HCVS Guidance Inquiry Form

A. TOPIC: HCVS Control and 'Boundary Valves' Inq. No.: HCVS-05

Source document: NEI 13-02 Sections: Order EA-13-109, Element 1.2.3, 1.2.12, and 1.2.13, NEI 13-02 Section 4.1.4, 4.1.6, and 6.2

B. DESCRIPTION:

The cited NEI-13-02 sections address the prevention of cross flow between units, the prevention of effluent migration between systems (HCVS to connected systems) in a common unit, and testing of the HCVS to assure continued operability. This FAQ addresses valving integrity relative to leakage as applicable to these Order elements.

More specifically, this FAQ addresses the operational philosophy, HCVS specific requirements and testing of those valves which include; Primary Containment Isolation Valves (designated for the purpose of this paper as CIVs) associated with the HCVS, CIVs connected to Containment Atmosphere not associated with the HCVS, control valves (if other than CIVs), and boundary valves (which isolate other systems from the HCVS).

Questions to be answered are:

- Which valves are considered as control valves and which are boundary valves, and why?
- What are the testing criteria for the various valves cited?

C. PROPOSED ANSWER (Include additional pages if necessary. Total pages: 3)

Valve Definitions (see sketch below) –

1. Control Valve – Any valve used to open the containment to the HCVS vent path such that venting may commence. This valve will also have the function of closing thereby effectively halting the venting process. This may be either of the two (CIVs) associated with the vent system penetration or it may be a single valve installed downstream of the CIVs used for the purpose of commencing and ceasing the venting process. Note that these downstream valves may also be pressure control valves.
2. Boundary Valve – Any valve which serves to isolate the HCVS from another system. Depending on the application these valves may be safety related or (potentially in limited cases) non-safety related. The most typical instance of a boundary valve such as this would be to isolate the Standby Gas Treatment System (SGTS) from the HCVS vent path (in which case such valves would be safety related). This category also applies to valves which isolate the vent system of one plant from that of another.

Testing Criteria to be Used for Valve Types –

Valve Types by Design Function (see sketch below) -

Several types of valves have been discussed in the definitions but there are two fundamental valve types (not yet differentiated) which must be considered when addressing leakage testing. These 2 types are (1) CIVs and (2) all others cited. Note that these types are not directly related to the Control or Boundary function (as related to the HCVS) but to the safety function (or potentially non-safety function) of the valve as related to the licensing of the plant.

1. CIVs – These valves have a safety related function and are tested for that function as required by 10 CFR 50, Appendix J. Their safety related function is to maintain the containment pressure boundary (within a site-specific prescribed leakage range) during a design bases accident.

2. Non-CIVs HCVS valves– This category includes all valves that are not CIIVs and provide an boundary function$_2$ or a control function for the HCVS to be effectively operated. Basically they may be expected, at some point in the use of the HCVS, to prevent the leakage of effluent from containment to an undesirable location in the affected unit (or other unit on the plant site), or prevent leakage of effluent to the atmosphere surrounding the affected unit. These valves will typically be safety related (although there may be exceptions). The safety function of these valves is typically to open and allow flow for the reactor building ESF (engineered safety feature) system. This is typically known as the Standby Gas Treatment System (SGTS). These valves may fail open during a loss of power based on their current license base function (for example, in order to align for SGTS operation once power has been restored). As such, they must be closed and secured closed in order to be credited as an HCVS boundary valve.

Testing Criteria and Valve Requirements by Valve Type –

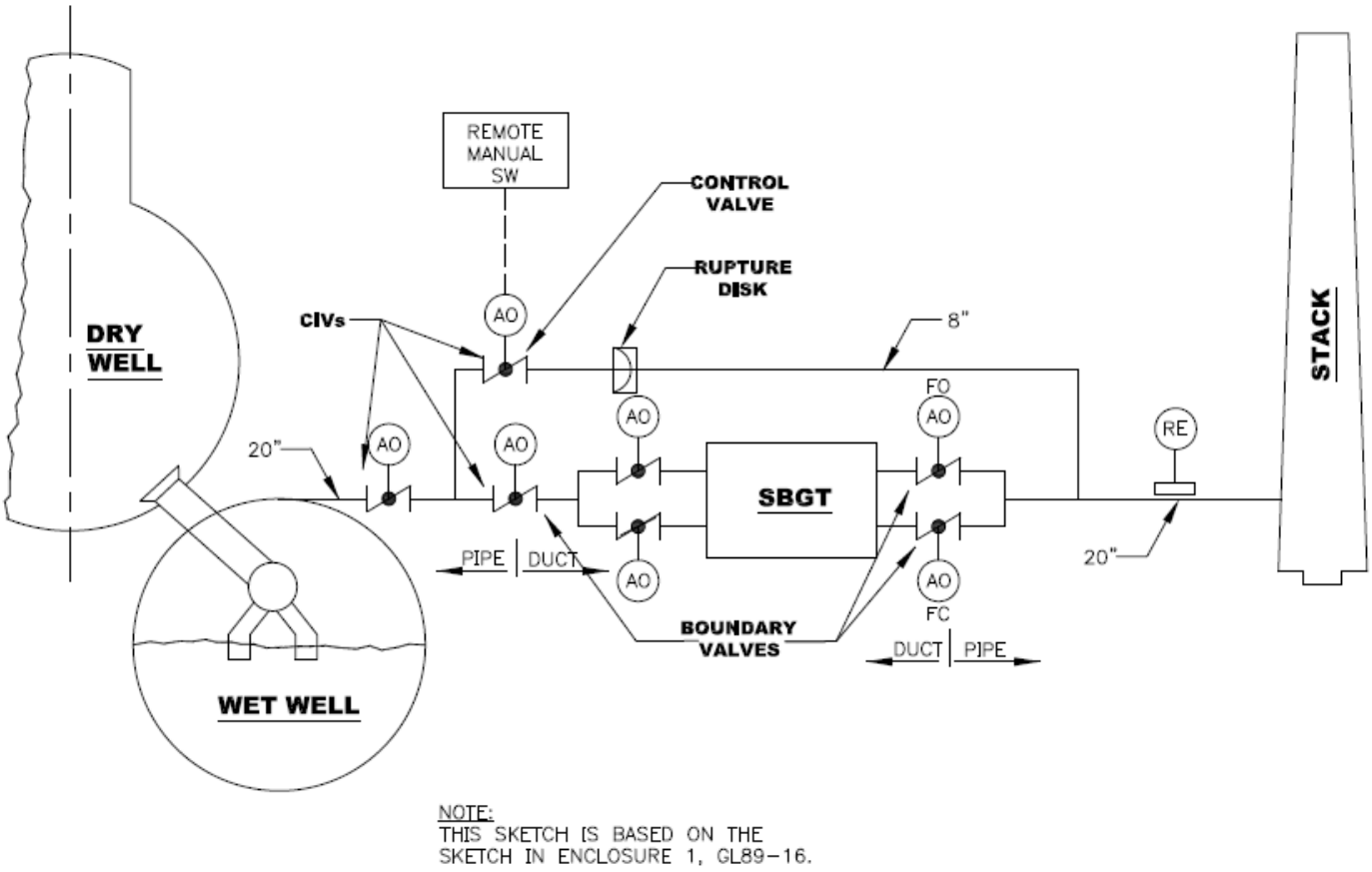
1. CIVs – Testing criteria for CIVs will not change. They will continue to be tested per Appendix J criteria.

2. Non-CIVs HCVS valves (boundary or control) – Testing criteria for these valves will be based on the individual site's Appendix J test criteria for CIVs associated with the HCVS. The allowable leakage may be set equal to the allowable leakage for the CIV of the valve pair associated with the HCVS containment penetration which exhibits the highest accepted leakage rate during current Appendix J testing cycle or to the leakage of the single CIV which is to serve as a control valve for the HCVS (if a CIV is used as such). In this way, expectations set for boundary valves will not be set higher than those for the existing safety related Primary Containment Isolation Valves. Another option which a site may consider is to test such valves in accordance with the criteria listed in the ISG, Section 6.2.3.3. Note that although minimal leakage may be expected, such leakage would be into a stagnant environment (an unused pipe or a SGTS train).

   These valves should be purchased or modified such that they are or can be qualified to operate and/or remain closed (depending on their function, either control or purely isolation) at HCVS design temperature and pressure. They should be tested at a frequency as specified in ISG, Section 6.2.4. They need not be tested at HCVS design temperature and pressure but at ambient temperature and per Appendix J as formerly stated. Note that leakage requirements are to be applied separately to each valve such that cumulative consideration of the leak testing of the individual valves will suffice as leak testing of the system. As an example, consider that an HCVS is connected both upstream and downstream of the SGTS (2 isolation valves, one on either side of SGTS), is opened to containment during HCVS operation by the 2 associated PCIVs, and has a downstream control valve which controls venting and acts as an extension to containment upon halting of venting (with the upstream CIVs remaining open during HCVS operation and isolation). The worst case leakage from that system with the vent system isolated by the control valve would be the combined leakage values of both boundary valves plus that of the control valve. Again the allowable leakage of each of these valves would be that of the associated HCVS PCIV with the highest measured leakage (of the last Appendix J applicable test cycle). Note that this total leakage would not typically be going to the same location or attached system.

   It is understood that this may require evaluation and possible modification of existing site systems besides the HCVS itself (including Boundary Valves associated with those systems). System modifications such as flanged connections (for temporary blind flange installation) or maintenance valves may be required to facilitate leak testing. Test taps may also be required in the existing piping system to support boundary valve testing.

HARDENED CONTAINMENT VENT SYSTEM (HCVS) EXAMPLE



NOTE:
THIS SKETCH IS BASED ON THE SKETCH IN ENCLOSURE 1, GL89-16.

D. RESOLUTION: (Include additional pages if necessary. Total pages: _____)

Revision: 0 Date: _____

E. NRC Review:

Not Necessary_____ Interpretation X Agency Position_____
Explanation:_____

F. Industry Approval:

Documentation Method: FAQ Date:_____