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Subject: Containment Hydrogen Purge System Use During Plant Heatup and Power Ascension

Gentlemen:

This letter provides an updated status and additional information regarding venting of containment for pressure control during plant heatup and power ascension at the Davis-Besse Nuclear Power Station (DBNPS), Unit No. 1.

During plant heatup and power ascension (plant operating Modes 1-4) it is necessary to vent the containment in order to maintain the internal pressure within DBNPS Technical Specification 3.6.1.4 requirements. In response to an NRC letter of November 19, 1979 (Log No. 466) requesting information on how the DBNPS purge and vent systems satisfy the requirements of the NRC Branch Technical Position (BTP) CSB 6-4, Toledo Edison (TED) provided a discussion of the Containment Purge and Exhaust System (Serial No. 577, dated January 18, 1980). Similar information was not provided for the Containment Hydrogen Purge (CHP) System because, as indicated in that letter, the CHP system was not used for containment pressure or temperature control during plant operation.

In TED's letter of March 14, 1983 (Serial No. 920), a commitment was made to maintain the Containment Purge and Exhaust isolation valves (CV5005 through 5008) closed in Modes 1 through 4 with control power to the valves removed until the Safety Features Actuation Signal Block Inhibit Feature was installed. Toledo Edison no longer plans to install the block inhibit feature, but rather to maintain these isolation valves closed with valve control power removed (see Serial No. 1504). Subsequent to the commitment to maintain valves CV5005-5008 closed, containment venting has been accomplished by opening the CHP valves (CV5037 and CV5038) and relieving containment pressure to the station vent using the CHP System. The CHP System has a 0.5 inch orifice to limit flow. Since

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Serial No. 577 indicated that the CHP System was not used for this purpose, this letter serves to revise our notification to the NRC of the past and intended future use of the CHP System for containment pressure control.

TED intends to use the CHP System in the future to relieve containment pressure during plant heatup and power ascension using the CHP System as discussed below. An evaluation of compliance of this system with the requirements of BTP CSB 6-4 is provided in Attachment 1 to this letter. It discusses each item of the BTP in numerical order as indicated in NUREG-0800, Standard Review Plan (SRP), Section 6.2.4.

The following is a synopsis of the CHP System operation during containment pressure reduction. The synopsis supplements the information provided in the attachment.

During plant heatup and power ascension (Modes 1-4) CHP valves CV5037 and CV5038 are opened to reduce the containment internal pressure. A Safety Feat[illegible]e Actuation System (SFAS) incident level 2 signal will close the valves on a high containment pressure or a reactor coolant system low pressure condition. This feature will not be blocked or overridden for use in containment pressure control. The effluent flowpath will be through 4-inch containment penetration piping and motor-oper[illegible] butterfly valves to the 2-1/2 inch (~ 219 ft. long) piping which is in[illegible] use for the hydrogen recombiner. The normal CHP HEPA and charco[illegible]embly is protected during containment pressure release by clos[illegible]ly locked open manual valve, CV60, upstream of the filter assembly [illegible]ng the CHP containment isolation valves. This ensures the filte[illegible]amaged and available for post-LOCA use. The flow during plant heatup [illegible]er ascension is then directed through a new HEPA and charcoal filter assembly to the fuel handling area atmosphere. The effluent flowpath, described above, is shown on the simplified piping and instrument diagram for the containment hydrogen purge system presented herein as Attachment 2.

Because the use of the CHP isolation valves for containment pressure reduction occurs during plant heatup and power ascension, the radiation level in the containment is expected to be low. The CHP valves, when not in use for containment pressure reduction, are normally closed. They would be required to open only after a LOCA when the concentration of hydrogen in the containment has reached the 3 percent control limit. The DBNPS Updated Safety Analysis Report indicates that this limit would be reached in excess of 110 days after the LOCA event.

Based on the above, and the discussion provided in Attachment 1 indicating compliance with the BTP CSB 6-4 Acceptance Criteria, TED believes that the use of the CHP piping as described above for containment pressure reduction in operating Modes 1 through 4 is acceptable.

Should you have any questions or require additional information, please contact Mr. R. W. Schrauder, Nuclear Licensing Manager at (419) 249-2366.

Very truly yours,

RMC/sag

Attachments

cc: A. B. Davis, Regional Administrator
A. W. DeAgazio, NRC/NRR DB-1 Project Manager
DB-1 Resident Inspector

Discussion of Containment Hydrogen Purge System
and
Branch Technical Position CSB 6-4
Acceptance Criteria

Branch Technical Position CSB 6-4	Discussion
B.1.a	
General Design Criterion 54 requires that the reliability and performance capabilities of containment isolation valves reflect the importance of safety of isolating the systems penetrating the containment boundary. Therefore, the performance and reliability of the purge system isolation valves should be consistent with the operability assurance outlined in BTP MEB-2, "Pump and Valve Operability Assurance Program" (also see SRP Section 3.10). The design basis for the valves and actuators should include the buildup of containment pressure for the LOCA break spectrum, and the supply line and exhaust line flows as a function of time up to and during valve closure.	The Containment Hydrogen Purge isolation valves (CV5037 & CV5038) are 4 inch motor operated butterfly valves designed by Fisher Controls. They are designed and tested in accordance with ASME Section III, Subsection NC and ND. They are qualified to Seismic Class I requirements and they have been verified capable of closing during the containment maximum transient pressure (37 psig) resulting from the worst break LOCA. The valves are designed to function for a 45 psig differential pressure.
B.1.b	
The number of supply and exhaust lines that may be used should be limited to one supply line and one exhaust line, to improve the reliability of the isolation function as required by General Design Criterion 54, and to facilitate compliance with the requirements of Appendix K to 10CFR50 regarding the containment pressure used in the evaluation of the emergency core cooling system effectiveness and 10CFR100 regarding offsite radiological consequences.	Only one exhaust line is being used during containment pressure reduction.
B.1.c	
The size of the lines should not exceed about eight inches in diameter, unless detailed justification for larger line sizes is provided, to improve the reliability and performance capability of the isolation and containment functions as required	The Containment Hydrogen Purge valves discharge into a 4 inch line which is subsequently reduced to 2 1/2 inches. This small line size will facilitate compliance with the requirements of 10CFR50

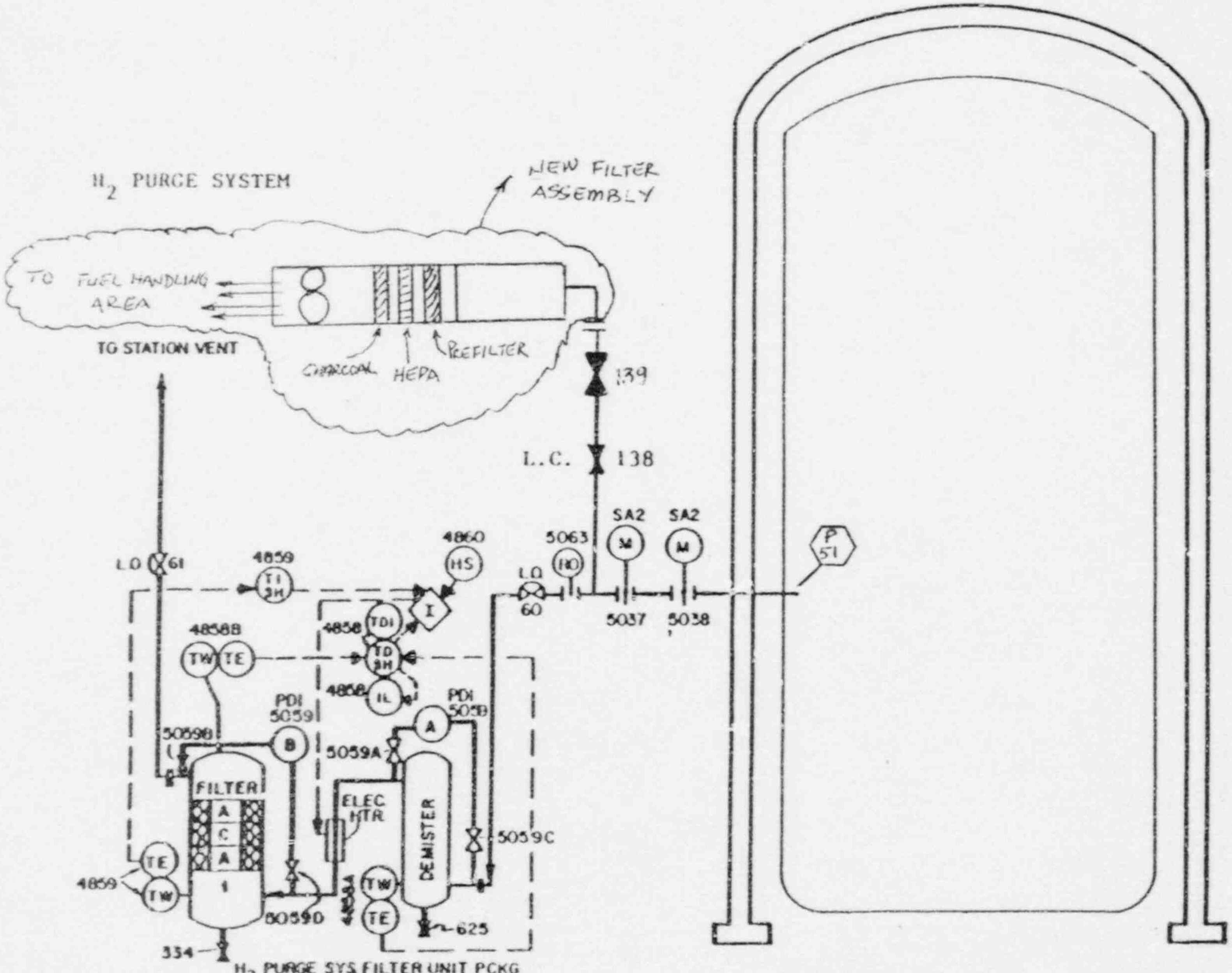
Branch Technical Position CSB 6-4	Discussion
by General Design Criterion 54, and to facilitate compliance with the requirements of Appendix K to 10CFR50 regarding the containment pressure used in evaluating the ECCS effectiveness and 10CFR100 regarding the offsite radiological consequences.	Appendix K and ensure the offsite radiological consequences are within the 10CFR100 requirements.
B.1.d	
As required by General Design Criterion 54, the containment isolation provisions for the purge system lines should meet the standards appropriate to ESF; i.e., quality, redundancy, testability and other appropriate criteria, to reflect the importance to safety of isolating these lines. General Design Criterion 56 establishes explicit requirements for isolation barriers in purge system lines.	The Containment Hydrogen Purge isolation valves meet the requirements for the containment isolation system as described in Section 6.2.4.2 of the USAR. Although the valve arrangement does not comply with the explicit requirements of General Design Criterion 56 which designates: 1) One locked closed isolation valve inside and one locked closed isolation valve outside containment; or 2) One automatic isolation valve inside and one locked isolation valve outside containment; or 3) One locked closed isolation valve inside and one automatic isolation valve outside containment; or 4) One automatic isolation valve inside and one automatic isolation valve outside containment, the exception to General Design Criterion 56 (two motor operated valves outside containment) complies with the intent of BTP CSB 6-4 relative to provisions for quality, redundancy and testability. This arrangement is consistent with the original design as presented in FSAR Section 6.2.4.2.

Branch Technical Position CSB 6-4	Discussion
B.1.e	
To improve the reliability of the isolation function, which is addressed in General Design Criterion 54, instrumentation and control systems provided to isolate the purge system lines should be independent and actuated by diverse parameters; e.g., containment pressure, safety injection actuation, and containment radiation level. Furthermore, if energy is required to close the valves, at least two diverse sources of energy shall be provided, either of which can effect the isolation function.	The Containment Hydrogen Purge isolation valves are actuated by diverse parameters (high containment pressure, low RC pressure) and by a separate and independent source of power to each valve.
B.1.f	
Purge system isolation valve closure times, including instrumentation delays, should not exceed 5 seconds, to facilitate compliance with 10CFR100 regarding offsite radiological consequences.	The Containment Hydrogen Purge isolation valve closure time, including instrument delays, is 75 seconds, as indicated in Technical Specification Table 3.3-5. Although this closure time exceeds the closure time recommended by the NRC (5 seconds), it has been evaluated and concluded that the small amount of containment atmosphere discharged during closure will not affect compliance with 10CFR100 with regard to offsite radiological consequences.
B.1.g	
Provisions should be made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.	The Containment Hydrogen Purge isolation valves are protected from debris entrained in the escaping air and steam. A stainless steel mesh is welded to the entrance of the piping upstream of the valves to ensure valve closure will not be affected by debris.

Branch Technical Position CSB 6-4	Discussion
B.2	
The purge system should not be relied on for temperature and humidity control within the containment.	The Containment Hydrogen Purge system is used to relieve pressure during heatup and power ascension and is not relied on for temperature or humidity control within the containment during normal power operation.
B.3	
Provisions should be made to minimize the need for purging of the containment by providing containment atmosphere cleanup systems within the containment.	Apart from its use following an accident, the Containment Hydrogen Purge system is used during heatup and power ascension for containment pressure reduction only. Therefore, the use of this system is limited.
B.4	
Provisions should be made for testing the availability of the isolation function and the leakage rate of the isolation valves during reactor operation.	Provisions for periodic testing of the isolation valves are in place and are described in Section 6.2.4.4 of the USAR. This testing can be performed during reactor operation.
B.5.a	
An analysis of the radiological consequences of a LOCA should be performed. The analysis should be done for a spectrum of break sizes, and the instrumentation and setpoints tant will actuate the purge valves closed should be identified. The source term used in the radiological calculations should be based on a calculation under the terms of Appendix K to determine the extent of fuel failure and the concomitant release of fission products, and the fission product activity in the primary coolant activity. A pre-existing iodine spike should be considered in determining primary coolant activity. The volume of containment in which fission products	The Containment Hydrogen Purge isolation valves will be automatically closed by SFAS signal generated by pressure transmitters PT2000-2003 for a containment pressure of 18.4 psia or by pressure transmitters PTRC2A3, RC2A4, RC2B3, RC2B4 for a reactor coolant pressure of 1620.75 psig. The amount of steam released through this system during the isolated valves closure will be less than 75 lbs. This release was calculated assuming a containment pressure of 37 psig and a valve closure time

Branch Technical Position CSB 6-4	Discussion
are mixed should be justified, and the fission products from the above sources should be assumed to be released through the open purge valves during the maximum interval required for valve closure. The radiological consequences should be within guideline values.	of 75 seconds. Assuming an iodine spiking source term of 60 μCi/gm of dose equivalent I-131 in the primary coolant, the thyroid dosed at the site boundary will be less than 0.2 Rem. Credit for filters and plateout is not considered. Thus the expected doses through this path are only a small fraction of 10CFR100.
B.5.b	
An analysis should be performed which demonstrates the acceptability provisions made to protect structures and safety-related equipment; e.g., fans, filters, and ductwork, located beyond the purge system isolation valves against loss of function from the environment created by the escaping air and steam.	The Containment Hydrogen Purge isolation valves will be discharging, during containment pressure reduction, into the piping provided for the hydrogen recombiner. This is approximately 219 ft. of 1/2 inch diameter piping rated at 150 lb. and seismically qualified. This piping terminates in the fuel handling area. The discharge of steam to this area will not affect the operation of safety related equipment required to mitigate the consequences of a LOCA. The piping will connect to a temporary HEPA and charcoal filter and will be used for containment depressurization during plant heatup and power ascension. The filter assembly is not safety related or seismically qualified. Failure of this filter assembly in the event of a LOCA or seismic event will not affect the function of safety related equipment.
B.5.c	
An analysis should be performed of the reduction in the containment pressure resulting from the partial	An analysis of the containment pressure reduction through the 2 1/2 inch

Branch Technical Position CSB 6-4	Discussion
loss of containment atmosphere during the accident for ECCS backpressure determination.	Hydrogen Purge line for a duration of 75 seconds has determined that the containment pressure response envelops the B&W assumed minimum back pressure and, thus, the ECCS analysis is not affected.
B.5.d	
The maximum allowable leak rate of the purge isolation valves should be specified on a case-by-case basis giving appropriate consideration to valve size, maximum allowable leakage rate for the containment (as defined in Appendix J to 10CFR50), and where appropriate, the maximum allowable bypass leakage fraction for dual containments.	The Containment Hydrogen Purge isolation valves are designed for a differential pressure of 45 psig. This differential pressure is higher than the peak pressure against which the valves must close. The valves are tested for leakage, in place, as part of the Integrated Leak Rate Test (ILRT) and Local Leak Rate Test (LLRT). The allowable leakage of the valves under LOCA conditions is determined, in combination with the other leakage paths, as part of the ILRT and LLRT, with acceptance criteria established in Technical Specification 3.6.1.2.c



NOTE: VALVES HAVE PREFIX "CV"
UNLESS OTHERWISE NOTED