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

Perry Nuclear Power Plant
Docket No. 50-440
Supplemental Response to
NRC Bulletin 93-03
Reactor Vessel Water Level
Instrumentation Modification Description

Gentlemen:

The Cleveland Electric Illuminating (CEI) Company responded to NRC Bulletin 93-03, Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs, on June 28, 1993 (PY-CEI/NRR-1681L). In that submittal CEI committed to install a "reference leg backfill modification" at the next cold shutdown beginning after July 30, 1993. Subsequently on October 1, 1993, the Perry Nuclear Power Plant (PNPP) commenced a Fall Maintenance Outage, which concluded on November 18, 1993. CEI installed a reference leg backfill modification during this outage. This letter provides, as required by Bulletin 93-03, a report confirming completion and describing the modification implemented.

The hardware modifications were completed November 10, and were fully operational November 19, 1993, upon completion of the post-installation testing and acceptance for use. Attachment 1 provides general background information on the modification, including design, installation and testing. Post-installation testing provided additional assurance that the modification to the level instrumentation system will function as designed.

If you have questions or require additional information, please contact Henry Hegrat - Regulatory Affairs at (216) 259-3737 extension 5606.

Sincerely,

170024

Robert A. Stratman

RAS:CSO:sc

Attachment

cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III

Operating Companies
Cleveland Electric Illuminating
Toledo Edison

IE41
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Perry Nuclear Power Plant
Reactor Vessel Water Level Instrumentation
Design Modifications to Implement NRC Bulletin 93-03

The PNPP Reactor Pressure Vessel (RPV) water level instrumentation modification is an Instrument Reference Leg Purge Control system providing continuous backfill as shown on Figure 1. There are four level indication channels associated with initiation signals to the Reactor Protection System (RPS), ECCS initiation and various isolation logic systems. This modification supplies water from the Control Rod Drive System (CRDS) charging water header to the four Reactor Pressure Vessel (RPV) water level instrument reference legs. Water from the CRDS is supplied continuously to purge the reference leg lines. The Reference Leg Purge Control system is comprised of four individual purge control stations providing charging water to each instrument reference leg.

The CRD charging water header provides a source of de-aerated water that is at a pressure above RPV pressure, and it is in the physical vicinity of the panels (H22) that house the instruments and associated reference leg piping. The flow provides a continuous purge of .005 GPM into the reference leg, which prevents the buildup of non-condensable gases. At such low flow rates no significant thermal stresses are imposed on the piping, condensing chambers, or RPV nozzles. The maximum allowable flow rate of .02GPM was also determined based on thermal stress considerations.

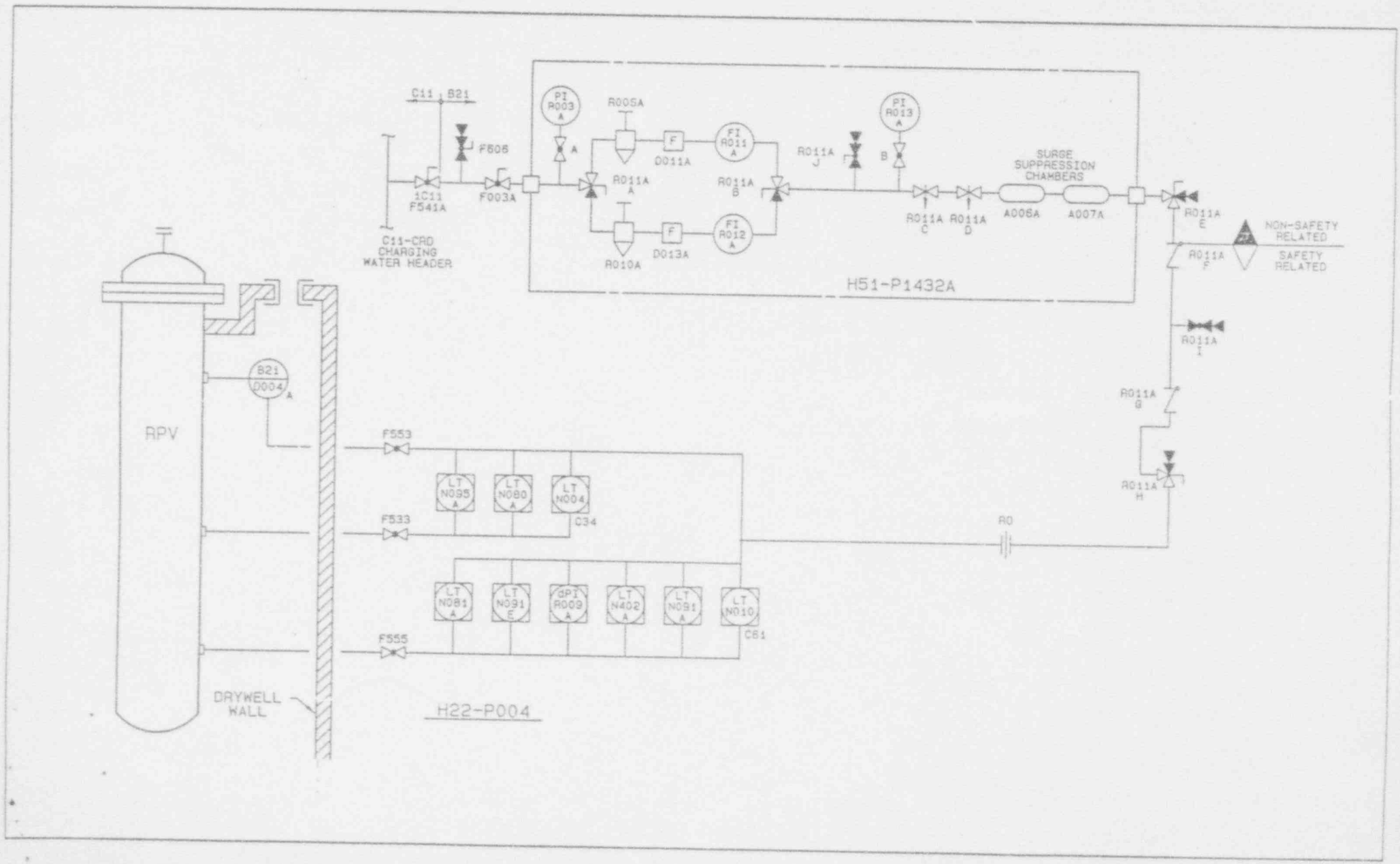
Flow control equipment consists of two needle valves for metering flow, surge suppressors, strainers, isolation valves, test valves, and pressure regulators. This flow regulating equipment is enclosed within four "purge" panels located at elevation 620' inside primary containment. Backfill water is introduced into each instrument reference leg at a connection point located inside local control panels 1H22P004, P005, P026 and P027. Each Purge Control Station has redundant flow indication paths which allow for maintenance without isolating the purge control loop.

The majority of the installation is non-safety related, except for the tie-in to the reference legs and the check valves used for reference leg isolation in the event of a loss of CRD supply water or CRD system pressure, which are safety related. Installation of the hardware has been evaluated for impact on plant structural equipment and has also been analyzed for seismic and fall down interaction with other plant components. A leak tight seal has been provided by two safety related check valves to prevent backflow in the event of Control Rod Drive system pressure degradation below the RPV pressure. Following receipt of Information Notice 93-89, CEI has locked open isolation valves for which inadvertent closure could result in pressurization of the associated instrumentation to CRDS pressure. Additionally, CEI is evaluating the need to lock open individual instrument isolation valves, for which inadvertent closure could otherwise impact associated instrumentation.

The system design was analyzed for the impact of thermal hydraulic stresses on the reference leg piping, condensing chambers, and reactor vessel nozzles.

Additionally, the system was analyzed for temperature and flow bias effects on the level instrument setpoints, CRD system transient effects, and single failure effects on the RPV pressure and level instrument performance. The analysis concluded that there was no significant impact from the operation of this modification on the reactor vessel or instrumentation.

Testing was conducted in two stages. First, a temporary modification was installed on an indication only channel associated with the RPV water level upset and shutdown range instrumentation reference leg. This temporary modification and testing was performed prior to shutdown with the reactor pressurized. Second, testing was conducted during startup from the fall outage on all four channels, both with the reactor depressurized and pressurized. Testing was conducted to evaluate instrumentation response to reactor vessel measured level changes and a variety of CRD system transients. Results indicated that the purge system will have negligible impact (approximately 1") on RPV indications even under the most severe CRD flow/pressure transients, including reactor scrams.


C11
B21
PI R003 A
R005A
F606
1C11 F541A
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C11-CRD CHARGING WATER HEADER
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R011A A
R011A B
R010A
D013A
FI R012 A
PI R013 A
R011A J
SURGE SUPPRESSION CHAMBERS
A006A
A007A
R011A C
R011A D
R011A E
R011A F
NON-SAFETY RELATED
SAFETY RELATED
H51-P1432A
R011A I
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