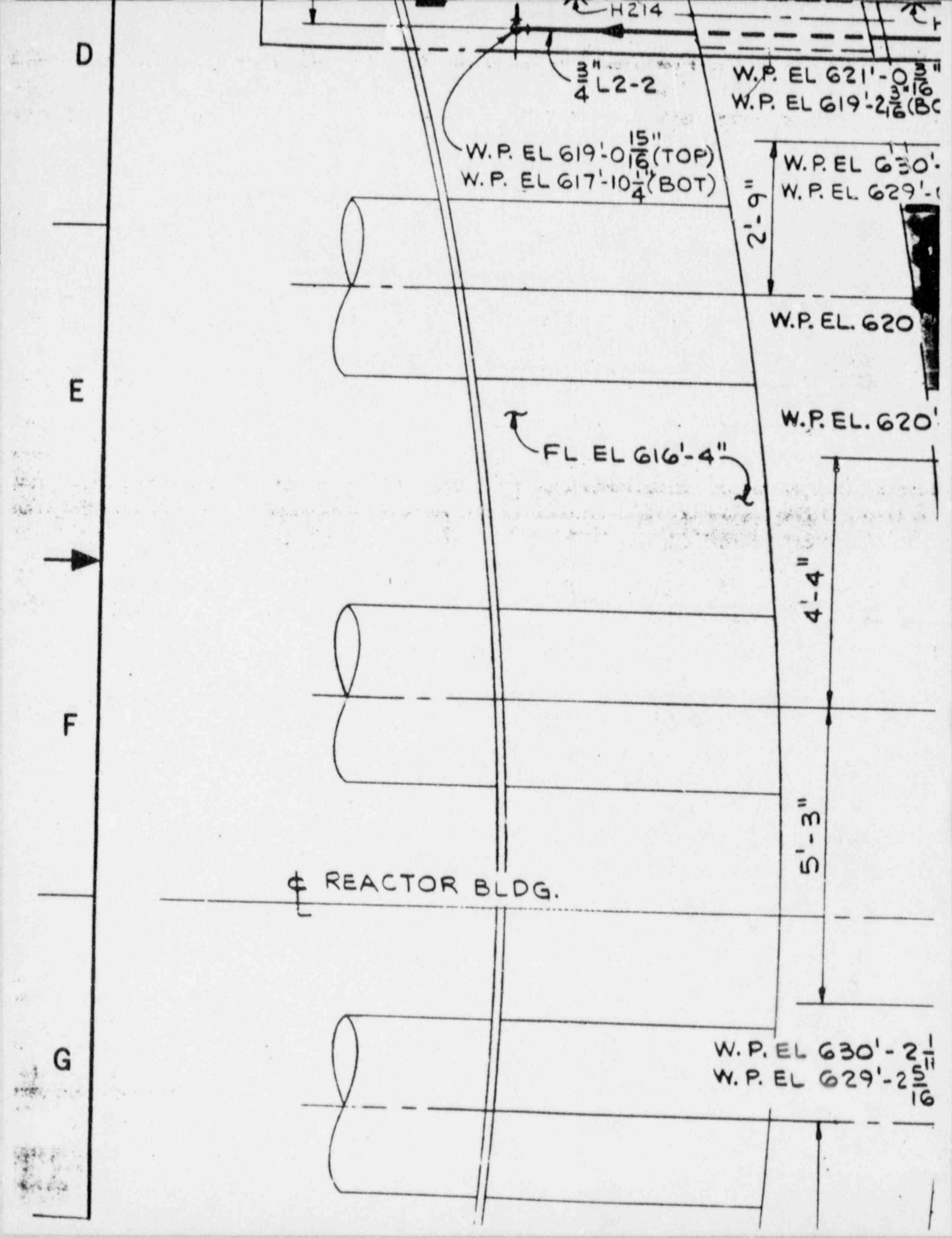
SCALE			
AS NOTED	04	4549	D-304-341 K
E.O. 944549-000	DRAWING NUMBER		REV

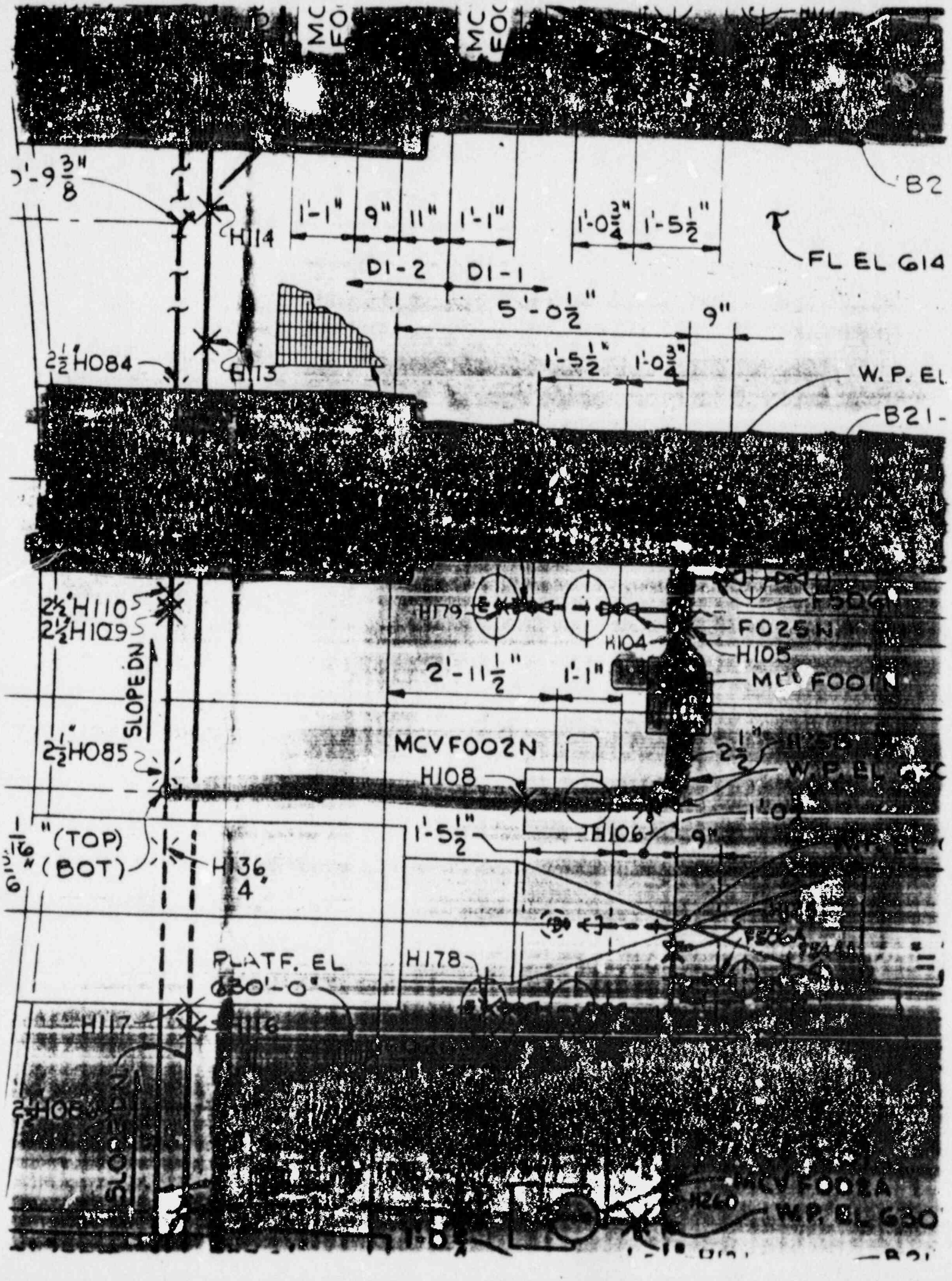
17 JUN 77

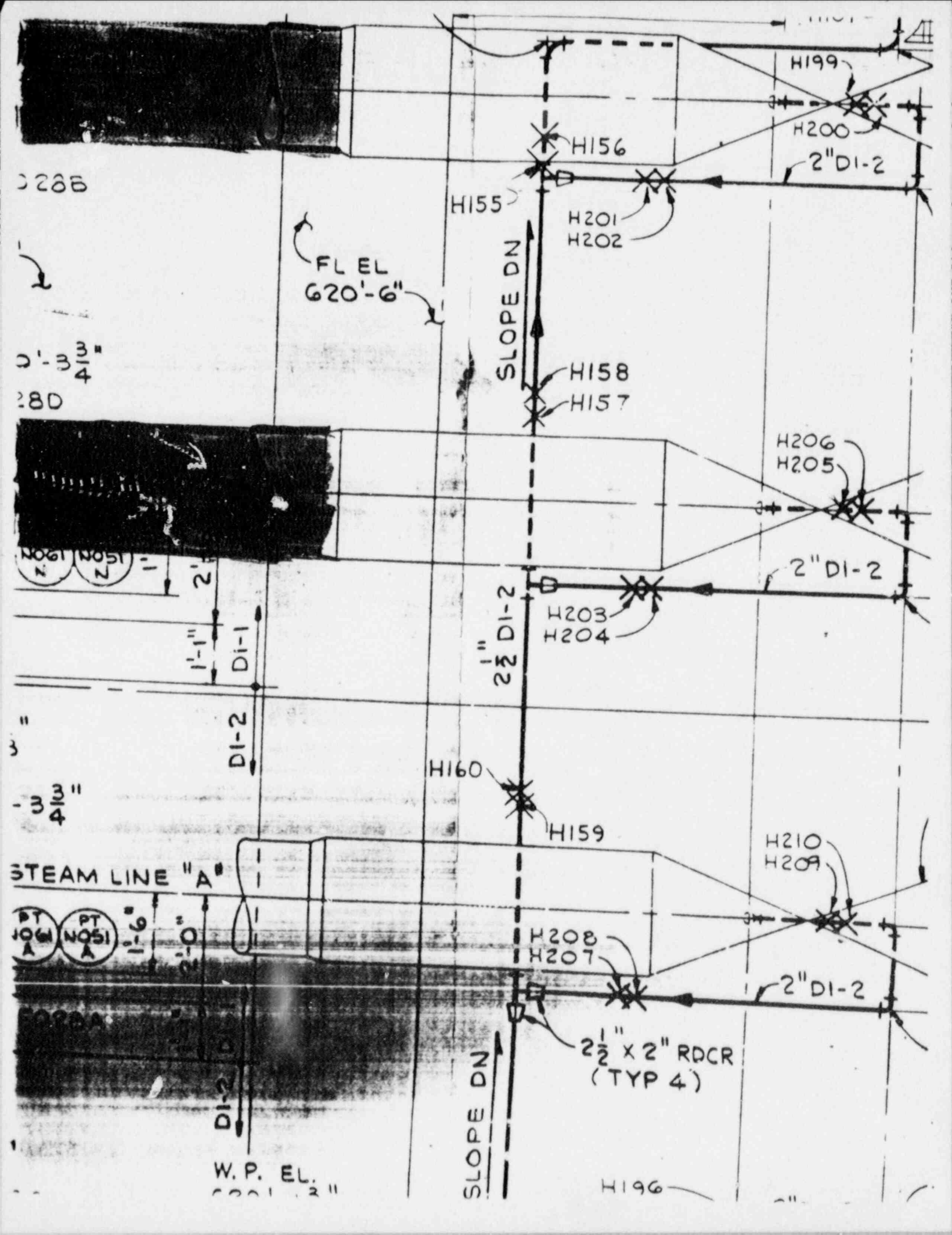
ITEM	NO	MADE	CHKD	APPROVALS	REVISIONS
A	1	HRM	M	JRG	JPS RTG

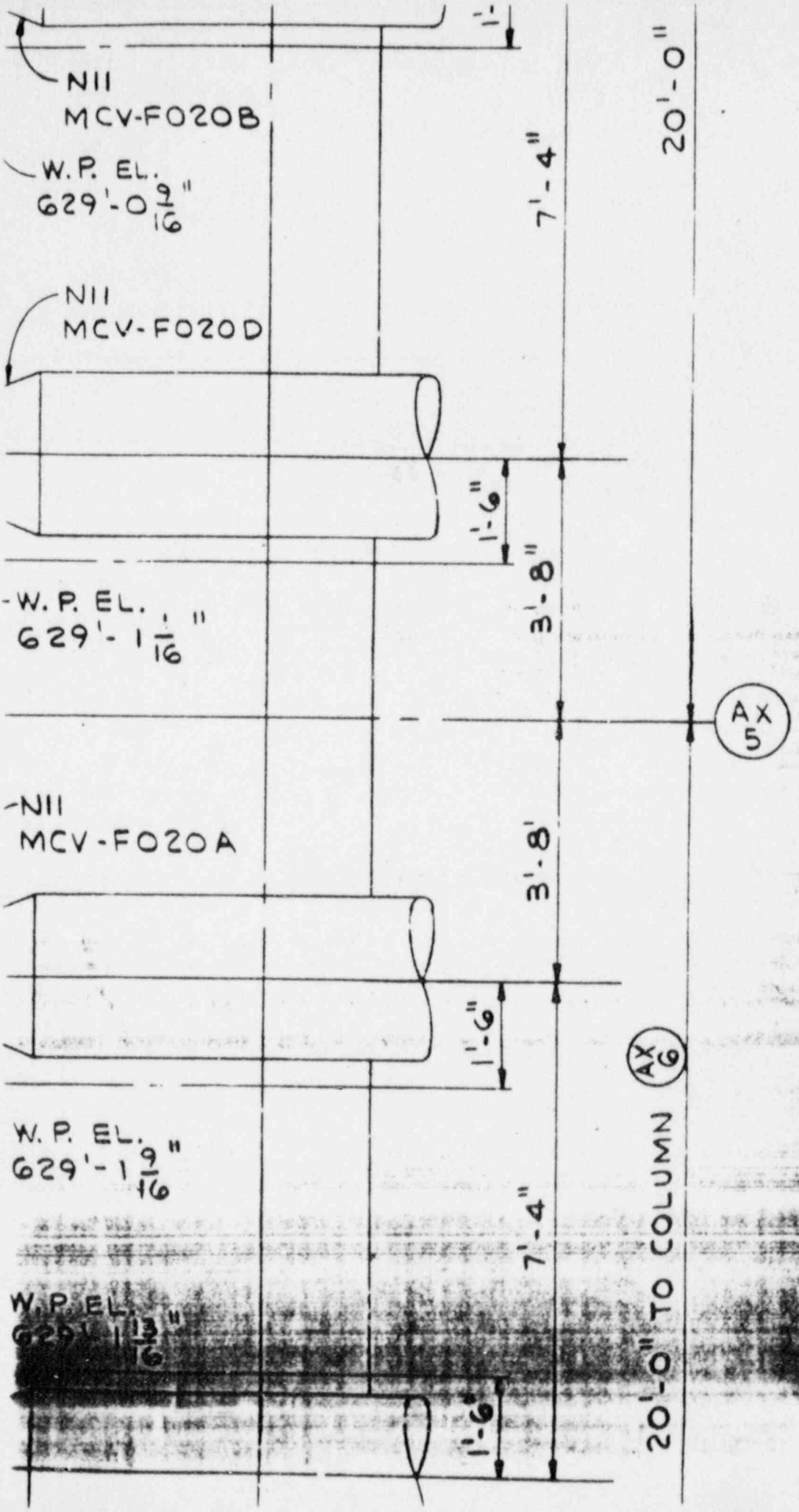
VALVED. ADDED VIM. FOR
FI-R354 (C-4).
INCORR DCN. 1-526
REVISED LOC. & DIMENIONED
12 VALVES AS SHOWN.
REVISED PIPE FOR
THERMAL ANALYSIS AND
MISSILE PROTECTION.

P150.


D
E
F
G
H214
3/4" L2-2
W.P. EL 621'-0 3/16"
W.P. EL 619'-2 3/16" (BC
W.P. EL 619'-0 15/16" (TOP)
W.P. EL 617'-10 1/4" (BOT)
W.P. EL 630'
W.P. EL 629'-(
2'-9"
W.P. EL. 620
W.P. EL. 620'
FL EL 616'-4"
4'-4"
5'-3"
℄ REACTOR BLDG.
W.P. EL 630'-2 1/16"
W.P. EL 629'-2 5/16"


MC FO
MC FO
B2
1'-9 3/8"
H114
1'-1"
9"
11"
1'-1"
1'-0 3/4"
1'-5 1/2"
FL EL G14
D1-2
D1-1
5'-0 1/2"
9"
2 1/2" H084
H113
1'-5 1/2"
1'-0 3/4"
W. P. EL
B21-
2 1/2" H110
2 1/2" H109
H179
K104
F025N
H105
2'-11 1/2"
1'-1"
MCV FOO1N
SLOPE DN
2 1/2" H085
MCV FOO2N
H108
2 1/2"
W. P. EL
1'-0"
1'-5 1/2"
H106
9"
1/16" (TOP)
(BOT)
H136
4
PLATF. EL
630'-0"
H178
H117
H116
2 1/2" H086
SLOPE DN
MCV FOO3A
H120
W.P. EL 630
B21


H199
H200
H156
2"D1-2
H155
H201
H202
FL EL
620'-6"
SLOPE DN
H158
H157
H206
H205
2"D1-2
H203
H204
2½" D1-2
D1-2
H160
H159
H210
H209
STEAM LINE "A"
H208
H207
2"D1-2
2½" x 2" RDCR
(TYP 4)
SLOPE DN
W.P. EL.
H196

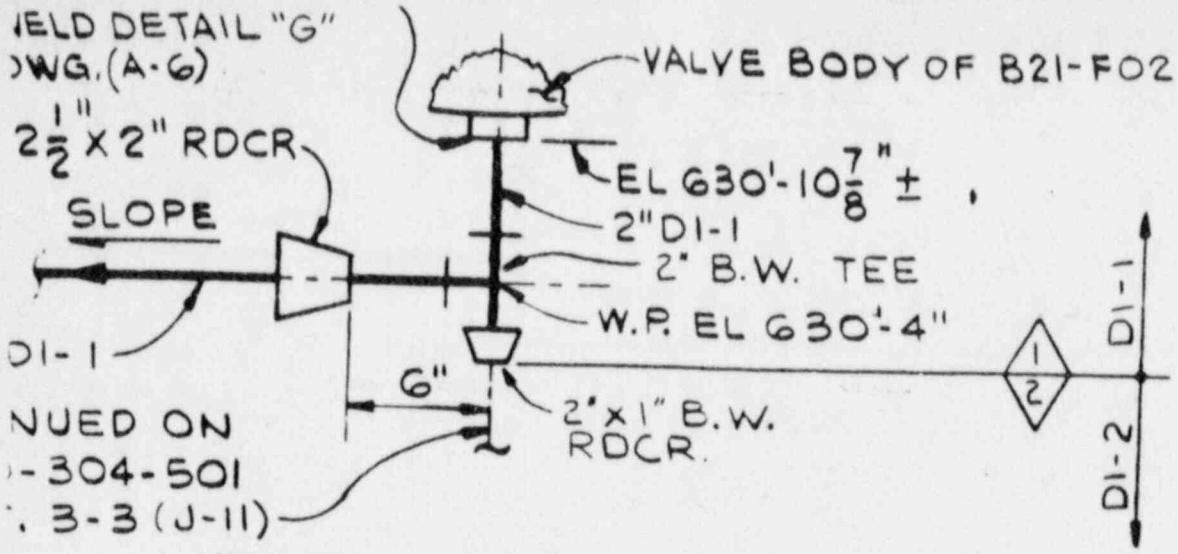


NOTES:-

1. A. PIPING IS SAFETY
   B. PIPING IS SEISMI
2. FOR PIPE MATERIAL,
   SP-527-4549-00 (SAF
3. FOR INSULATION, SEE
   SP-354-4549-00 OUTS
4. FOR WELD END DETAIL
5. ALL VENT AND DRAIN
   WITH CAF.
6. SMALL PIPING FOR DR
   DIAGRAMMATICALLY.
   MUST PROVIDE REQUIR
7. NO ALLOWANCE FOR WE
8. THIS DRAWING TO BE

REF ENCES:-

D-
D-
D-



DETAIL "E"

SCALE: NONE

'S AS INDICATED.
'EGORY I.
AI SPECIFICATION SP-350-4549-00 (NON-SAFETY).
LINE CLASS AS INDICATED.
SPECIFICATION SP-353-4549-00 INSIDE CONTAINMENT AND
ONTAINMENT.
E GAI DWGS. D-301-001 (NON-SAFETY), D-301-601 (SAFETY).
S TO HAVE T.O.E. (THREAD ONE END) NIPPLE AT THE OUTLET END,
SAMPLE AND INSTRUMENT CONNECTION LINES, IS SHOWN
INSTALLATION OF VALVES AND OTHER APPENDAGES, CONTRACTOR
EARANCE FOR INSULATION
'S.
IN CONJUNCTION [illegible] D-304-342 AND D-304-343.

RECEIVED
JUN 25 1986
DRAWING CONTROL

PRINTED
JUL 03 1986

ROL SYSTEM - FLOW DIAGRAM
FLOW DIAGRAM

RECORD AS BUILT
This Dwg. May Not Reflect
The As Built Condition.
As Built Information Is
Available in The Records
Management System

CEI CONTROL

REV.	DATE			CEI
K	5-2-86			

ADDED STAMP FOR DESIGN RESPONSIBILITY TRANSFER TO CEI

7 JGS for 8 N.I. INTERFACE

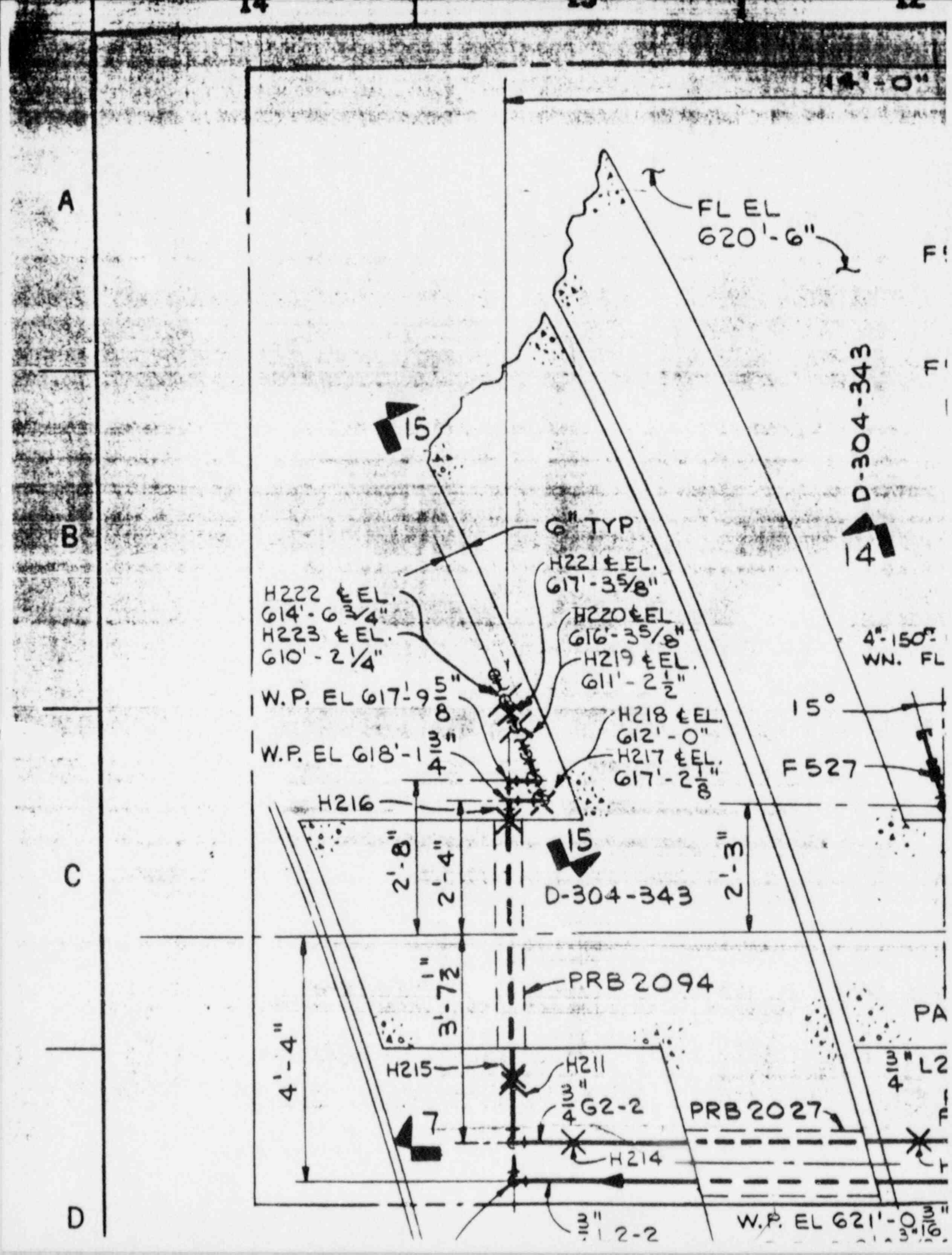
J					
	3-Dec.	4/2	8/0		JGS

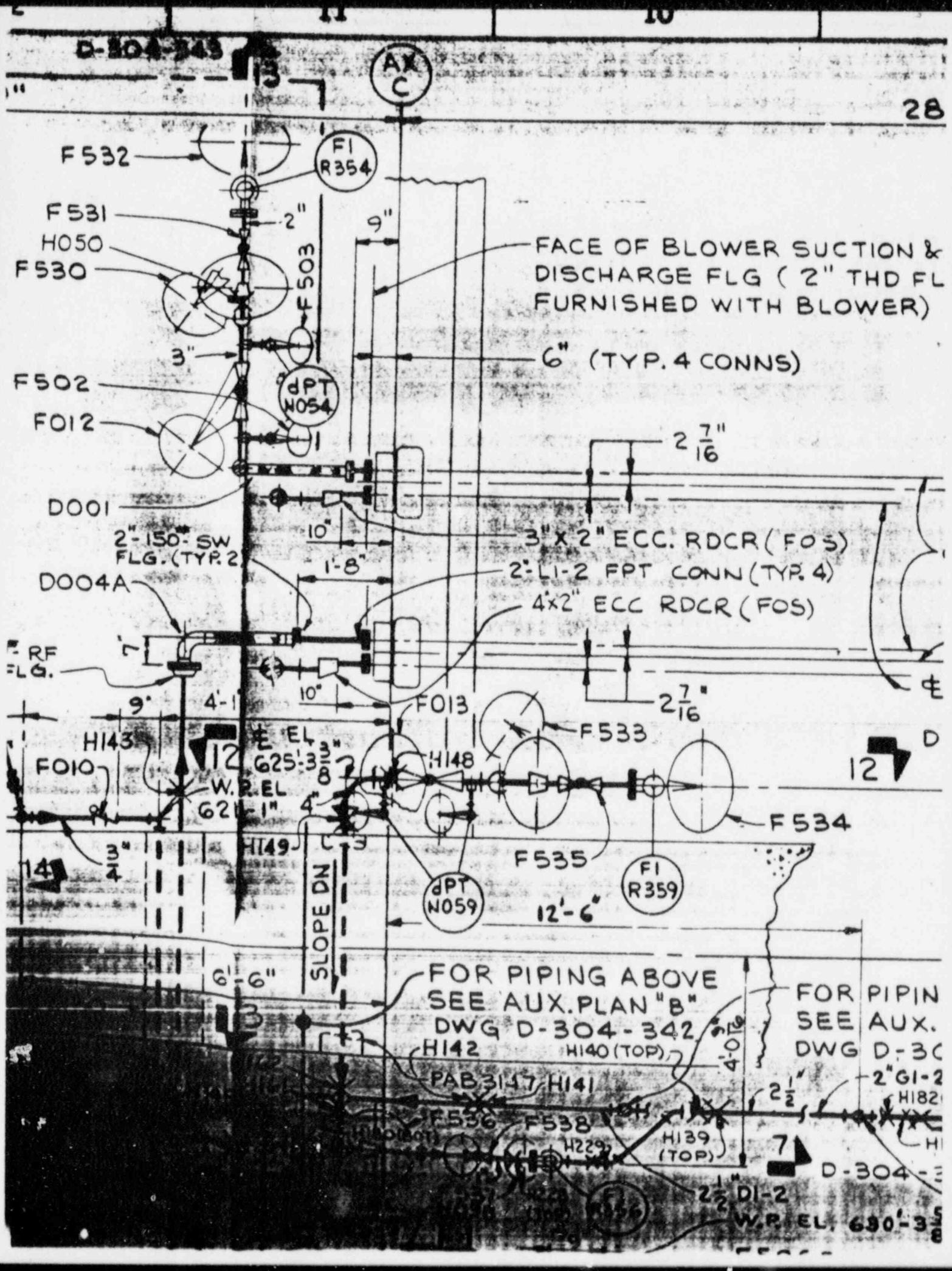
E

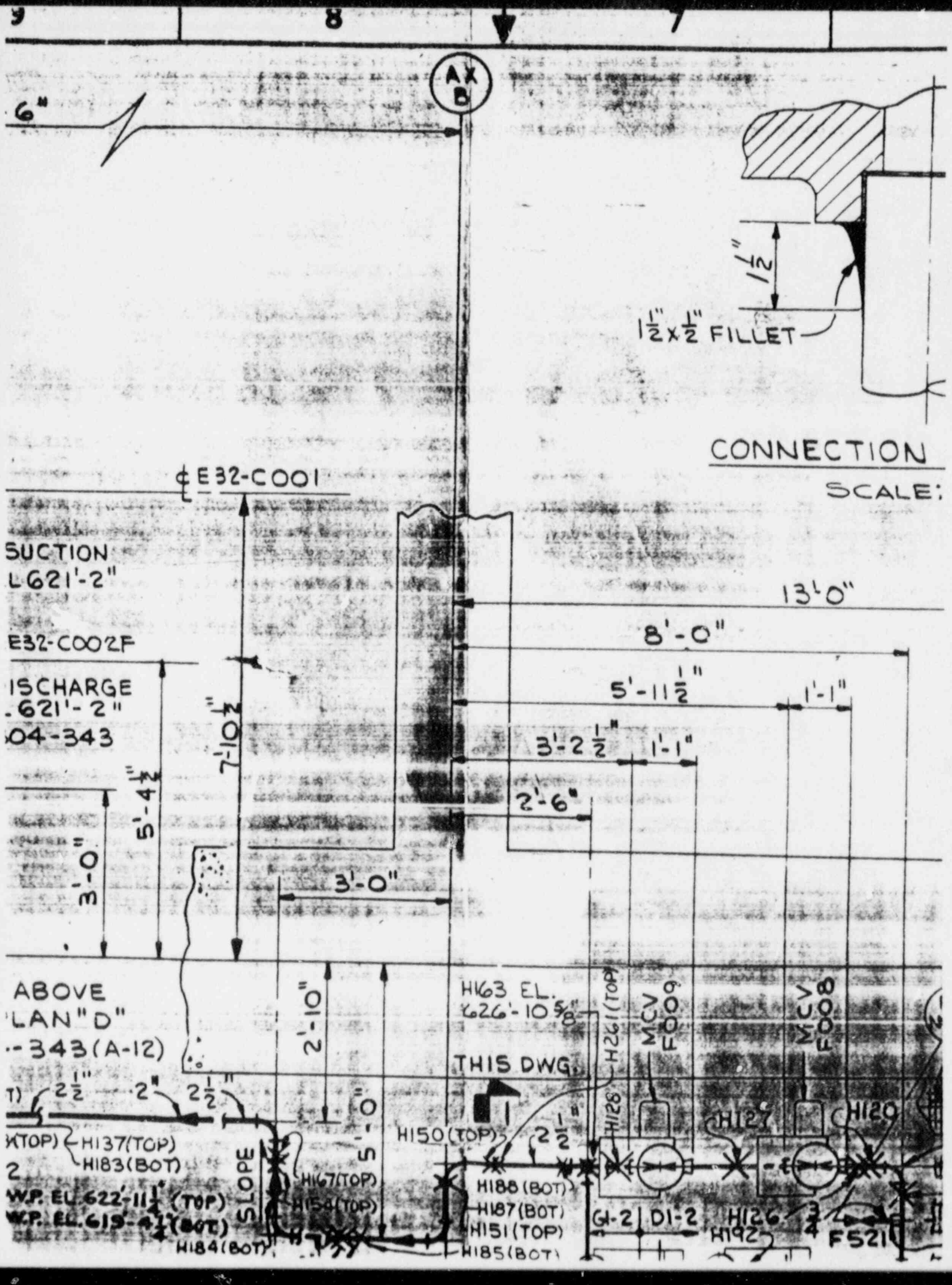
F

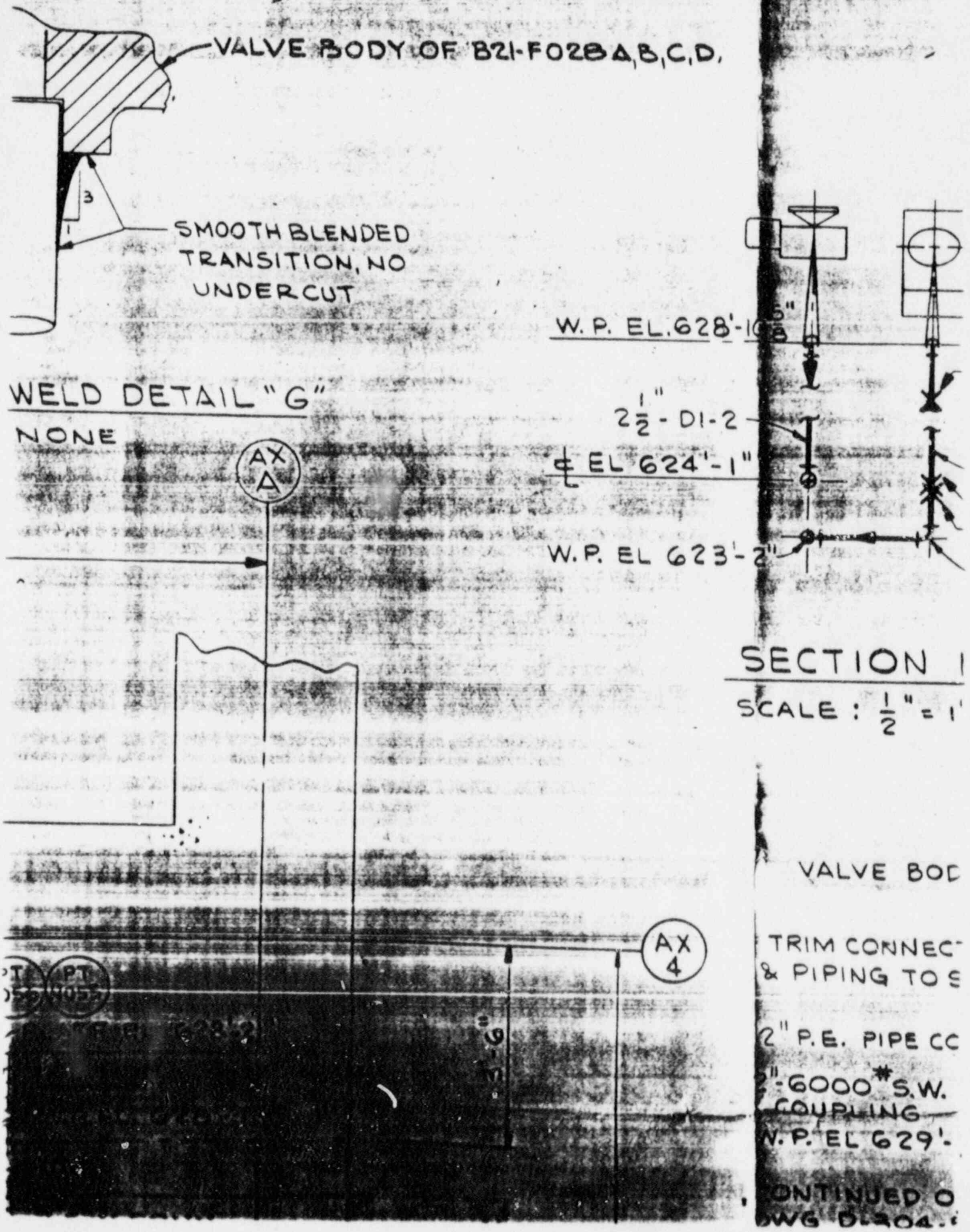
G

H


14
13
12
A
B
C
D
14'-0"
FL EL
620'-6"
F
F
D-304-343
15
14
6" TYP
H221 ℄ EL.
617'-3 5/8"
H222 ℄ EL.
614'-6 3/4"
H223 ℄ EL.
610'-2 1/4"
H220 ℄ EL
616'-3 5/8"
H219 ℄ EL.
611'-2 1/2"
4"-150°
WN. FL
W.P. EL 617'-9 5/8"
W.P. EL 618'-1 3/4"
H218 ℄ EL.
612'-0"
H217 ℄ EL.
617'-2 1/8"
15°
F527
H216
2'-8"
2'-4"
2'-3"
15
D-304-343
3'-7 1/2"
PRB 2094
PA
4'-4"
H215
H211
3/4" G2-2
PRB 2027
7
H214
3/4" L2
W.P. EL 621'-0 3/16"


D-304-343
13
AX
C
28
F532
FI
R354
F531
2"
9"
H050
F530
F503
FACE OF BLOWER SUCTION &
DISCHARGE FLG (2" THD FL
FURNISHED WITH BLOWER)
3"
6" (TYP. 4 CONNS)
F502
dPT
N054
F012
2 7/16"
D001
10"
3"X2" ECC. RDCR (FOS)
2"-150#-SW
FLG. (TYP. 2)
1'-8"
2"-L1-2 FPT CONN (TYP. 4)
D004A
4"x2" ECC RDCR (FOS)
RF
FLG.
2 7/16"
9"
4'-1"
10"
F013
F533
H143
12
℄ EL
625'-3 3/8"
H148
12
D
F010
W.P. EL
621'-1"
4"
F534
3/4"
14
H149
F535
FI
R359
dPT
N059
SLOPE DN
12'-6"
6'-6"
FOR PIPING ABOVE
SEE AUX. PLAN "B"
DWG D-304-342
FOR PIPIN
SEE AUX.
DWG D-3(
H142
H140 (TOP)
4'-0"
PAB 3147 H141
2"G1-2
2 1/2"
H182
F536
F538
H139
(TOP)
H229
7
D-304-
2 1/2" DI-2
W.P. EL. 690'-3 5/8"


9
8
7
AX
B
6"
1½"
1½"x½" FILLET
CONNECTION
SCALE:
℄E32-C001
SUCTION
L621'-2"
E32-C002F
ISCHARGE
.621'-2"
04-343
13'-0"
8'-0"
5'-11½"
1'-1"
3'-2½"
1'-1"
2'-6"
7'-10½"
5'-4½"
3'-0"
3'-0"
ABOVE
'LAN"D"
-343(A-12)
2'-10"
5'-0"
H163 EL.
626'-10⅝"
THIS DWG.
MCV F009
MCV F008
H127
H129
H128
H150(TOP)
2½"
2½"
2½"
2"
2½"
H137(TOP)
H183(BOT)
H167(TOP)
H154(TOP)
H184(BOT)
H188(BOT)
H187(BOT)
H151(TOP)
H185(BOT)
SLOPE
W.P. EL.622'-11¼"(TOP)
W.P. EL.619'-4¼"(BOT)
G1-2
D1-2
H126
H192
¾
F521

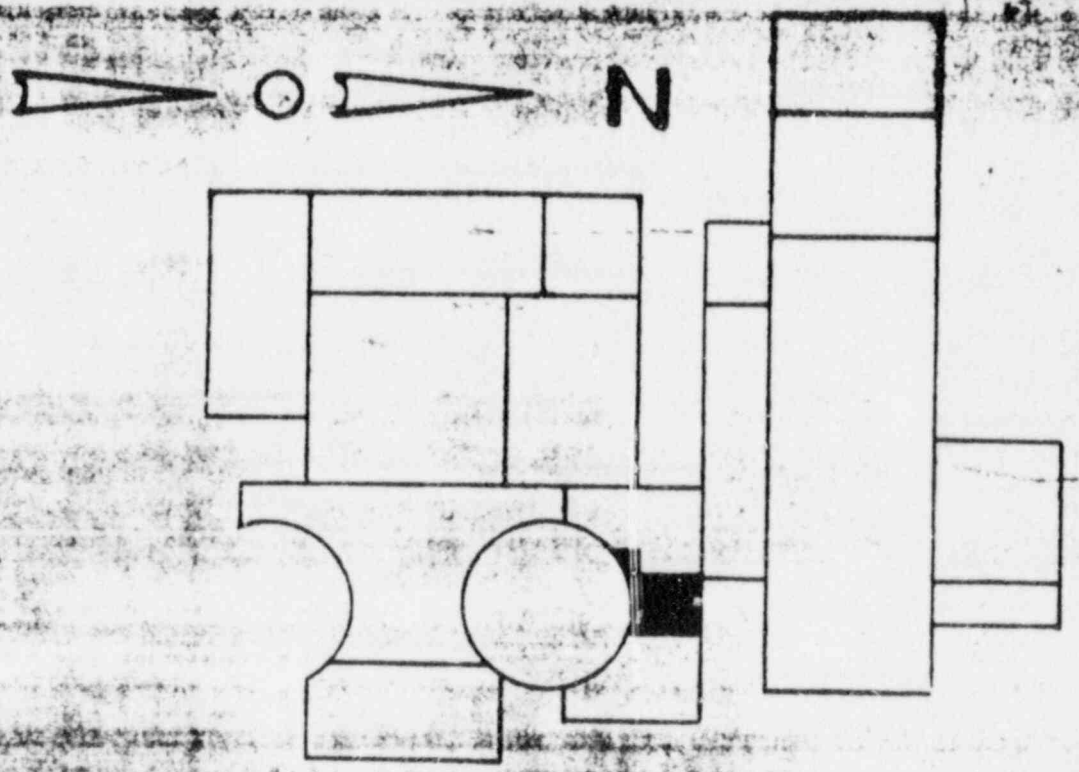

VALVE BODY OF B21-F028A,B,C,D.
3
1
SMOOTH BLENDED TRANSITION, NO UNDERCUT
W. P. EL. 628'-10 5/8"
2 1/2" - D1-2
℄ EL 624'-1"
W. P. EL 623'-2"
WELD DETAIL "G"
NONE
AX A
AX 4
SECTION
SCALE : 1/2" = 1'
VALVE BOD
TRIM CONNEC
& PIPING TO S
2" P.E. PIPE CC
2"-6000# S.W. COUPLING
W. P. EL 629'-
ONTINUED O
DWG D1204

3 2 1

A

B

C



KEY PLAN

G1-2

5

1

P. EL 623'-2 1/8"

2 1/2"-D1-1

1 1/2" D1-1

1 1/2" S.W. CONN.

℄ EL. 629'-8"

11"

ORIENTATION OF PIPING AND VALVES VARY (SEE PLAN VIEW)

2" D1-2

SLOPE

2" X 1 1/2" RDCR INSERT

DETAIL "F"

SCALE : NONE

MANAGEMENT

					H	8/30/85	DA				L	9/8/86	DLE					
					J	9/9/86	TRG				K	9/7/86	DLE					

VALVE F781 (H-7)
KN 13086-45-9531-;
RELIEF VALVE F806
ER ECN 28386-
89/-; ADDED ERIS
TS (H-8) PER ECN
1-86-2188/-

S. M.J.C
& DLE
INTERFACE

AS-BUILT WITH CHG.:
DCP 85-0088/CUN 615
WAS INC. IN REV. E.
REVISED REF. DWG. NO.
(F,G,H-10,11)(G-13) &
ADDED DWG. MATCH-
MARK (G-13)

S. M.J.C
& [illegible]
INTERFACE

AS-BUILT REVISED ADDED
VALVE OF-807(E-10), DWG.
REF. (J-9) & PIPE SIZE (D-12)
PER CUN. 1533/-, 2268/-1
2787/-

S. M.J.C
& A.R.L
INTERFACE

F-6
352-761
TO TEST
POINT

F-5
352-24

B-6
352-761

G-4
352-24

SODIUM HYPOCHLORITE
GEN. BUILDING

816-409

M4-4 S20-4

S20-4 M9-4

1"

OF607

INTERM
BUILDI

TO PEN
PRESSURIZ

J804
599'-0"

J812
574'-10"

J806
574'-10"

J802
620'-6"

J805
654'-6"

2"

3"

M9-4 L2

3/4"

SCV
F160

S

ISOL.
SIGNAL

TO PEN

302

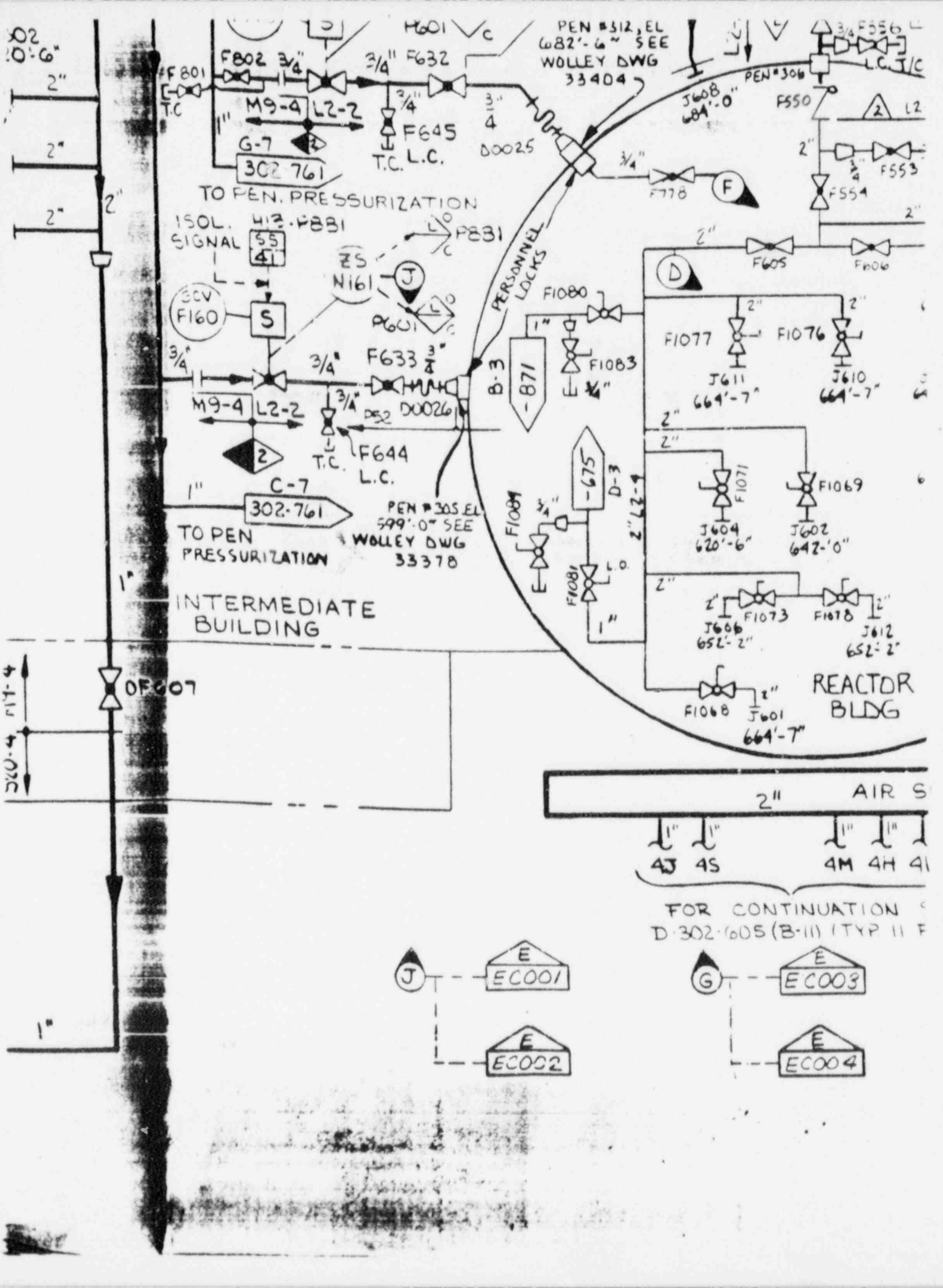
G-7

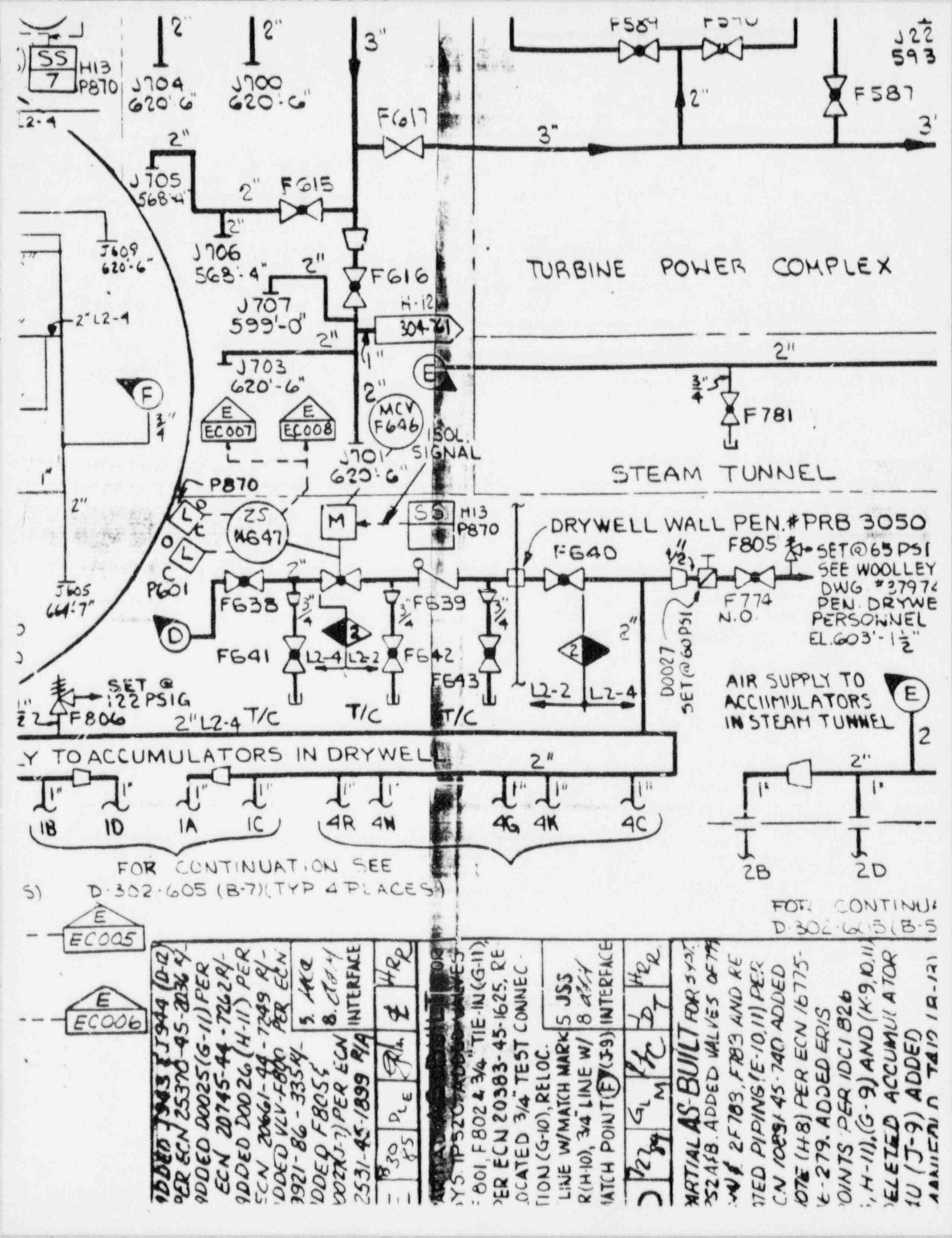
M9

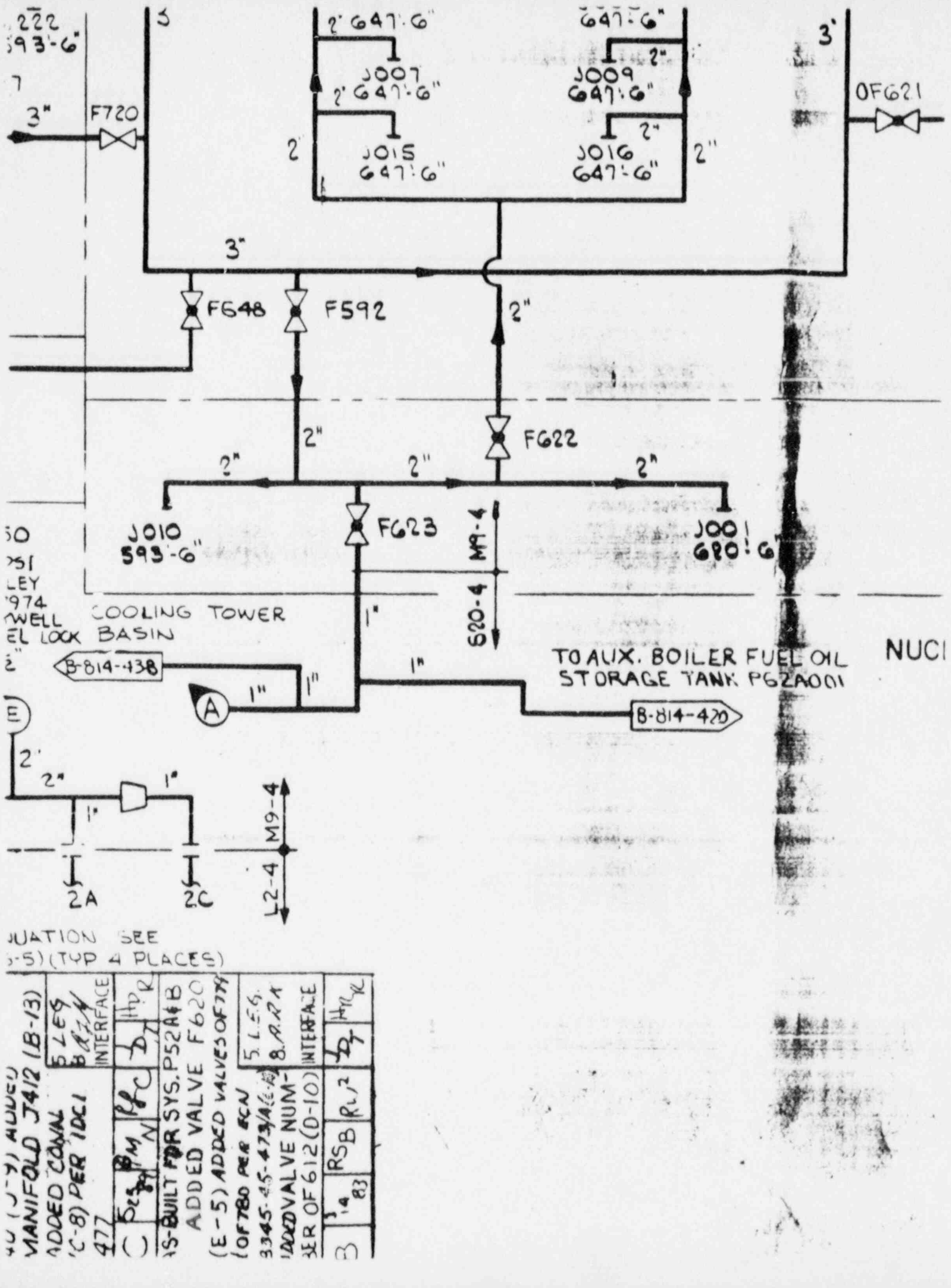
F801
T.C.

F802

SCV
F170

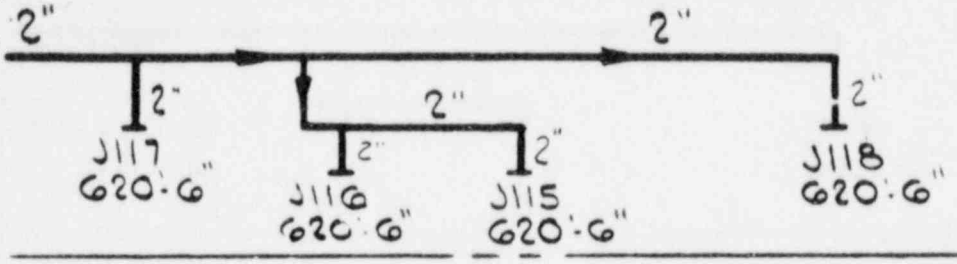

PEN #312, EL 682'-6" SEE WOLLEY DWG 33404
PEN #306
PEN #305 EL 599'-0" SEE WOLLEY DWG 33378
TO PEN. PRESSURIZATION
TO PEN PRESSURIZATION
ISOL. SIGNAL
SCV F160
PERSONNEL LOCKS
INTERMEDIATE BUILDING
REACTOR BLDG
AIR S
FOR CONTINUATION
D-302-605 (B-11) (TYP 11 F
F801
F802
F632
F645
F633
F644
F778
F556
F550
F553
F554
F605
F606
F1080
F1083
F1077
F1076
F1071
F1069
F1073
F1078
F1068
F1081
F1084
J608 684'-0"
J611 664'-7"
J610 664'-7"
J604 620'-6"
J602 642'-0"
J606 652'-2"
J612 652'-2"
J601 664'-7"
M9-4 L2-2
G-7
C-7
302-761
B-3
-871
-675
D-3
L2-4
0F607
4J 4S 4M 4H 4I
E EC001
E EC002
E EC003
E EC004


TURBINE POWER COMPLEX
STEAM TUNNEL
DRYWELL WALL PEN. #PRB 3050
SET @ 65 PSI
SEE WOOLLEY DWG #37974
PEN. DRYWELL PERSONNEL EL. 603'-1½"
AIR SUPPLY TO ACCUMULATORS IN STEAM TUNNEL
SET @ 122 PSIG
SET @ 60 PSI
ISOL. SIGNAL
MCV F646
F615
F616
F617
F638
F639
F640
F641
F642
F643
F781
F805
F806
F774
J704 620'-6"
J708 620'-6"
J705 568'-4"
J706 568'-4"
J707 599'-0"
J703 620'-6"
J701 620'-6"
J609 620'-6"
J605 664'-7"
P870
P601
ZS M647
EC007
EC008
EC005
EC006
T/C
FOR CONTINUATION SEE D-302-605 (B-7) (TYP 4 PLACES)
FOR CONTINUA D-302-605 (B-5
1B 1D 1A 1C 4R 4M 4G 4K 4C
2B 2D
AS-BUILT


222
593'-6"
3"
F720
2' 647'-6"
J007
2' 647'-6"
2'
J015
647'-6"
647'-6"
2"
J009
647'-6"
2"
J016
647'-6"
2"
3'
0F621
3"
F648
F592
2"
F622
2"
2"
2"
2"
J010
593'-6"
F623
J001
680'-6"
M9-4
S20-4
COOLING TOWER
BASIN
1"
B-814-438
A
1"
1"
1"
TO AUX. BOILER FUEL OIL
STORAGE TANK P62A001
B-814-420
NUCL
E
2"
2"
1"
1"
2A
2C
M9-4
L2-4
UATION SEE
-5) (TYP 4 PLACES)
MANIFOLD J412 (B-13)
ADDED CONN'L
(C-8) PER IDC1
477
AS-BUILT FOR SYS. P52A & B
ADDED VALVE F620
(E-5) ADDED VALVES OF 774
(OF 780 PER ECN
3345-45-473/A(E-8)
ADDED VALVE NUM-
BER OF 612 (D-10)
INTERFACE
INTERFACE

MONITOR

AUXILIARY BOILER ROOM



RECEIVED

DRAWING CONTROL

NOTES:-

1. INSTRUMENT AIR DISTRIBUTION MANIFOLDS ARE INDICATED BY LETTER "J" FOLLOWED BY THREE DIGITS.
2. AIR DISTRIBUTION MANIFOLD ASSIGNMENTS ARE SHOWN ON VARIOUS S-809 SERIES DRAWINGS
3. ENTIRE SYSTEM IN ACCORDANCE WITH LINE SPECIFICATION M9-4 EXCEPT WHERE NOTED OTHERWISE.
4. FOR OPERATING DATA AND DESIGN DATA, SEE DWG. 302-241

DRAWING UNDER DESIGN CONFIGURATION MANAGEMENT AS OF REV. L

NO	DATE	MADE	CHKD	APPROVALS

REVISIONS

R SAFETY RELATED

	CONSTRUCTION	
	LIMITED CONSTRUCTION: AS NOTED	
	PRELIMINARY NOT FOR CONSTRUCTION	
	BIDDING PURPOSES	
DATE	RELEASED FOR	ENGR.

UED ON 0 4 1987

EXPIRES ON NOV 1 7 1987

WORKING COPY

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

PERRY NUCLEAR POWER PLANT — UNIT 1

PIPING — SYSTEM DIAGRAM P52

INSTRUMENT AIR

READING PA — **GILBERT ASSOCIATES, INC.** ENGINEERS AND CONSULTANTS — GAI

DRAFTING MADE	DRAFTING CHECKED	ENGINEER APPROVALS: ARCHITECTURAL	CIVIL	STRUCTURAL	ELECTRICAL
RHJ 8-7-87	RHJ 8-7-87	1 NA	2 NA	3 NA	4 NA
DATES		DATES			

APPROVAL	MECHANICAL	ENVIRONMENTAL	NUCLEAR	
J.R. Gordon 9/17/87	DATE 9/3/87	6 NA	7 NA	DATE 9/10/87

SCALE

W.O. 44548-000

04 | 4548 | D-302-243 | N

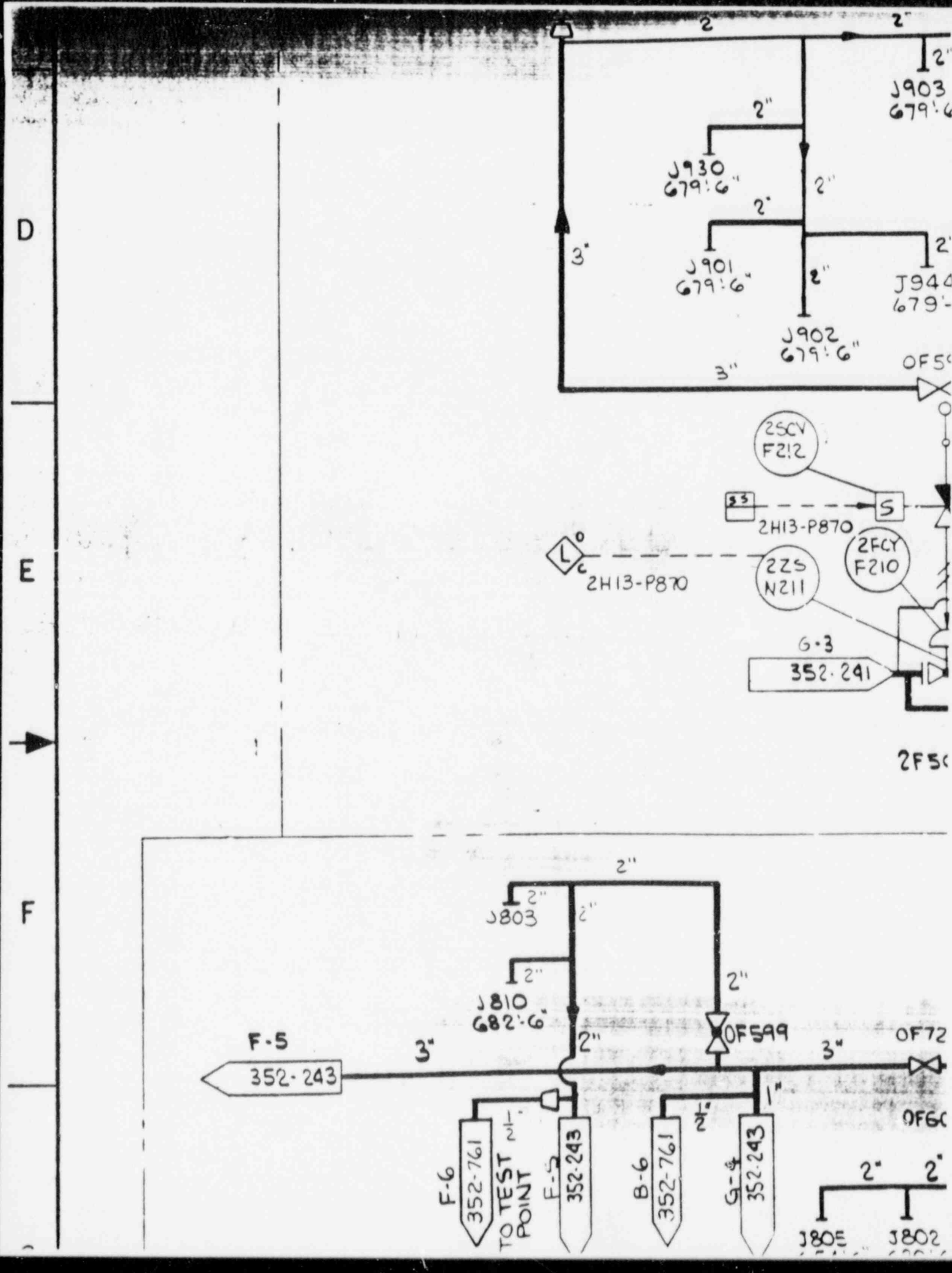
AS-BUILT PER CUN 8523/DCP B50067C.

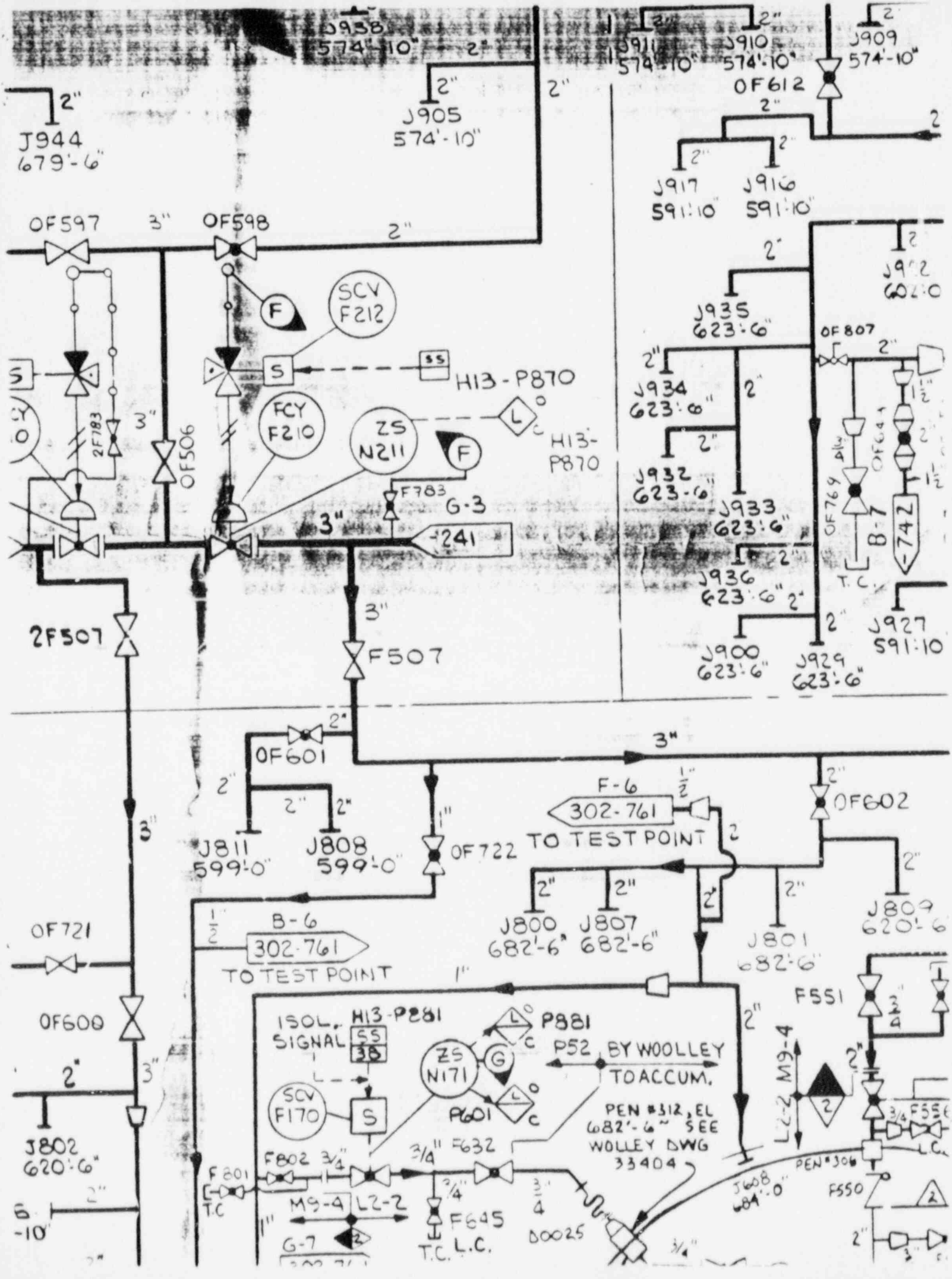
Inc Quan

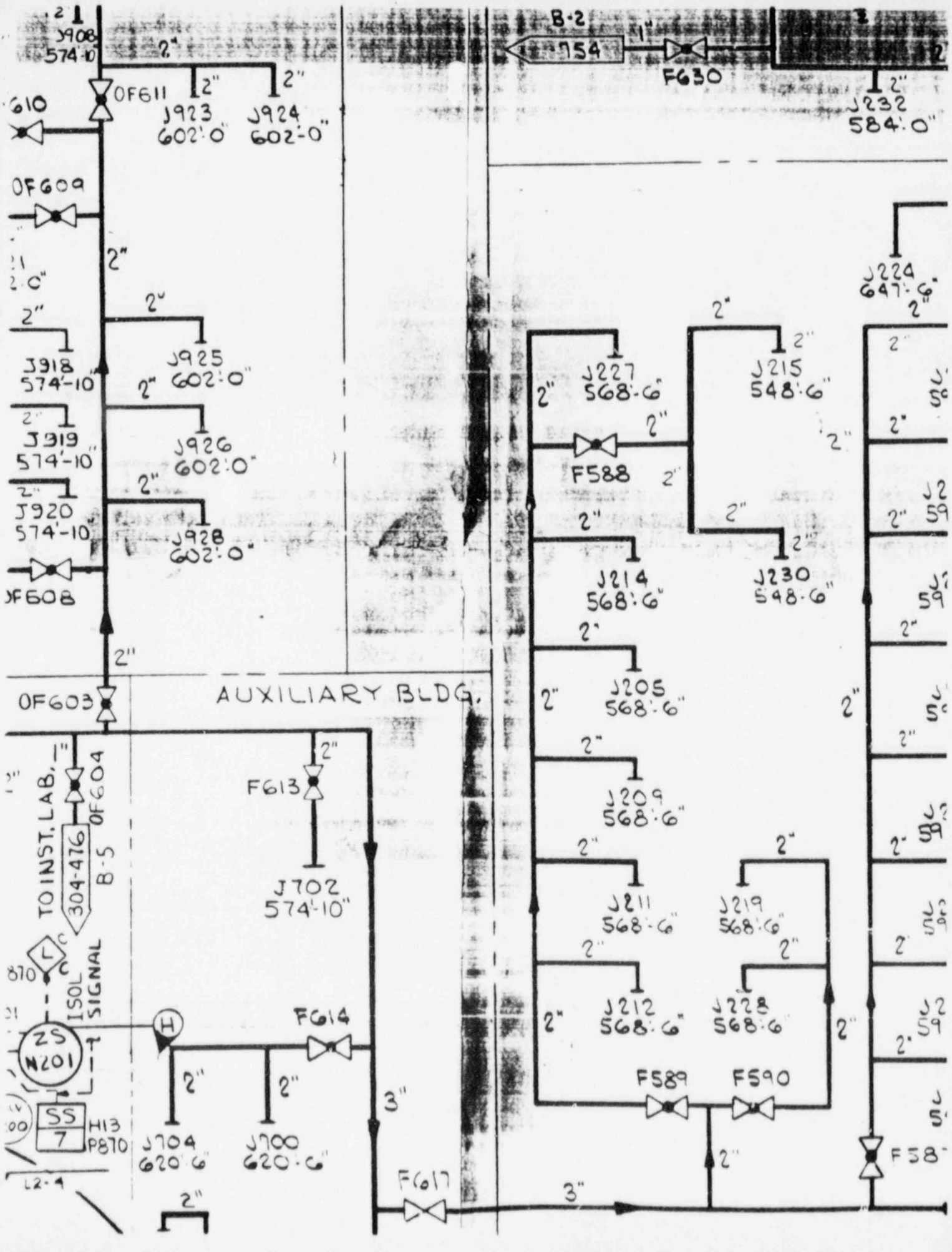
NO	DATE	MADE	CHKD	APPROVALS
N	10/9/87	MP	H	ME MC

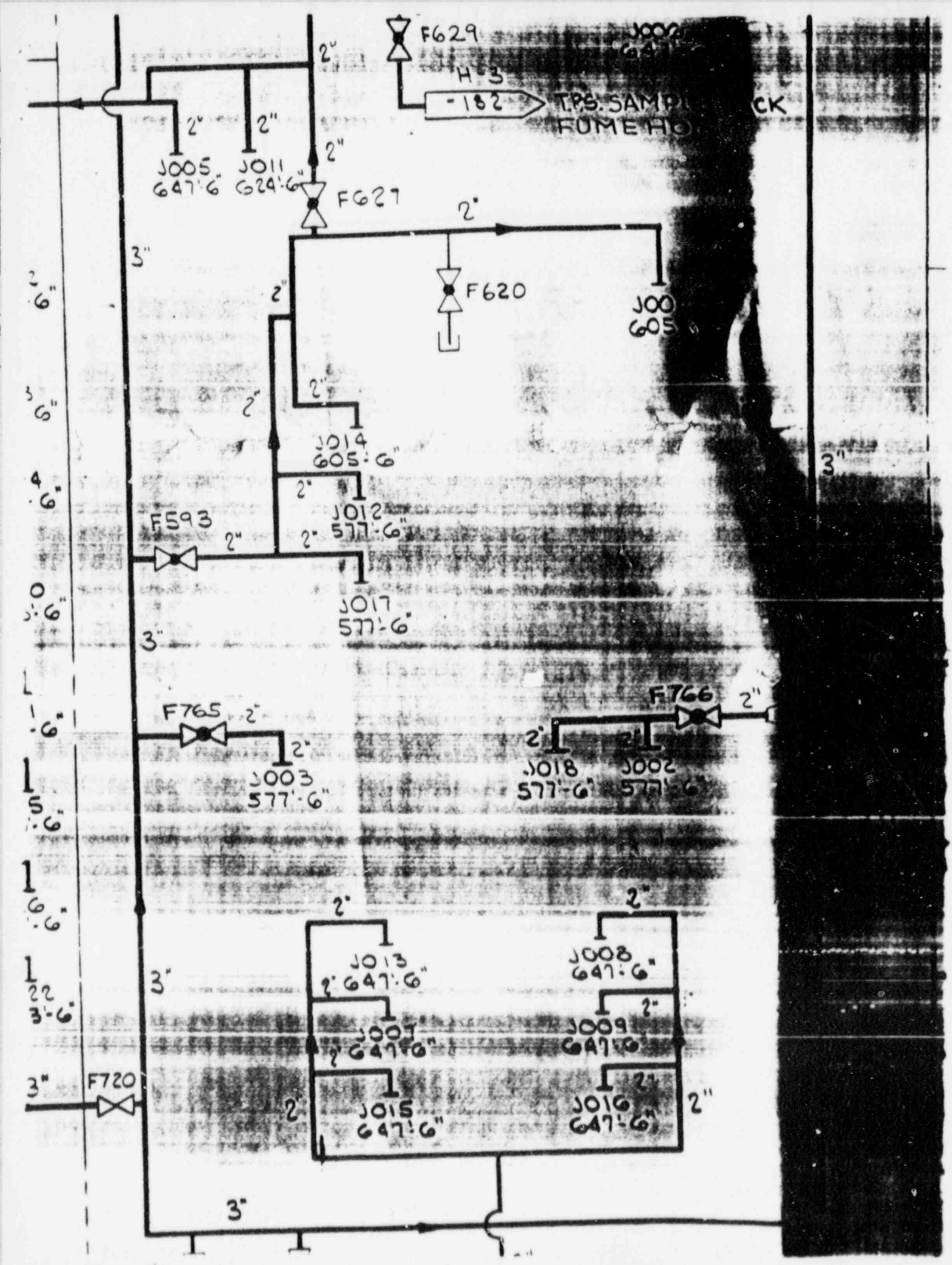
REVISIONS

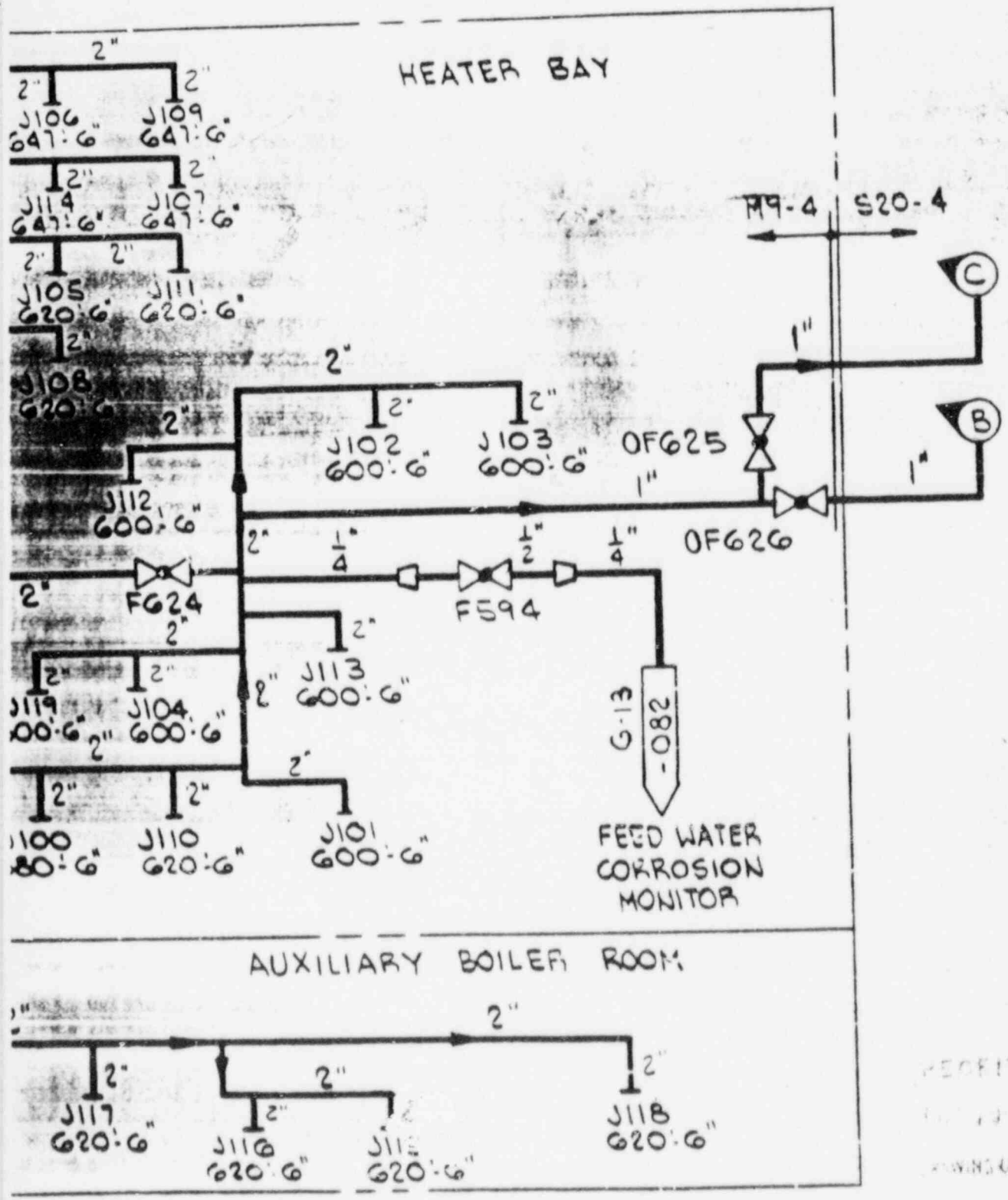
INTERFACE


D
E
F
2"
J903
679'-6"
J930
679'-6"
3"
J901
679'-6"
J902
679'-6"
2SCV
F212
S3
S
2H13-P870
L
2H13-P870
2ZS
N211
2FCY
F210
G-3
352-291
2F5
2"
J803
J810
682'-6"
F-5
352-243
OF599
OF72
OF6
F-6
352-761
TO TEST POINT
F-5
352-243
B-6
352-761
G-4
352-243
J80
J802


J938
574'-10"
2"
J944
679'-6"
J905
574'-10"
J911
574'-10"
J910
574'-10"
J909
574'-10"
OF612
J917
591'-10"
J916
591'-10"
OF597
3"
OF598
2"
SCV
F212
F
S
SS
H13-P870
FCY
F210
ZS
N211
L
C
H13-
P870
2F783
OF506
F783
G-3
-241
3"
2F507
F507
J935
623'-6"
OF 807
J934
623'-6"
J932
623'-6"
J933
623'-6"
OF769
B-7
-742
T.C.
J936
623'-6"
J927
591'-10
J900
623'-6"
J929
623'-6"
OF601
J811
599'-0"
J808
599'-0"
OF722
F-6
302-761
TO TEST POINT
OF602
J800
682'-6"
J807
682'-6"
J801
682'-6"
J809
620'-6
OF721
B-6
302-761
TO TEST POINT
OF600
J802
620'-6"
ISOL.
SIGNAL
H13-P881
SS
38
P881
ZS
N171
G
P52 BY WOOLLEY
TO ACCUM.
SCV
F170
P601
PEN #312, EL
682'-6" SEE
WOLLEY DWG
33404
F551
M9-4
LC-2
F632
F802
F801
T.C.
M9-4
LC-2
F645
T.C.
L.C.
D0025
PEN #306
J608
684'-0"
F550
G-7

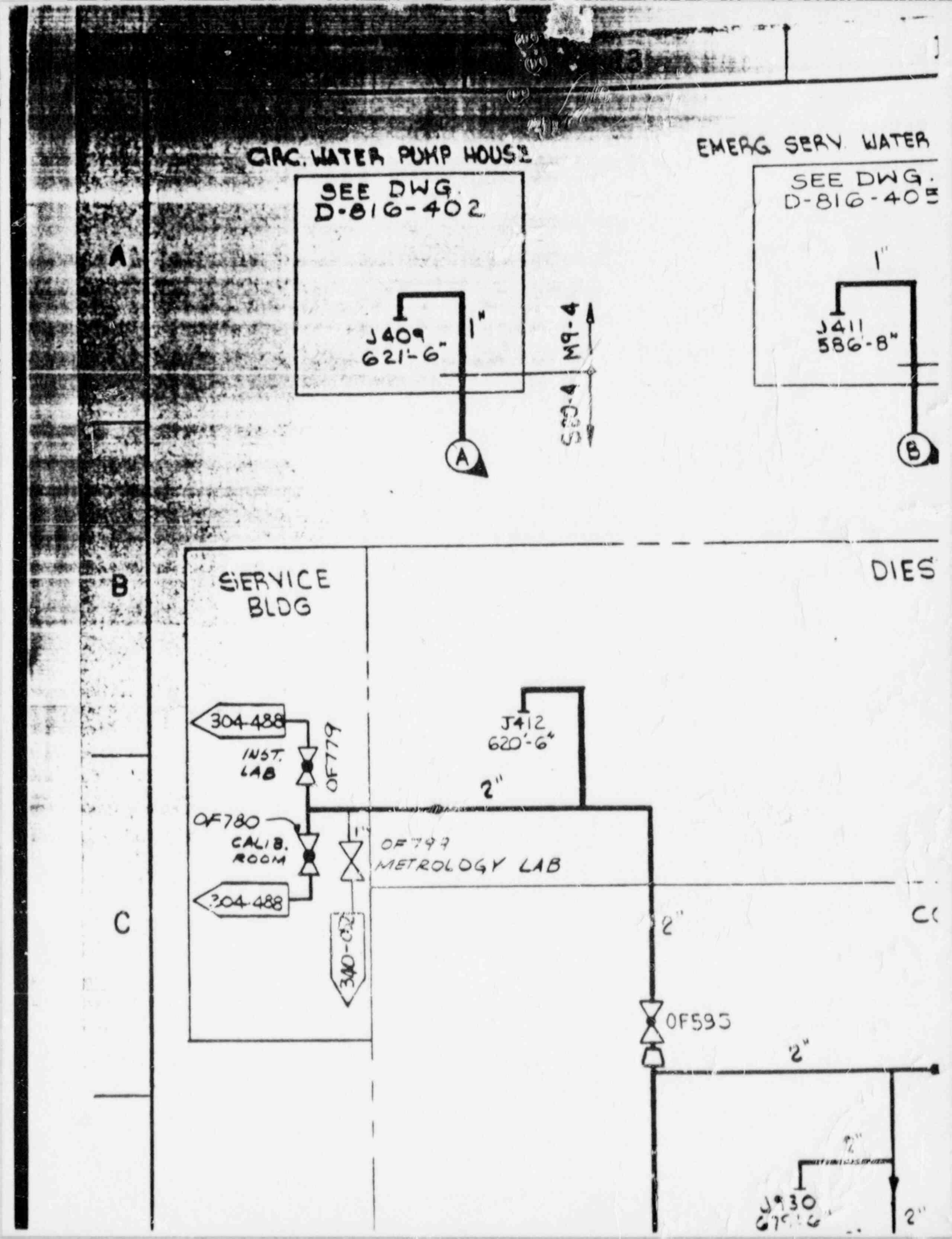

J908
574'-10"
2"
OF611
2"
J923
602'-0"
2"
J924
602'-0"
610
OF609
2"
J918
574'-10"
2"
J925
602'-0"
2"
J919
574'-10"
2"
J926
602'-0"
2"
J920
574'-10"
2"
J928
602'-0"
OF608
2"
OF603
AUXILIARY BLDG.
TO INST. LAB.
304-476
B-5
OF604
F613
2"
J702
574'-10"
870
ISOL
SIGNAL
ZS
N201
SS
7
H13
P870
F614
2"
2"
J704
620'-6"
J700
620'-6"
3"
F617
2"
3"
B-2
754
1"
F630
2"
J232
584'-0"
J224
647'-6"
2"
J227
568'-6"
2"
J215
548'-6"
F588
2"
J214
568'-6"
2"
J230
548'-6"
2"
J205
568'-6"
2"
J209
568'-6"
2"
J211
568'-6"
2"
J219
568'-6"
2"
J212
568'-6"
2"
J228
568'-6"
F589
F590
2"
F58
2"
J2
59
2"
3"

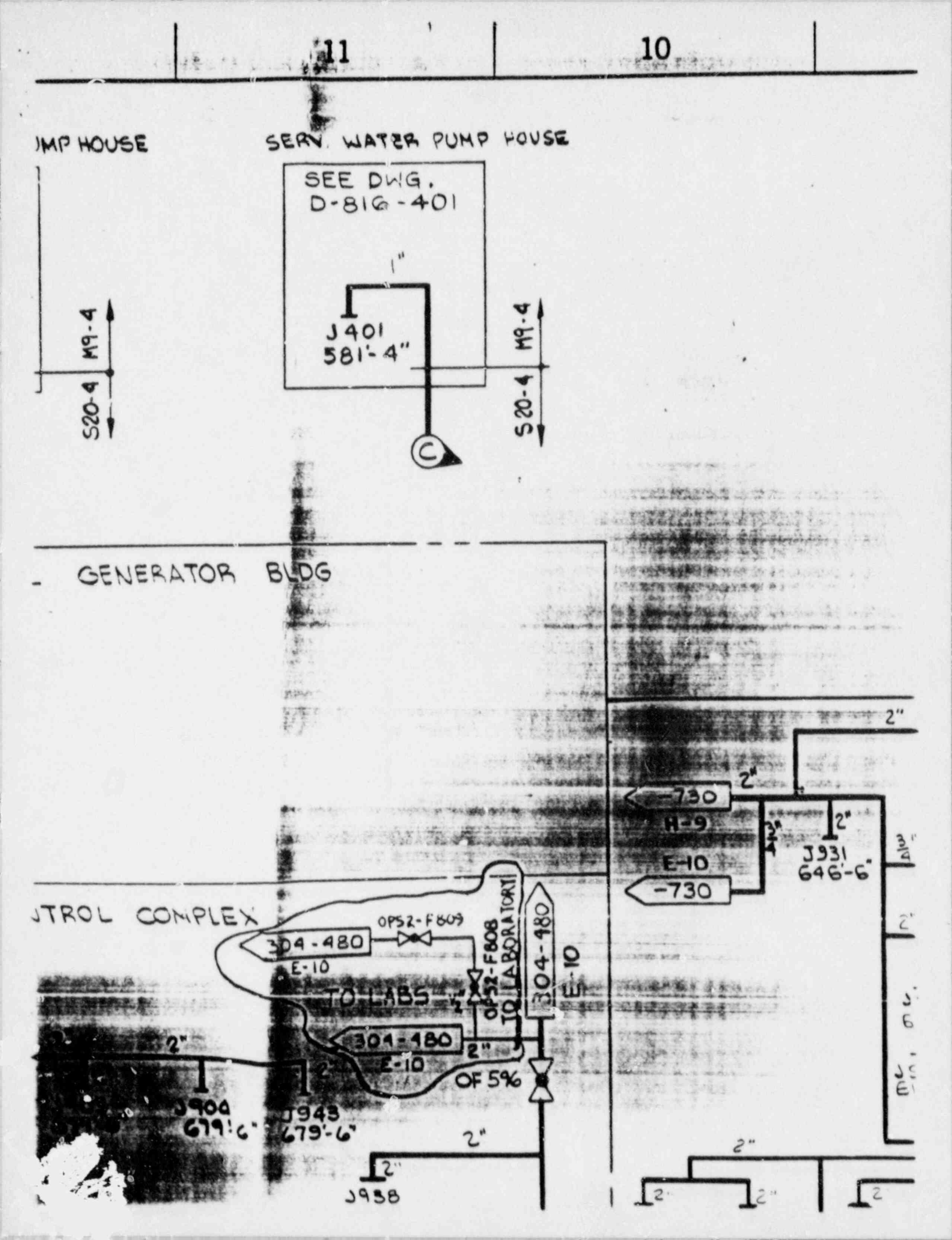

F629
H-3
-182
T.P.S. SAMPL
FUME HO
CK
2"
J005
647'-6"
J011
629'-6"
F627
J00
64
3"
F620
J00
605
J014
605'-6"
F593
J012
577'-6"
J017
577'-6"
F765
J003
577'-6"
F766
J018
577'-6"
J002
577'-6"
J013
647'-6"
J008
647'-6"
J007
647'-6"
J009
647'-6"
F720
J015
647'-6"
J016
647'-6"

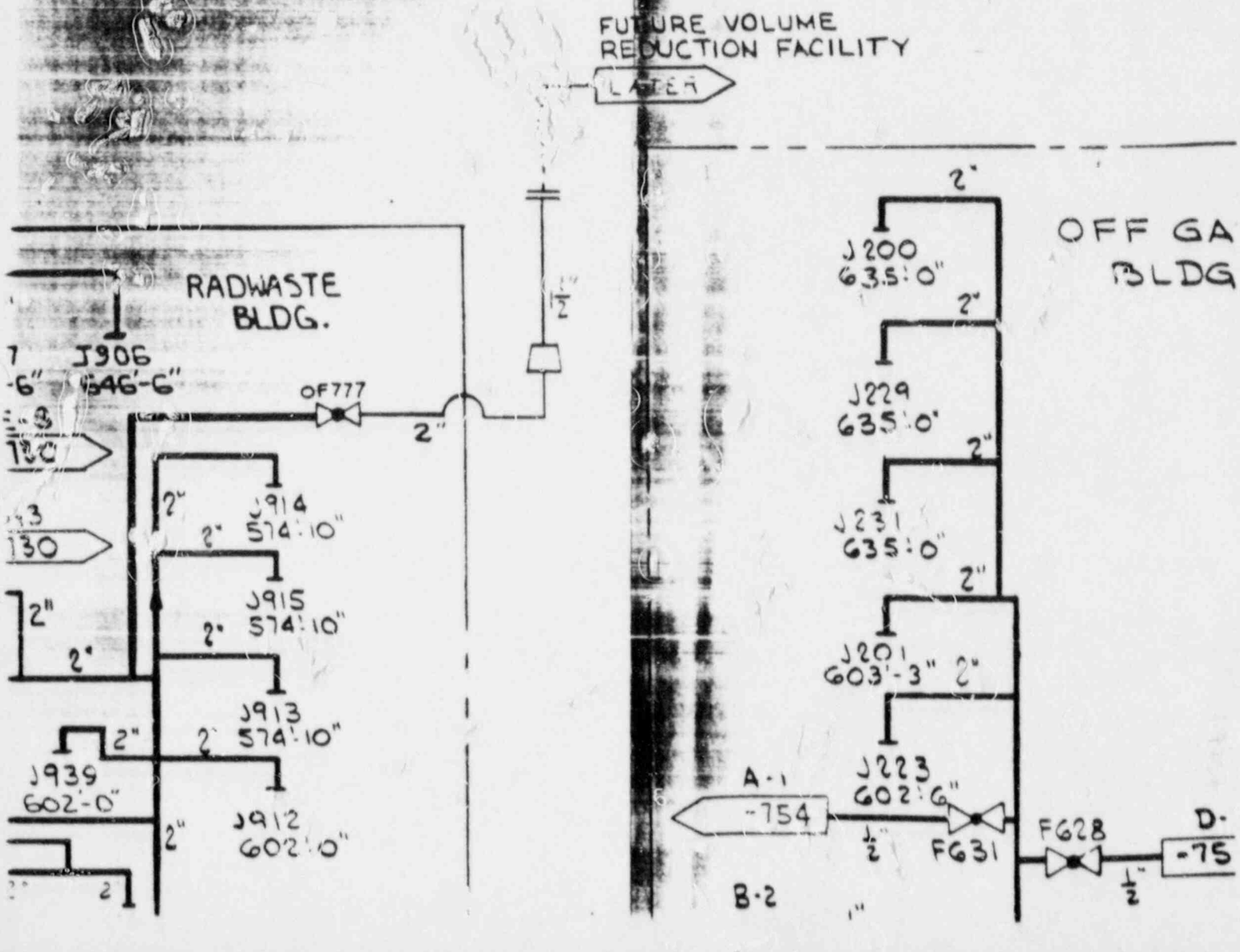


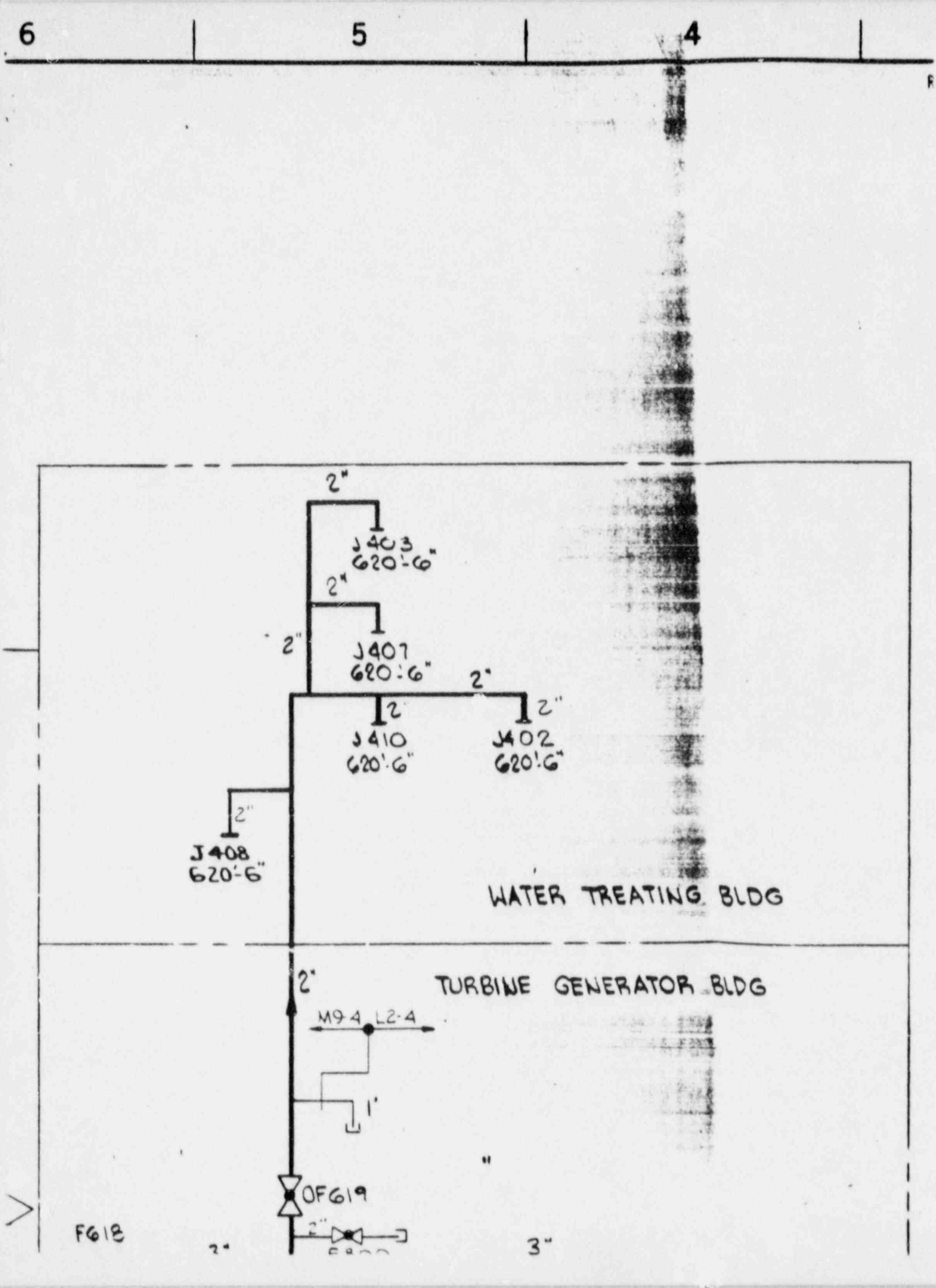
NOTES:-

1. INSTRUMENT AIR DISTRIBUTION MANIFOLDS ARE INDICATED BY LETTER "J" FOLLOWED BY THREE DIGITS.
2. AIR DISTRIBUTION MANIFOLD ASSIGNMENTS ARE SHOWN ON


CIRC. WATER PUMP HOUSE
SEE DWG. D-816-402
J409
621'-6"
1"
M9-4
S9-4
A
EMERG SERV. WATER
SEE DWG. D-816-405
1"
J411
586'-8"
B
SERVICE BLDG
DIES
304-488
INST. LAB
OF779
J412
620'-6"
2"
OF780
CALIB. ROOM
1"
OF797
METROLOGY LAB
304-488
340-0
2"
OF595
2"
J930
2"
A
B
C


11
10
SERV. WATER PUMP HOUSE
SEE DWG.
D-816-401
1"
J401
581'-4"
M9-4
S20-4
M9-4
S20-4
C
GENERATOR BLDG
2"
2"
-730
H-9
2"
2"
J931
646'-6"
E-10
-730
OPS2-F809
304-480
E-10
OPS2-F808
TO LABORATORY
304-480
E-10
TO LABS
2"
2"
304-480
2"
E-10
OF 5%
2"
J904
679'-6"
J943
679'-6"
2"
2"
J958
2"
2"
2"


FUTURE VOLUME REDUCTION FACILITY
LATER
RADWASTE BLDG.
J906
OF777
2"
1½"
J914
574'-10"
J915
574'-10"
J913
574'-10"
J939
602'-0"
J912
602'-0"
OFF GA BLDG
J200
635'-0"
J229
635'-0"
J231
635'-0"
J201
603'-3"
J223
602'-6"
A-1
-754
FG631
FG628
D-
-75
½"
B-2


6
5
4
2"
J403
620'-6"
2"
2"
J407
620'-6"
2"
2"
2"
J410
620'-6"
J402
620'-6"
2"
J408
620'-6"
WATER TREATING BLDG
2"
TURBINE GENERATOR BLDG
M9-4 L2-4
1"
OFG19
FG18
2"
3"

NCES: -

2-082 FEEDWATER SYSTEM N27
2-182 TURBINE PLANT SAMPLING SYSTEM P33
2-241 SERVICE AND INSTRUMENT AIR SUPPLY SYSTEM P51, P52
2-605 NUCLEAR BOILER SYSTEM B21
2-675 REACTOR WATER CLEAN-UP FILTER DEMINERALIZER SYSTEM G36
2-730 LRW - WASTE COLLECTOR FILTER AND FLOOR DRAINS SYSTEM G50
2-742 LRW - WASTE EVAPORATOR CONDENSERS SYSTEM G50
2-752 OFF-GAS SYSTEM N64
2-754 OFF-GAS SYSTEM N64
2-871 CONTROL ROD DRIVE HYDRAULIC SYSTEM C11
2-241 SERVICE AND INSTRUMENT AIR SUPPLY SYSTEM P51, P52
2-243 INSTRUMENT AIR SYSTEM P52
4-476 INSTRUMENT AIR SYSTEM P52 - INTERMEDIATE BUILDING
4-480 INSTRUMENT AIR DISTRIBUTION SYSTEM P52 - CONTROL COMPLEX
4-488 INSTRUMENT AIR SYSTEM P52 - DIESEL GENERATOR AND SERVICE BUILDING
4-761 PENETRATION PRESSURIZATION SYSTEM P53 - REACTOR BUILDING
4-762 PENETRATION PRESSURIZATION SYSTEM P53 - REACTOR BUILDING
4-762 PENETRATION PRESSURIZATION SYSTEM P53 - REACTOR BUILDING
4-420 FUEL OIL STORAGE TANK - LEVEL INSTRUMENTATION
4-438 COOLING TOWER BASIN - LEVEL INSTRUMENTATION
6-401 INSTRUMENT AIR TUBING INTERCONNECTION DIAGRAM - SERVICE WATER PUMP HOUSE
6-402 INSTRUMENT AIR TUBING INTERCONNECTION DIAGRAM - CIRCULATING WATER PUMP HOUSE
6-405 INSTRUMENT AIR TUBING INTERCONNECTION DIAGRAM - EMERGENCY SERVICE WATER
6-409 INSTRUMENT AIR TUBING INTERCONNECTION DIAGRAM - MISCELLANEOUS BUILDINGS