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JAN 2 3 2014

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON CHANGE TO TECHNICAL SPECIFICATION SURVEILLANCE REQUIREMENT (SR) 3.5.1.12
PLA-7125

Docket No 50-387 and No. 50-388

References: 1. PPL Letter (PLA-6977), titled "Proposed Amendment No. 313 to License NPF-14 and Proposed Amendment No. 285 to License NPF-22: Change to Technical Specification Surveillance Requirement (SR) 3.5.1.12," dated June 06, 2013.

2. NRC Letter, titled "Susquehanna Steam Electric Station, Units 1 and 2 – Request for Additional Information Regarding Request for Changes to Technical Specification Surveillance Requirement 3.5.1.12: (TAC Nos. MF1955 and MF1956)," dated December 18, 2013.

The purpose of this letter is for PPL Susquehanna, LLC (PPL) to provide a response to the request for additional information contained in Reference 2. The NRC discussed a draft of the requested information with PPL on December 17, 2013, to ensure the questions were understood. PPL agreed to provide this response by January 24, 2014. The information supports a review of the proposed changes to Technical Specification (TS) Surveillance Requirement (SR) 3.5.1.12, for the Automatic Depressurization System valve actuators. The requested information is in Attachment 1 to this letter. Attachments 2 and 3 contain the revised TS and TS Bases markups that reflect this additional information. Attachment 4 contains additional figures provided by the response.

PPL has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Furthermore the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no regulatory commitments associated with this response.

If you have any questions or require additional information, please contact Mr. Richard W. McIntosh (570) 542-1695.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 01/23/2014

Sincerely,

J. A. Franke

Attachments:

Attachment 1 Response to Request for Additional Information
Attachment 2 Technical Specification Markups (Units 1 and 2) (Revised)
Attachment 3 Technical Specification Bases Markups (Units 1 and 2) (Revised)
Attachment 4 Drawings: P&ID M-141, Sheets 1, 2 and Assembly (selected sheets)

Copy: NRC Region I
Mr. J. Greives, NRC Sr. Resident Inspector
Mr. J. Whited, NRC Project Manager
Mr. L. Winker, PA DEP/BRP

Attachment 1 to PLA-7125

Response to Request for Additional Information

Response to Request for Additional Information

The additional information provided by this attachment supports a review of proposed changes[1] to Technical Specification (TS), Surveillance Requirement (SR) 3.5.1.12, for the Automatic Depressurization System valve actuators. The NRC request[2] for additional information (RAI) includes questions from the Division of Safety Systems, Technical Specifications Branch (STSB), the Division of Engineering, Instrumentation and Controls Branch (EICB), and the Component Performance, Non-Destructive Examination (NDE), and Testing Branch (EPNB). The PPL response to the RAI is provided below.

EICB RAI 1:

Provide a description of Susquehanna's operating experience with single and repeated open cycling action with the ADS [Automatic Depressurization System] valves that develop the leakage. The discussion would assist the staff in understanding and considering the problem being experienced.

PPL's RESPONSE:

Recent Operating Experience (OE) at the Susquehanna Steam Electric Station (SSES) is described in a Licensee Event Report (LER) 2013-002-00, "Valve Internal Misalignment Resulting in Multiple Inoperable Main Steam Safety Relief Valves," dated July 3, 2013 for Unit 2. Three Main Steam Safety Relief Valves (SRVs) failed to meet the setpoint criteria set forth in the Technical Specifications (TS). Cycling the valves with the actuator, prior to start-up, was observed to have led to misalignment of valve internals. Misalignment of load bearing parts resulted in the reduced lift setpoints. Recent OE is also described in LER 2012-005-00, "Valve Internal Misalignment Resulting in Multiple Inoperable Main Steam Safety Relief Valves," dated August 2, 2012, which describes two Main Steam SRVs' failure to meet the setpoint criteria set forth in TS. The cause of this condition was also misalignment of valve internals from cycling the valves with the actuator, prior to start-up.

Experience across the industry and at SSES has shown that manual actuation of SRVs during plant operation (start-up) can lead to valve seat leakage and other valve condition issues. Industry OE shows how excessive seat leakage has caused premature opening of SRVs at other domestic BWRs using pilot operated valves. The ADS valves at SSES are Crosby, Dual Function SRVs, with Model Number HB-65-BP, Size 6R10. The ADS valves at SSES use a direct acting SRV that is less susceptible to inadvertent opening but this industry OE is applicable to SSES also, and leakage and valve cycling does contribute to lowering of the valve set pressure.

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(1) PPL Letter (PLA-6977), titled "Proposed Amendment No. 313 to License NPF-14 and Proposed Amendment No. 285 to License NPF-22: Change to Technical Specification Surveillance Requirement (SR) 3.5.1.12," dated June 6, 2013.

(2) NRC Letter, titled "Susquehanna Steam Electric Station, Units 1 and 2 – Request for Additional Information Regarding Request for Changes to Technical Specification Surveillance Requirement 3.65.1.12: (TAC Nos. MF1955 and MF1956)," dated December 18, 2013.

Response to Request for Additional Information

A recent disassembly for inspection of the internal load train provided a visual inspection of parts in one SRV. The disk insert and nozzle seating areas were steam cut and wire drawn. The bonnet adapter internal diameter had some grooves worn into the sleeve. Excessive seat leakage prior to as-found set pressure testing may have contributed to set pressures being outside of acceptance criteria. This conclusion is documented in the Crosby Receipt inspection report for the SRV. With a nameplate set pressure of 1205 psig, subsequent actuations of the SRV were recorded to show the following:

Initial Actuation	set pressure 1145 psig
Second Actuation	set pressure 1143 psig
Third Actuation	set pressure 1136 psig
Fourth Actuation	set pressure 1131 psig

There have been other LERs for SSES to describe events similar to this most recent OE. These include:

- LER 2011-001-00, "Multiple Inoperable Main Steam Safety Relief Valves," dated July 1, 2011
- LER 2009-001-00, "Multiple Test Failures of Main Steam Safety Relief Valves," dated October 12, 2009
- LER 2001-005-00, "Multiple Test Failures of Main Steam Safety Relief Valves," dated June 11, 2001
- LER 2000-007-00, "Multiple Test Failures of Main Steam Safety Relief Valves," dated May 15, 2000

EICB RAI 2:

Justify the technical analysis as to why the valves appear to operate within their normal design per this statement: "design appears to be adequate and is not considered to be a cause for ADS valve seat leakage as a result of manual operation of the ADS valves," and according to the reference citation 7.3, under the discussion, please explain the apparent contradiction to this statement: "[t]he licensee believes that the failure of the S/RV [safety/relief valve] is related to the manufacturing tolerances of the valve stem and piston assembly and to the lengthy service time without adequate inspection and maintenance." It appears that ADS valves with mechanical issues per design and wear require higher inspection surveillance.

PPL's RESPONSE:

The ADS valves at SSES are Crosby valves. The reference 7.3 is NRC Information Notice (IN) 2003-01, "Failure of a Boiling Water Reactor Target Rock Main Steam Safety/Relief Valve," dated January 15, 2003. This reference discusses SRV performance at the Hatch Nuclear Plant and it is not used for technical analysis with respect to the specific valve design for the SRVs at SSES. Therefore, the details of the discussion and root cause of valve degradation in the reference are not applicable to the SSES proposal. PPL included this reference to recognize how SRV leakage is an industry issue, and it was not documenting a design deficiency or mechanical issue in SSES ADS valves. Evaluation of OE at SSES by PPL component engineering has

Response to Request for Additional Information

concluded that reducing unnecessary cycling of the ADS valves can help to maintain good material conditions of the valve seating areas. Maintaining a good material condition of the valve seating areas improves performance characteristics, reducing seat leakage. Steam cutting and wire drawn surfaces in seating surfaces has been shown at SSES to have contributed to set pressures outside acceptance criteria, and the proposed TS change to reduce unnecessary cycling of these valves will reduce the potential for valve leakage.

EICB RAI 3:

The cited material states that the design for a Target Rock valve does degrade and requires periodic inspection, which could mean an increased validation of valve operation is best done with the ADS valve connected to the relief positioner, yet the valves cited in the license amendment request are identified as Crosby valves. Explain the discrepancy.

PPL's RESPONSE:

The reference to IN 2003-01, "Failure of a Boiling Water Reactor Target Rock Main Steam Safety/Relief Valve," dated January 15, 2003, is not a reference for technical analysis with respect to the specific valve design and its application at SSES. The ADS valves at SSES are Crosby valves and not Target Rock. The IN 2003-01 describes experience with how valve actuations at the Hatch Nuclear Plant resulted in eventual misalignments between the main disk and seat. At SSES, disassembly and visual inspection of the internal load train in an SRV experiencing an as-found set pressure outside of acceptance criteria suggests that prior valve actuations have resulted in seat leakage and set pressure drift. Industry OE acknowledges that the number of SRV openings be reduced as much as possible and that unnecessary challenges to the SRV should be avoided.

EICB RAI 4:

Provide drawings/sketches/piping and instrument diagrams depicting detailed design of the physical installation of the ADS valve (including information on the actuator such as number and arrangement of solenoids and air system arrangement) the licensee wants to disconnect from the positioner, so the staff can verify the ADS actuator is disconnected from the valve to ensure no damage is done to the valve seat or to the valve internals.

Response to Request for Additional Information

PPL's RESPONSE:

FSAR Figure 5.2-7 shows a simplified schematic. The figure below provides the requested information.

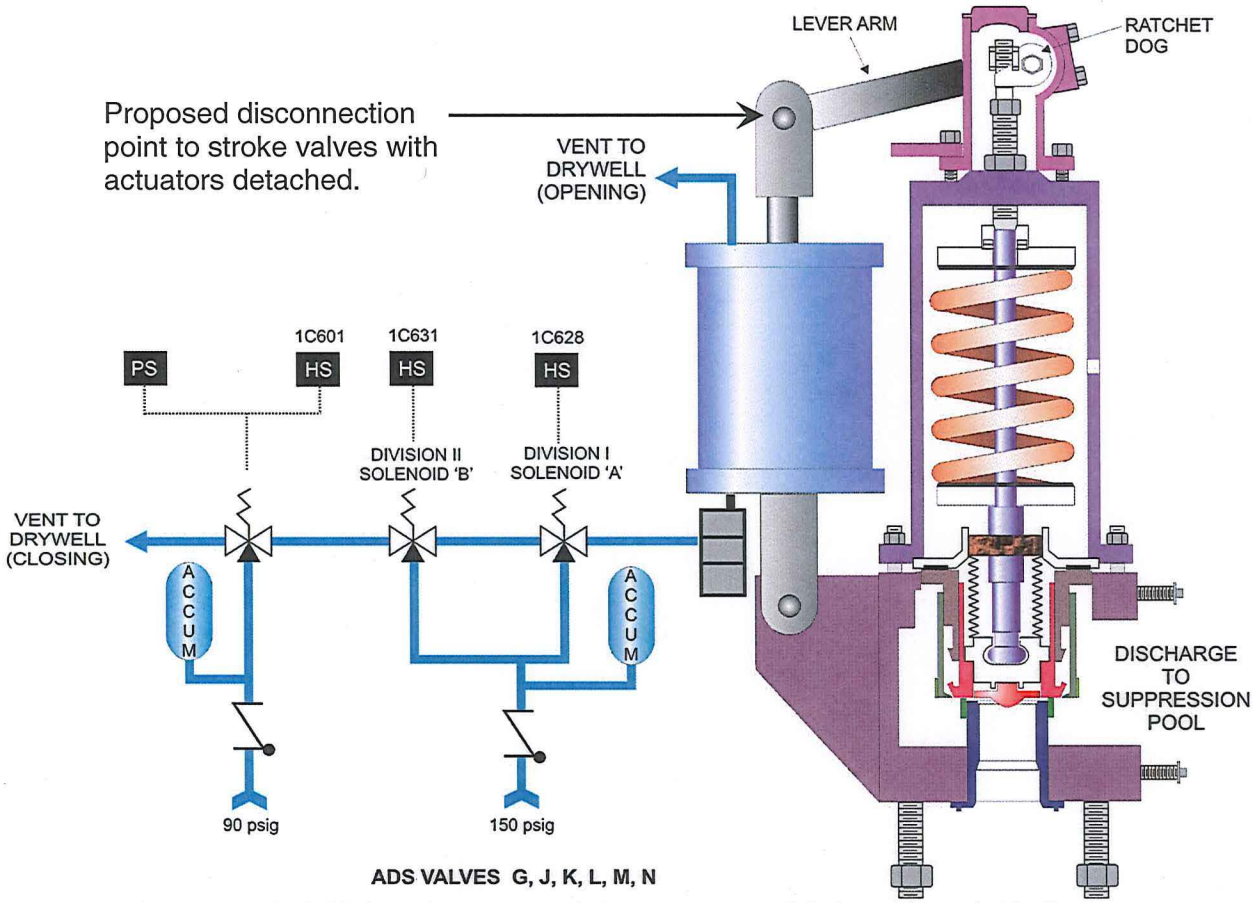

Figure 1: ADS Valve, Actuator and Arrangement of Solenoids and Air System

The proposed disconnection point to stroke actuators detached from the valve is shown in the figure above. There is no damage done to the valve seat or to the valve internals by the proposal.

Piping and Instrumentation Diagram (P&ID) M-141, Sheets 1 and 2, Unit 1, Nuclear Boiler, is in Attachment 4. There are six ADS valves in the A, B, C and D main steam lines. These are shown as ADS valves 1F013G, J, K, L, M, and N. A manufacturer's assembly drawing is also provided in Attachment 4.

EICB RAI 5:

Provide further discussion on the S/RVs replaced under current practices for a 24 month cycle and how a "main disk exercise test" (referred to on page 3 of 7) performed on all S/RVs at least once every 6 years would ensure the main disks can freely open. This discussion would aid the staff in understanding the operating history of the S/RVs.

Response to Request for Additional Information

PPL's RESPONSE:

The Main Disk Exercise test is performed at Wyle Laboratories during valve testing and overhaul. This test places instrumentation (LVDT or Accelerometers) on the valve disk to monitor travel during bench testing. This test ensures that the disk is achieving proper lift (travel) during bench testing and valve actuation. This test demonstrates proper fit of the disk and disk holder and that there is no binding in the spindle assembly giving assurance that the disk will align properly with the seat.

EICB RAI 6:

Provide the cited document in reference 7.2 "INPO [Institute of Nuclear Power Operations] Event Report, Level 3, 11-24, "Maintenance Error results in Uncontrolled Reactor Vessel Depressurization," dated July 26, 2011. The cited material is not available to the NRC in its entirety. Furthermore, the redacted INPO version states the valve failed open. The staff would like to know the relevance to this proposed licensing amendment.

PPL's RESPONSE:

The INPO Event Report in reference 7.2 of the proposal was not used for a technical justification of the proposed change. The reference does not discuss SSES Unit 1 and Unit 2 ADS valve design and operating experience. PPL is not using reference 7.2 in this proposal, and so deletes the citation. Consequently, reference 7.2 has not been provided.

EPNB RAI 1:

Are the actual installed actuators and solenoids shipped and tested with a given ADS valve during off-site bench testing?

PPL's RESPONSE:

Yes. The actuators and solenoid remain attached to the SRVs during shipping. The valves are shipped in specially designed crates to ensure there are no misalignments during shipping.

Response to Request for Additional Information

EPNB RAI 2:

Do the set point testing program and the valve control program referred to in Sections 1 and 3 of the referenced letter implement the requirements of American Society of Mechanical Engineers (ASME) operations and maintenance (OM) Code for the testing of the ADS valves? Describe the specific tests performed for these valves to comply with ASME OM Code, Mandatory Appendix I, paragraph I-3310.

PPL's RESPONSE:

Yes. ADS valve testing is performed in accordance with the test procedure for the Crosby Style 6xRx10 HB-65-BP Safety Relief Valve. Testing performs Solenoid Valve Assembly Seat Leakage Tests, Actuator Leakage Tests, Emergency Operability Tests using each solenoid individually, ADS SRV response time testing, as-found and as-left set pressure testing, seat leakage test, and an air valve leakage test. These periodic tests that are required to be performed for SSES ADS valves comply with ASME OM Code, Mandatory Appendix I, paragraph I-3310.

EPNB RAI 3:

Does the Susquehanna test program for the subject ADS valves fully implement the requirements of ASME OM Code Case OMN-17? In particular, are the valves disassembled and inspected after as-found set-pressure testing?

PPL's RESPONSE:

Yes. All the ADS valves are disassembled and inspected during their 72 month overhaul/certification testing. The SSES test program implements requirements of ASME OM Code Case OMN-17. Disassembly and inspection will verify parts are free from defects resulting from time-related degradation or maintenance induced wear. This maintenance helps to reduce the potential for set point drift, and increases the reliability of these SRVs to perform their design functions.

EPNB RAI 4:

Do the tests performed to satisfy TS SR 3.5.1.11 and SR 3.5.1.12 actuates each solenoid independently for a given actuator?

PPL's RESPONSE:

Yes, each solenoid is tested independently. SR 3.5.1.11 is satisfied by two separate tests. This uses the Division 1 and Division 2 ADS Logic System Functional Test procedures. This testing is performed at least every 24 months in connection with the SRs. The SR 3.5.1.12 is satisfied by the ADS Valve Manual Actuation procedure. This testing demonstrates 24 month operability of the six ADS controlled Main Steam Relief Valves (MSRVs) by manually opening each valve/actuator from both Relay Rooms. This test opens each ADS valve/actuator and then tests

Response to Request for Additional Information

each solenoid independently to ensure the valve would remain open. The proposed change allows for an actuation of the actuator, without a valve stroke.

EPNB RAI 5:

Under the proposed new wording of SR 3.5.1.12, is the existing note still necessary that allows for a twelve hour delay in testing?

PPL's RESPONSE:

The existing note in SR 3.5.1.12 allows waiting until 12 hours after reactor steam pressure and flow are adequate to perform the ADV valve open test. The note will no longer be necessary when ADV valve opening for this surveillance requirement is replaced with an actuator stroke that does not require reactor steam pressure and flow to perform.

A revised mark-up of the proposed SR 3.5.1.12 without the note is provided in Attachment 2. A revised portion of the associated TS Bases mark-up is also provided in Attachment 3 for information.

EPNB RAI 6:

Does deletion of "on a staggered test basis for each valve solenoid" from the SR 3.5.1.12 frequency requirement mean that each solenoid on each actuator will be individually tested every 24 months?

PPL's RESPONSE:

Yes. Deleting "on a staggered test basis for each valve solenoid" means that all the ADS SRV solenoids will be tested every outage.

STSB RAI 1:

10 CFR 50.36(c)(3), "Surveillance requirements," requires, in part, that SRs be established to ensure that the necessary quality of components is maintained, and that facility operation will be within safety limits.

The proposed SR changes would eliminate the TS requirement to verify that for the ADS valves to open during manual actuation of the ADS circuitry. When performing the testing in-situ as required by the current TSs, the testing verifies that the ADS valve components actuate as designed and discharge lines are not blocked. This test provides assurance that the necessary quality of components is maintained, and that facility operation will be within safety limits.

Please provide a description of the Quality Assurance and Foreign Material Exclusion methods that will be used to provide assurance that the ADS valves that have been bench-tested will actuate as designed and that discharge lines are not blocked once the valves are installed.

Response to Request for Additional Information

PPL's RESPONSE:

Set pressure testing is performed using steam at an offsite test facility as part of certification testing for each of the ADS valves. The proposed change continues to require functional tests, in situ that verify the electrical and pneumatic connections, the actuator and solenoid functions. Surveillances are still performed to demonstrate the ability of the various logics and controls to actuate the ADS valves up to the point of energizing the solenoids. ADS valves that have been bench-tested will actuate as designed because the proposed change requires the use of overlapping tests that verify the SRVs function properly at operating conditions, and the testing ensures the valves are capable of being opened when installed in the plant. The use of overlapping tests to demonstrate OPERABILITY of active components is similar to applications elsewhere in the TS for other systems and components. The proposed change continues to test the active components, and therefore, makes unnecessary the cycling of the ADS valves during startup with reactor steam.

The probability of blocking a discharge line is considered extremely remote. SSES requires the use of good work practices that prevent the introduction of foreign material into a system or component. ADS valve testing, maintenance, inspections and preparations for shipment to and from an offsite test facility are performed with requirements subject to Quality Assurance Programs in accordance with 10 CFR 50, Appendix B, and a Foreign Material Exclusion (FME) Program. These programs and specifications ensure that standards for packaging, shipping, receiving, storage and handling of items for nuclear power plants are properly controlled.

All SRVs, upon receipt and before any further action is taken, are visually inspected. At the offsite test facility, and after completion of testing, the valves are thoroughly cleaned internally and externally to remove all potentially harmful foreign matter. Final cleaning processes are controlled to assure effective cleaning without injuring the surface finishes, material properties or metallurgical structure of the materials. Quality Control inspects the valves prior to re-crating for shipment from the offsite test facility to SSES. After completion of testing, valve assemblies are shipped to the plant without disassembly or alteration of valve components.

SSES performs its receipt inspection in accordance with the requirements of the Quality Assurance Program. Storage requirements in effect at SSES ensure the valves are protected. Prior to installation the valve will again be inspected for foreign material. Following the initial demonstration during plant startup testing, improper valve functioning or blockage would arise only through assembly errors or the introduction of foreign material into the piping system. The FME program provides the necessary requirements and guidance to prevent and control introduction of foreign materials into structures, systems, and components. These maintenance procedures, FME procedures and practices are sufficient to ensure proper mechanical functioning and unobstructed steam flow capability without periodic actuation testing. The TS Bases for SR 3.5.1.12 also describes that proper operation of the valve tailpipes is ensured through the use of FME during maintenance.

Attachment 2 to PLA-7125

Technical Specification Markups (Units 1 and 2)

(Revised)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.9	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. --- Verify, with reactor pressure ≤ 165 psig, the HPCI pump can develop a flow rate ≥ 5000 gpm against a system head corresponding to reactor pressure.	24 months
SR 3.5.1.10	----------NOTE---------- Vessel injection/spray may be excluded. --- Verify each ECCS injection/spray subsystem actuates on an actual or simulated automatic initiation signal.	24 months
SR 3.5.1.11	----------NOTE---------- Valve actuation may be excluded. --- Verify the ADS actuates on an actual or simulated automatic initiation signal.	24 months
SR 3.5.1.12	~~----------NOTE----------~~ ~~Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test.~~ ~~---~~ Verify each ADS valve ~~opens~~ actuator strokes when manually actuated.	24 months ~~on a STAGGERED TEST BASIS for each valve solenoid~~

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.1.9	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------	
	Verify, with reactor pressure ≤ 165 psig, the HPCI pump can develop a flow rate ≥ 5000 gpm against a system head corresponding to reactor pressure.	24 months
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	Verify each ECCS injection/spray subsystem actuates on an actual or simulated automatic initiation signal.	24 months
SR 3.5.1.11	----------NOTE---------- Valve actuation may be excluded. ----------	
	Verify the ADS actuates on an actual or simulated automatic initiation signal.	24 months
SR 3.5.1.12	~~----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------~~	
	Verify each ADS valve ~~opens~~ actuator strokes when manually actuated.	24 months ~~on a STAGGERED TEST BASIS for each valve solenoid~~

(continued)

Attachment 3 to PLA-7125

Technical Specification Bases Markups (Units 1 and 2)

(Revised)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.11

The ADS designated S/RVs are required to actuate automatically upon receipt of specific initiation signals. A system functional test is performed to demonstrate that the mechanical portions of the ADS function (i.e., solenoids) operate as designed when initiated either by an actual or simulated initiation signal, causing proper actuation of all the required components. SR 3.5.1.12 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform portions of the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note that excludes valve actuation. This prevents an RPV pressure blowdown.

SR 3.5.1.12

A manual actuation of each ADS valve actuator is performed to verify that the valve and solenoid are functioning properly. This is demonstrated by ~~one of~~ the ~~two~~ method~~s~~ described below. Proper operation of the valve tailpipes is ensured through the use of foreign material exclusion during maintenance.

~~One method is by manual actuation of the ADS valve under hot conditions. Proper functioning of the valve and solenoid is demonstrated by the response of the turbine control or bypass valve or by a change in the measured flow or by any other method suitable to verify steam flow. Adequate reactor steam dome pressure must be available to perform this test to avoid damaging the valve due to seat impact during closure. Also, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the ADS valves divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this SR. Adequate pressure at which this SR is to be performed is 150 psig. However, the requirements of SR 3.5.1.12 are met by a successful performance at any pressure. Adequate steam flow is represented by at least 1.25 turbine bypass valves open. Reactor startup is allowed prior to performing this SR by this method because valve~~Valve OPERABILITY and the setpoints for

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.12 (continued)

overpressure protection are verified, per ASME requirements, prior to valve installation. ~~Therefore, this SR is modified by a Note that states the Surveillance is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for manual actuation after the required pressure is reached is sufficient to achieve stable conditions and provides adequate time to complete the Surveillance.~~

~~Another method is by manual~~ Manual actuation of the ~~ADS valve~~actuator at atmospheric temperature and pressure during cold shutdown is performed. ~~When using this method, proper~~ Proper functioning of the valve actuator and solenoid is demonstrated by visual observation of actuator movement. ~~Actual disc travel is measured during valve refurbishment and testing per ASME requirements. Lifting the valve at atmospheric pressure is the preferred method because lifting the valves with steam flow increases the likelihood that the valve will leak.~~ The ADS actuator will be disconnected from the valve to ensure no damage is done to the valve seat or to the valve internals. Each valve shall be bench-tested prior to reinstallation. The bench-test along with the test on the ADS actuator establishes the OPERABILITY of the valves. ~~The Note that modifies this SR is not needed when this method is used because the SR is performed during cold shutdown.~~

SR 3.5.1.11 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function. The Frequency of 24 months ~~on a STAGGERED TEST BASIS~~ ensures that both solenoids for each ADS valve are alternately tested. The Frequency is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.5.1.13

This SR ensures that the ECCS RESPONSE TIME for each ECCS injection/spray subsystem is less than or equal to the maximum value assumed in the accident analysis. Response Time testing acceptance criteria are included in Reference 13. This SR is modified by a Note that allows the instrumentation portion of the response time to be assumed to be based on historical response time data and therefore, is excluded from the

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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.1.11

The ADS designated S/RVs are required to actuate automatically upon receipt of specific initiation signals. A system functional test is performed to demonstrate that the mechanical portions of the ADS function (i.e., solenoids) operate as designed when initiated either by an actual or simulated initiation signal, causing proper actuation of all the required components. SR 3.5.1.12 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform portions of the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

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~~One method is by manual actuation of ADS valve under hot conditions. Proper functioning of the valve and solenoid is demonstrated by the response of turbine control or bypass valve or by a change in the measured flow or by any other method suitable to verify steam flow. Adequate reactor steam dome pressure must be available to perform this test to avoid damaging the valve due to seat impact during closure. Also, adequate steam flow must be passing through the main turbine or turbine bypass valves to continue to control reactor pressure when the ADS valves divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this SR. Adequate pressure at which this SR is to be performed is 150 psig. However, the requirements of SR 3.5.1.12 are met by a successful performance at any pressure. Adequate steam flow is represented by at least 1.25 turbine bypass valves open. Reactor startup is allowed prior to performing this SR by this method because valve~~ Valve OPERABILITY and the setpoints for

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.12 (continued)

overpressure protection are verified, per ASME requirements, prior to valve installation. ~~Therefore, this SR is modified by a Note that states the Surveillance is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The 12 hours allowed for manual actuation after the required pressure is reached is sufficient to achieve stable conditions and provides adequate time to complete the Surveillance.~~

~~Another method is by manual~~ Manual actuation of the ~~ADS valve~~actuator at atmospheric temperature and pressure during cold shutdown is performed. ~~When using this method, proper~~Proper functioning of the valve actuator and solenoid is demonstrated by visual observation of actuator movement. ~~Actual disc travel is measured during valve refurbishment and testing per ASME requirements. Lifting the valve at atmospheric pressure requires controlling the actuator to set the valve disc softly on its seat to prevent valve damage. Lifting of the valves at atmospheric pressure is the preferred method because lifting the valves with steam flow increases the likelihood that the valve will leak.~~ The ADS actuator will be disconnected from the valve to ensure no damage is done to the valve seat or to the valve internals. Each valve shall be bench-tested prior to reinstallation. The bench-test along with the test on the ADS actuator establishes the OPERABILITY of the valves. ~~The Note that modified this SR is not needed when this method is used because the SR is performed during cold shutdown.~~

SR 3.5.1.11 and the LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlap this Surveillance to provide complete testing of the assumed safety function. The Frequency of 24 months ~~on a STAGGERED TEST BASIS~~ ensures that both solenoids for each ADS valve are alternately tested. The Frequency is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.5.1.13

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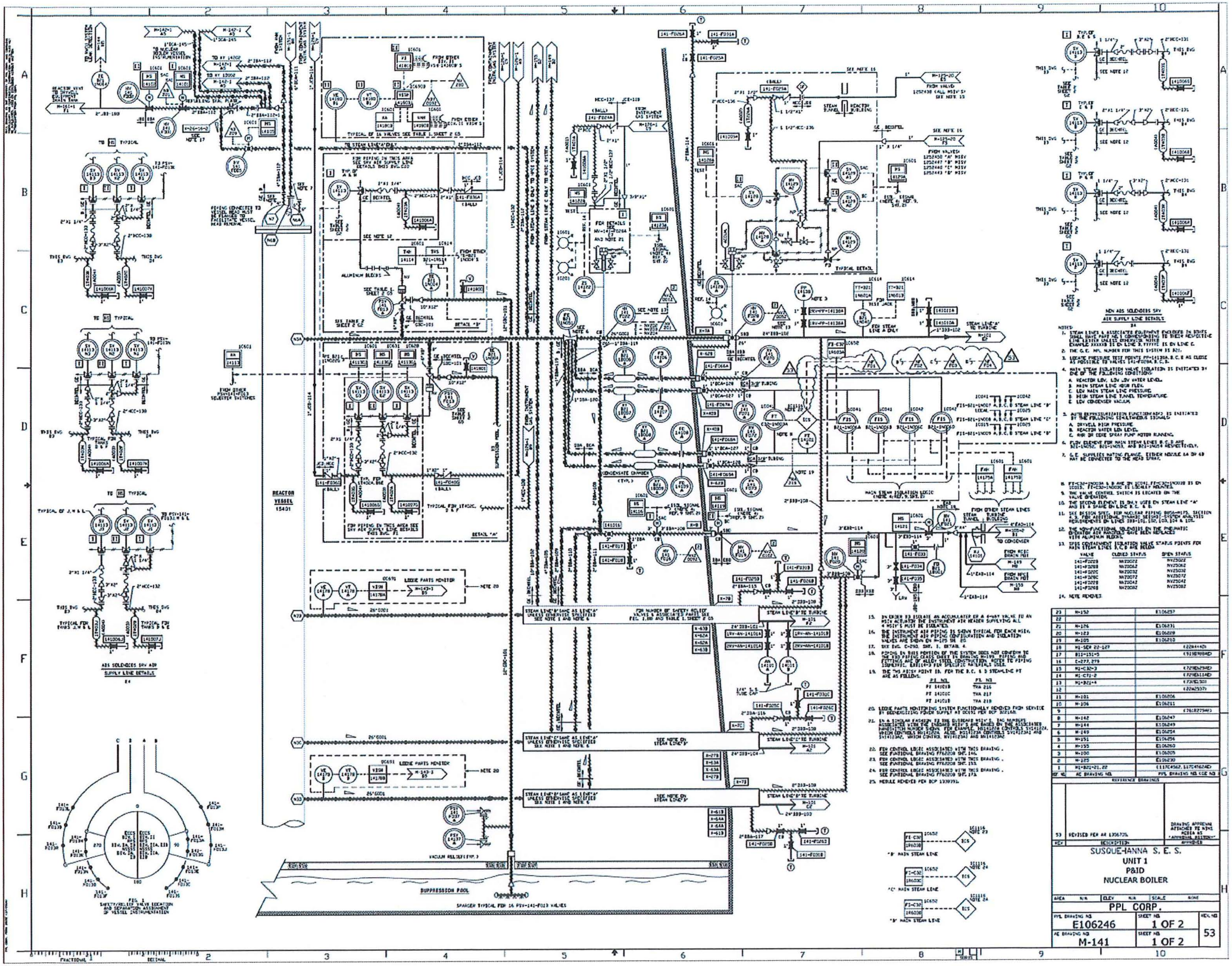
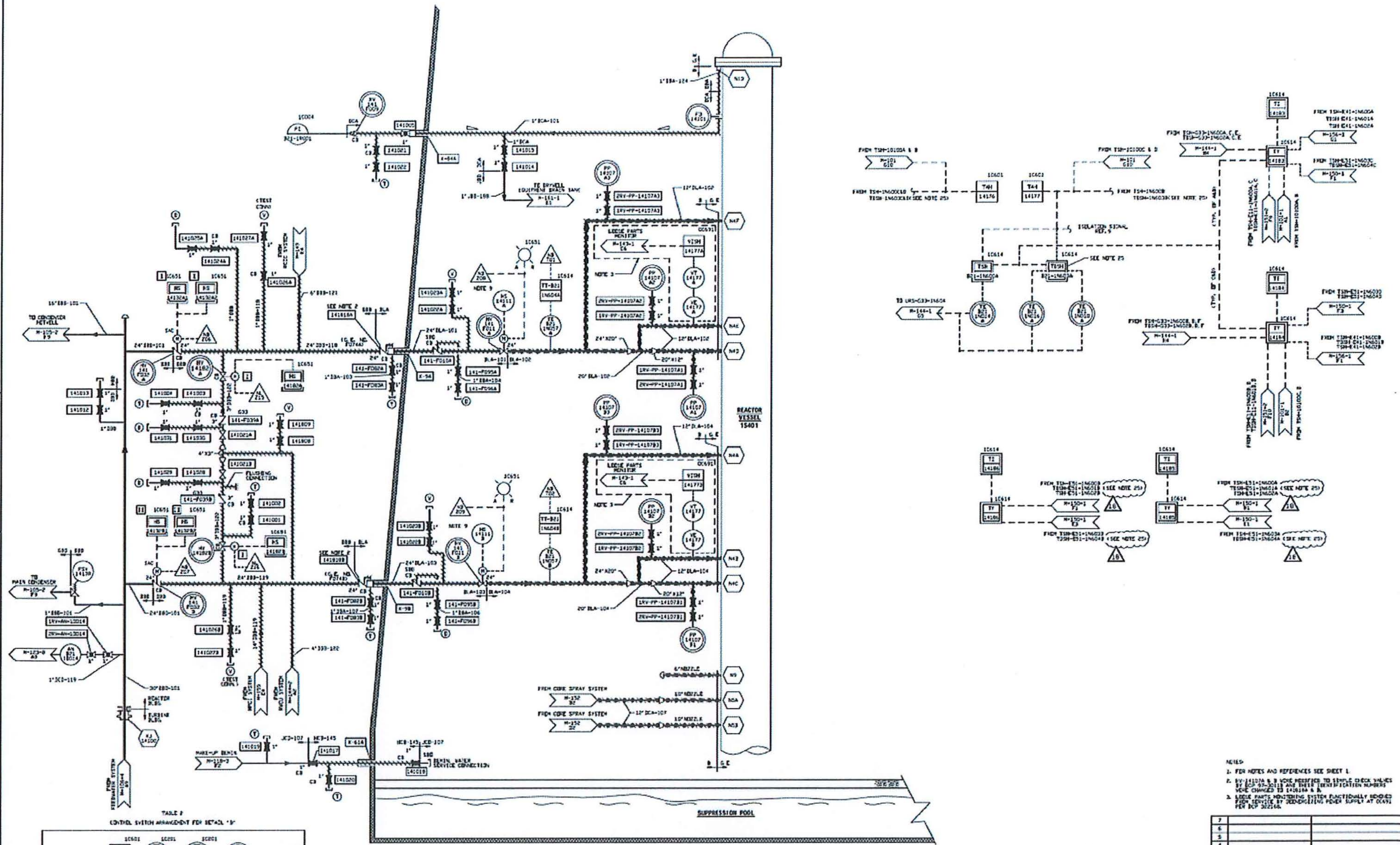
(continued)

Attachment 4 to PLA-7125

Drawings:
P&ID M-141, Sheets 1, 2 and Assembly
(selected sheets)


REACTOR VESSEL
1S401
SUPPRESSION POOL
SUSQUEHANNA S. E. S.
UNIT 1
P&ID
NUCLEAR BOILER
PPL CORP.
PPL DRAWING NO
E106246
SHEET NO
1 OF 2
AE DRAWING NO
M-141
SHEET NO
1 OF 2
REV. NO
53



NOTES:

1. FOR NOTES AND REFERENCES SEE SHEET 1.
2. SV-14107A & B WERE MODIFIED TO SIMPLE CHECK VALVES BY DCP 97-3011B AND THEIR IDENTIFICATION NUMBERS WERE CHANGED TO 141618A & B.
3. LOOSE PARTS MONITORING SYSTEM FUNCTIONALLY REMOVED FROM SERVICE BY DEENERGIZING POWER SUPPLY AT 0C691 PER DCP 322168.

TABLE 2

CONTROL SWITCH ARRANGEMENT FOR DETAIL "B"

PS-B21-1N022A M-142-1,B7 — 1C601 HS 14113A1 — 1C201 HS 14113A2 — 1C201 HSS 15113A — SV 14113 A — TYPICAL FOR 141-F013A,B&C

PSV 141 F013	1C201 CONTROL SWITCH	1C201 TRANSFER SWITCH	1C601 CONTROL SWITCH	SOLENOID VALVE
A	HS-14113A2	HSS-15113A	HS-14113A1	SV-14113A
B	HS-14113B2	HSS-15113B	HS-14113B1	SV-14113B
C	HS-14113C2	HSS-15114A	HS-14113C1	SV-14113C

PS-B21-1N022B M-142-1,B7 — 1C601 HS 14113D — SV 14113 D — TYPICAL FOR 141-F013D,E,F,H P,R,&S

PSV 141 F013	1C201 CONTROL SWITCH			SOLENOID VALVE
D	HS-14113D			SV-14113D
E	HS-14113E			SV-14113E
F	HS-14113F			SV-14113F
H	HS-14113H			SV-14113H
P	HS-14113P			SV-14113P
R	HS-14113R			SV-14113R
S	HS-14113S			SV-14113S

TABLE 1

SAFETY/RELIEF VALVE LOCATION, SUFFIX ASSIGNMENT & ASSOCIATED EQUIPMENT

SAFETY/RELIEF VALVE 141-F013		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
RELIEF VALVE SPRING SET PRESSURE(PSIG)		1175	1205	1195	1175	1195	1205	1205	1195	1195	1205	1195	1205	1195	1205	1205	1205
ACCUMULATORS	(ADS)1T403(X) 150 PSIG							A		B	C	D	E	F			
	1T403(X) 90 PSIG	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
TEMPERATURE ELEMENT B21-1N004		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
CHECK VALVES	141-F036(X)	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
	141-F040(X)(ADS)							G		J	K	L	M	N			
VACUUM BREAKER PSV-141-F037(X) & PSV-14137(X)		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
PRESSURE SWITCH B21-1N027 (M-142-1,B9)		A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S
PRESSURE SET POINT OF B21-1N022 (PSIG)		1136	1126	1146	1136	1146	1146	1106	1126	1116	1106	1116	1116	1116	1126	1136	1136
DIVISIONIZATION OF SRV POSITION INDICATION INSTRUMENTS		II	I	II	I	II	I	II	I	II	I	I	II	I	II	I	II
SRV POSITION INDICATION INSTRUMENT	VT-, VE-, VTSH-14180-	B1	A1	B2	A2	B3	A3	B4	A4	B5	A5	A6	B6	A7	B7	A8	B8
PANEL 1C601 INDICATION VI-14181-LOSS OF POWER XA-14180-ALARMS GANGED PER DIVISION YAH-14180		B	A	B	A	B	A	B	A	B	A	A	B	A	B	A	B
SOLENOID VALVES 14113 ASSIGN. (FUNCTION)	ADS (A)							A		A	A	A	A	A			
	ADS (A)							A		A	A	A	A	A			
	14113(X) PRESSURE RELIEF (Y)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
SRV POSITION INDICATION COMPUTER POINTS - NYZ		80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
SRV POSITION SPDS POINTS - NBY		9Z	1Z	10Z	2Z	11Z	3Z	12Z	4Z	13Z	5Z	6Z	14Z	7Z	15Z	8Z	16Z
VENT VALVE NO. ON S/R VALVE 141-F013 DISCHARGE PIPE		141800	141810	141803	141813	141802	141814	141801	141815	141807	141816	141811	141806	141817	141805	141812	141804

REV. NO.	AE DRAWING NO.	PPL DRAWING NO. COC NO.
7		
6		
5		
4		
3		
2		
1		

REFERENCE DRAWINGS

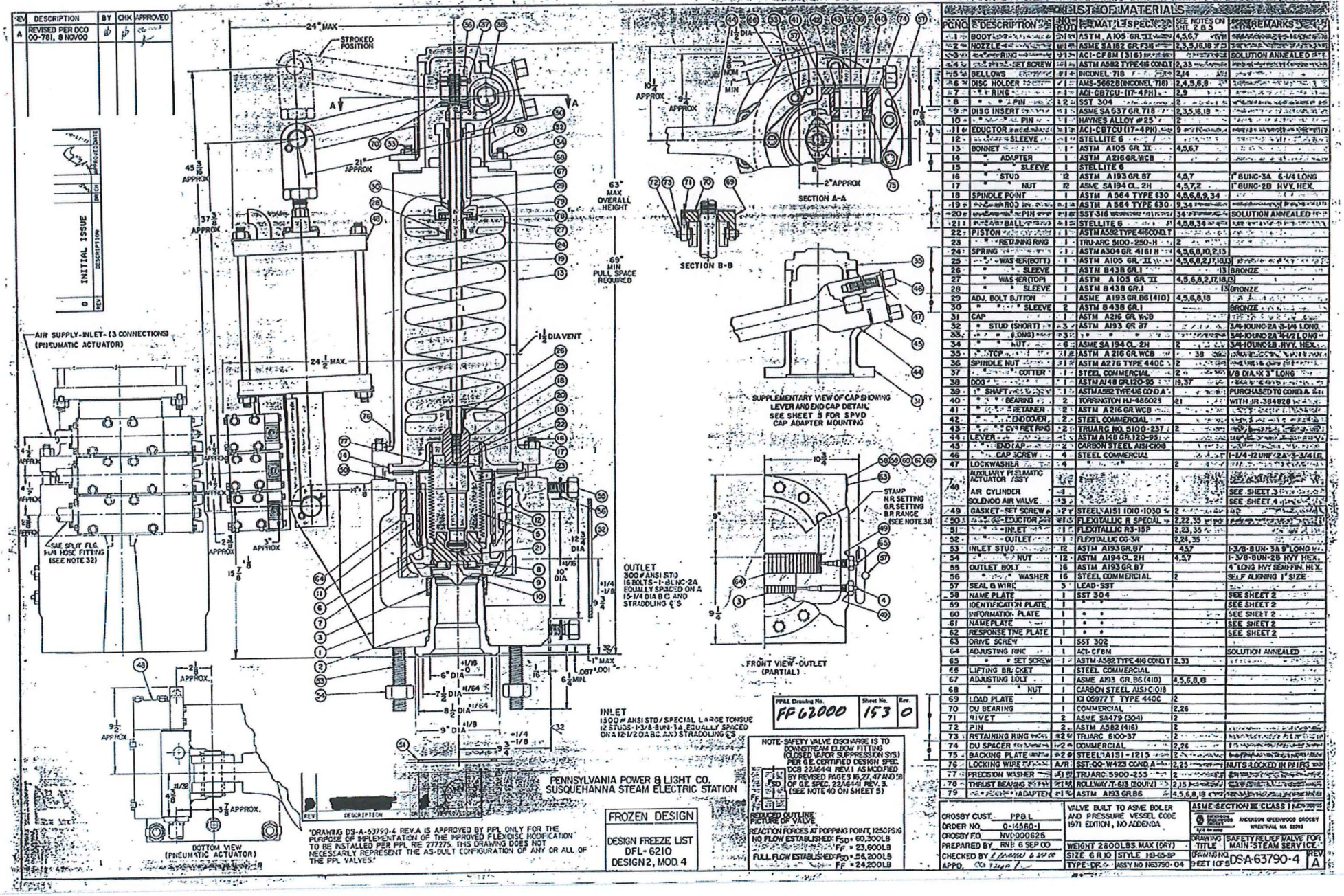
REV	DESCRIPTION	APPROVED
18	ADDED ADDITIONAL REFERENCES TO NOTE 25. SEE SHEET 1 THIS DRAWING PER CRA 1357931	DRAWING APPROVAL ATTACHED TO NIMS RCBIA AS "APPROVAL HISTORY"

SUSQUEHANNA S. E. S.
UNIT 1
P&ID
NUCLEAR BOILER

AREA N/A | ELEV N/A | SCALE NONE

PPL CORP.

PPL DRAWING NO.	SHEET NO.	REV. NO.
E106246	2 OF 2	18
AE DRAWING NO. M-141	SHEET NO. 2 OF 2	

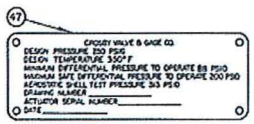


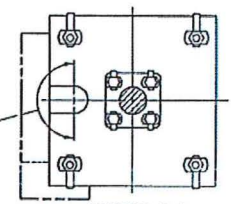
LIST OF MATERIALS

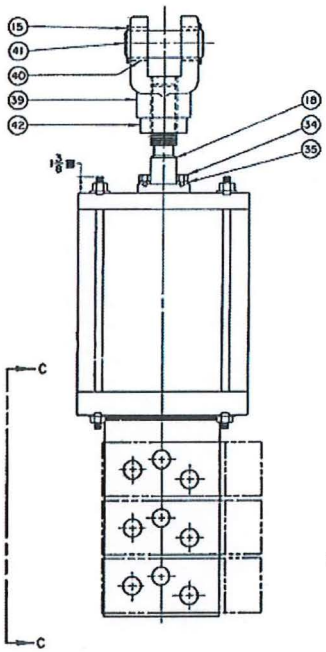
ITEM NO	DESCRIPTION	NO REQD	MATL SPEC	SEE NOTES ON SHT 2 & 5	REMARKS
1	BODY	1	ASTM A105 GR II	4,5,6,7	
2	NOZZLE	1	ASME SA182 GR F316	2,3,5,16,18	
3	RING	1	ACI-CF8M (316)		SOLUTION ANNEALED
4	SET SCREW	1	ASTM A582 TYPE 416 CONDT	2,33	
5	BELLOWS	1	INCONEL 718	2,14	
6	DISC HOLDER	1	AMS-5662B (INCONEL 718)	2,4,5,6,8	
7	RING	1	ACI-CB7CU-(17-4PH)	2,9	
8	PIN	12	SST 304	2	
9	DISC INSERT	1	ASME SA 637 GR 718	2,35,16,18	
10	PIN	1	HAYNES ALLOY #25	2	
11	EDUCTOR	1	ACI-CB7CU (17-4PH)	9	
12	SLEEVE	1	STELLITE 6		
13	BONNET	1	ASTM A105 GR II	4,5,6,7	
14	ADAPTER	1	ASTM A216 GR WCB		
15	SLEEVE	1	STELLITE 6		
16	STUD	12	ASTM A193 GR B7	4,5,7	1" 8UNC-3A 6-1/4 LONG
17	NUT	12	ASME SA194 CL. 2H	4,5,7,2	1" 8UNC-2B HVY. HEX.
18	SPINDLE POINT	1	ASTM A564 TYPE 630	4,5,6,8,9,34	
19	ROD	1	ASTM A564 TYPE 630	9,34	
20	PIN	1	SST-316	34	SOLUTION ANNEALED
21	BALL	1	STELLITE 6	4,5,8,34	
22	PISTON	1	ASTM A582 TYPE 416 CONDT		
23	RETAINING RING	1	TRU-ARC 5100-250-H	2	
24	SPRING	1	ASTM A304 GR. 4161 H	4,5,6,8,10,2,13	
25	WASHER (BOTT)	1	ASTM A105 GR. II	4,5,6,8,2,17,18,13	
26	SLEEVE	1	ASTM B438 GR.1	13	BRONZE
27	WASHER (TOP)	1	ASTM A105 GR. II	4,5,6,8,2,17,18,13	
28	SLEEVE	1	ASTM B438 GR.1	13	BRONZE
29	ADJ. BOLT BUTTON	1	ASME A193 GR.B8 (410)	4,5,6,8,18	
30	SLEEVE	2	ASTM B438 GR.1		BRONZE
31	CAP	1	ASTM A216 GR WCB		
32	STUD (SHORT)	3	ASTM A193 GR B7		3/4-10UNC-2A 3-1/4 LONG
33	STUD (LONG)	3	" " "		3/4-10UNC-2A 4-1/2 LONG
34	NUT	6	ASME SA 194 CL. 2H	2	3/4-10UNC-2B HVY. HEX.
35	TOP	1	ASTM A216 GR WCB	38	
36	SPINDLE NUT	1	ASTM A276 TYPE 440C	2	
37	COTTER	1	STEEL COMMERCIAL	2	1/8 DIA X 3" LONG
38	DOG	1	ASTM A148 GR 120-95	19,37	
39	SHAFT	1	ASTM A582 TYP 416 CONDT		PURCHASED TO CONDI A 1441
40	BEARING	2	TORRINGTON HJ-486028	21	WITH IR-384828 SHELL
41	RETAINER	2	ASTM A216 GR WCB		
42	COVER	2	STEEL COMMERCIAL		
43	RET RING	2	TRUARC NO. 5100-237	2	
44	LEVER	1	ASTM A148 GR 120-95		
45	END CAP	2	CARBON STEEL AISI C1018		
46	CAP SCREW	4	STEEL COMMERCIAL		1-1/4-12 UNF-2A X 3-3/4 LG.
47	LOCKWASHER	4	"	2	
48	AUXILIARY PNEUMATIC ACTUATOR ASSY	1		2	SEE SHEET 3
48	AIR CYLINDER	1			
48	SOLENOID AIR VALVE	1			SEE SHEET 4
49	GASKET-SET SCREW	2	STEEL AISI 1010-1030	2	
50	EDUCTOR	1	FLEXITALLIC R SPECIAL	2,22,35	
51	INLET	1	FLEXITALLIC R3-15P	2,23,35	
52	OUTLET	1	FLEXITALLIC CG-3R	2,24,35	
53	INLET STUD	12	ASTM A193 GR B7	4,5,7	1-3/8-8UN-3A 9" LONG
54	NUT	12	ASTM A194 CL. 2H	4,5,7	1-3/8-8UN-2B HVY HEX.
55	OUTLET BOLT	16	ASTM A193 GR B7		4" LONG HVY SEMI FIN. HEX.
56	WASHER	16	STEEL COMMERCIAL	2	SELF ALIGNING 1" SIZE
57	SEAL & WIRE	3	LEAD - SST		
58	NAME PLATE	1	SST 304		SEE SHEET 2
59	IDENTIFICATION PLATE	1	"		SEE SHEET 2
60	INFORMATION PLATE	1	"		SEE SHEET 2
61	NAMEPLATE	1	"		SEE SHEET 2
62	RESPONSE TIME PLATE	1	"		SEE SHEET 2
63	DRIVE SCREW	1	SST 302		
64	ADJUSTING RING	1	ACI-CF8M		SOLUTION ANNEALED
65	SET SCREW	1	ASTM A582 TYPE 416 CONDT	2,33	
66	LIFTING BRACKET	1	STEEL COMMERCIAL		
67	ADJUSTING BOLT	1	ASME A193 GR. B6 (410)	4,5,6,8,18	
68	NUT	1	CARBON STEEL AISI C1018		
69	LOAD PLATE	1	KOLSTER TYPE 440C	2	
70	DU BEARING	1	COMMERCIAL	2,26	
71	RIVET	2	ASME SA479 (304)	2	
72	PIN	2	ASTM A582 (416)	2	
73	RETAINING RING	2	TRUARC 5100-37	2	
74	DU SPACER	1	COMMERCIAL	2,26	
75	BACKING PLATE	2	STEEL AISI-1215	2	
76	LOCKING WIRE	A/R	SST-QQ-W423 COND A	2,25	NUTS LOCKED IN PAIRS
77	PRECISION WASHER	1	TRUARC 5900-253	2	
78	THRUST BEARING	1	ROLLWAY T-613 (EQUIV)	2,15	
79	ADAPTER	1	ASTM A193 GR.B6	4,5,6,8,18	

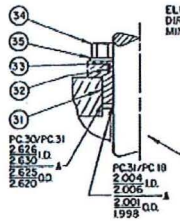
CROSBY CUST. PP&L	VALVE BUILT TO ASME BOILER AND PRESSURE VESSEL CODE 1971 EDITION, NO ADDENDA	ASME SECTION III CLASS 1	
ORDER NO. 0-14560-1			
CROSBY EQ. NV0000625			
PREPARED BY RNP 6 SEP 00	WEIGHT 2800 LBS. MAX (DRY)	DRAWING TITLE	SAFETY RELIEF VALVE FOR MAIN STEAM SERVICE
CHECKED BY [illegible]	SIZE 6 R 10 STYLE HB-65-BP	DRAWING NO.	DS-A-63790-4 REV A
APPD. [illegible]	TYPE DFL ASSY NO 1163750-04	SHEET 1 OF 5	

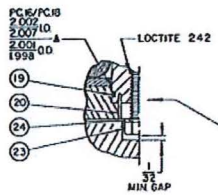
REV	DESCRIPTION	BY	CHK	APPROVED
A	REVISED PER DCO 00-781, 8 NOV 00			

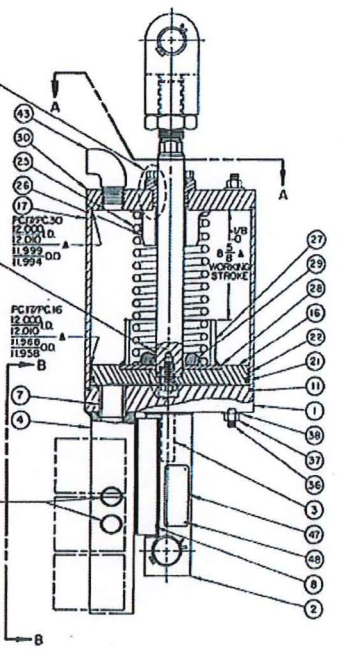


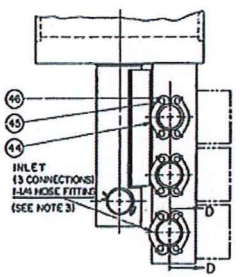




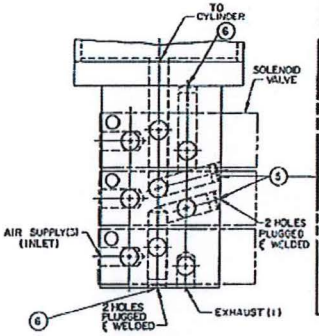




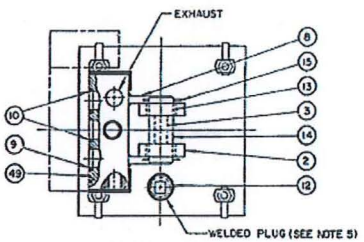




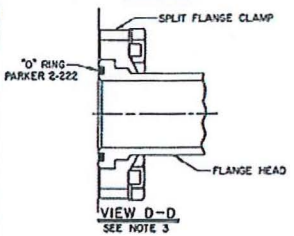
VIEW C-C



VIEW B-B
REAR CYLINDER HEAD PORTING



BOTTOM VIEW



VIEW D-D
SEE NOTE 3

"DRAWING DS-A-63790-4 REV.A IS APPROVED BY PPL ONLY FOR THE PURPOSE OF IMPLEMENTATION OF THE IMPROVED FLEXDISC MODIFICATION TO BE INSTALLED PER PPL RE 277275. THIS DRAWING DOES NOT NECESSARILY REPRESENT THE AS-BUILT CONFIGURATION OF ANY OR ALL OF THE PPL VALVES."

LIST OF MATERIALS

PC.NO.	DESCRIPTION	NO. REQ'D	MATERIAL	SEE NOTE XT SYM. 3 & 5	REMARKS
1	REAR CYLINDER PLATE	1	CARBON STEEL	1	
2	" " STRUT (LG)	2	" "	1	
3	" " " (SHORT)	1	" "	1	
4	MANIFOLD BLOCK	1	SST 316		
5	" " PLUG	2	" "		
6	" " "	2	" "		
7	" " NIPPLE	1	" "		
8	" " BRACE	2	CARBON STEEL	1	
9	" " O-RING	3	VITON "E"	2	PARKER 2-130
10	" " "	6	" "	2	PARKER 2-135
11	REAR CYLINDER "O" RING	1	" "	2	PARKER 2-278
12	" " PLUG	1	STEEL	1,5	1-1/4 NPT
13	" " BUSHING	2	BRONZE (SAE 841)		
14	" " PIN	1	CARBON STEEL	1	CHR. PLATED (5" LONG)
15	COTTER PIN	4	SST	2	5/16 DIA. X 3-1/4 OR 3-1/2 LONG
16	PISTON	1	CARBON STEEL	1	
17	" TUBE	1	ASTM A53 GR. B	1	CHR. PLATED I.D.
18	" ROD	1	CARBON STEEL	1	
19	" " "O" RING	1	VITON "E"	2	PARKER 2-032
20	" " SPRING PIN	1	STEEL	1	1/8 DIA. X 1" LONG
21	" "U" CUP	1	VITON "E"	2	CR. 721553
22	" WEAR STRIP	1	TEFLON	2	
23	HEX HEAD CAP SCREW	1	ALLOY STEEL (GR 8)	1	7/8-9UNC-2A (2-1/2 LG.)
24	SPRING LOCK WASHER	1	STEEL	1	7/8 REGULAR
25	RETURN SPRING	1	INCONEL X-750		
26	" " GUIDE	1	CARBON STEEL	1	
27	SPACER TUBE	1	" "	1	
28	" PLATE	1	" "	1	
29	BUMPER	1	VITON "E"		
30	ROD HEAD	1	CARBON STEEL	1	
31	" " PACKING GLAND	1	CAST IRON	1	
32	" WIPER	1	BRASS/VITON "E"	2	HOUGHTON 31
33	" " RET. RING	1	STEEL	1	AR-250-CD
34	HEX HEAD CAP SCREW	4	"	1	3/8-16UNC-2A (1-1/4 LONG)
35	LOCK TAB WASHER	4	SST 304	2	
36	TIE ROD	4	CARBON STEEL	1	
37	" " HEX NUT	8	STEEL	1	5/8-18UNF-2B
38	" " LOCK TAB WASH	8	SST 304	2	
39	CLEVIS	1	CAST IRON	1	
40	" BUSHING	2	BRONZE (SAE 841)		
41	" PIN	1	CARBON STEEL	1	CHR. PLATED (6-1/4 LG)
42	" JAM NUT	1	" "	1	
43	SHORT RADIUS ELBOW	1	STEEL	1	1-1/2 X 90°
44	SPLIT FLANGE CLAMP	3	" (SAE-61-201	1,4	
45	HEX HEAD CAP SCREW	12	SST 18-8		7/16-14UNC-2A (1-1/2 LG)
46	LOCK TAB WASHER	12	SST 304	2	
47	CYLINDER DATA PLATE	1	" "		
48	DRIVE SCREW	4	SST		
49	MANIFOLD BLOCK O-RING	3	VITON "E"	2	PARKER 2-013

● FURNISHED AS SUB-ASSEMBLY ONLY
▲ DENOTES CRITICAL DIMENSION
■ DIMENSIONS WITHOUT TOLERANCE ARE FOR REFERENCE ONLY

NOTES:
1. ALL Cr AND Cd PLATED PARTS ARE BAKED TO AVOID H2 EMBRITTLEMENT
2. RECOMMENDED SPARE PART
3. FLANGE HEAD AND "O" RING SUPPLIED BY OTHERS.
4. ALTERNATE MATERIAL 'MALLEABLE IRON
5. OPTIONAL PIPE PLUG

REV.	DESCRIPTION	APPROVED
1	UPDATED PER EWR 1562015	SPRING APPROVAL ATTACHED TO NOMS MEDIA AS "APPROVAL HISTORY"

PPL DRAWING NO.	FF62000	SHEET NO.	155
A/E DRAWING NO.	FF62000	SHEET NO.	155

REV. 1

CROSBY CUST.	PPL	VALVE BUILT TO ASME BOILER AND PRESSURE VESSEL CODE 1971 EDITION, NO ADDENDA	ASME SECTION III CLASS 1
ORDER NO.	0-14560-1		ANDERSON GREENWOOD CROSBY WRENTHAM, MA 02093
CROSBY P.O.	NV0000625		DRAWING AUXILIARY PNEUMATIC
PREPARED BY	RNB 6 SEP 00		TITLE ACTUATOR - CYLINDER
CHECKED BY	[signature] 6 SEP 00	SIZE 6 X 10	STYLE HB-65-BP
APPD.	[signature]	TYPE DF	ASSY NO. H63790-04

DRAWING NO. DS-A-63790-4 REV A
SHEET 3 OF 5