

**9D SRP 6.5.1, Table 6.5.1-1 Compliance Assessment**

The following provides a comparison between the instrumentation specified in SRP 6.5.1, Table 6.5.1-1, and the instrumentation provided in the ABWR Control Room Habitability Area (CRHA) HVAC System filter train design. Justification is provided for those items that deviate from the SRP.

There are two identical divisions of CRHA HVAC System filter trains located on the opposite ends of the Control Building. Each train can be used for the filtration of the outside air.

Instrumentation required for monitoring the operation of the CRHA HVAC System filter train to meet the requirements of GDC 19 is provided in the main control room (MCR) on panel displays. Monitoring, of course, is a fundamental plant requirement specified in GDC 13. Instrumentation used for testing or maintenance is located at the local instrument rack.

**Unit Inlet or Outlet**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Flow rate (indication)	Flow rate (recorded indication, high alarm indication, high alarm & low alarm signals)
ABWR CRHA filter train	Flow rate (indication)	Flow rate (indication) and low alarm

**Local**—ABWR design is in compliance with SRP Table 6.5.1-1

**MCR**—A low flow will indicate an obstruction to the flow CRHA HVAC system uses a mix of recirculated air and outdoor air. In such case, the redundant filter train can be used or both the filter trains can be used to supplement the air supply. An effective surveillance testing and parts replacement program will assure proper functioning of the CRHA filter trains. A high alarm signal in the MCR is not necessary.

**Electric Heater**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Status indication	None
ABWR CRHA filter train	Hand switch, status	Hand switch, status indication

**Local**—The ABWR design exceeds the local panel requirements of 6.5.1-1.

**MCR**—The ABWR design exceeds the control room requirements specified in SRP Table 6.5.1-1.

#### **Space Between Heater and Prefilter**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Temperature (Indication, high alarm and low alarm signals)	Temperature (Indication, high alarm and low alarm signals)
ABWR CRHA filter train	None	Temperature

**Local**—Temperature indication required for testing is available from the control room. Operation of the CRHA filter train to mitigate offsite releases will not be affected by the absence of temperature indication or the high and low alarms at the local panel.

**MCR**—The high alarm and trip in the ABWR CRHA filter train design is used to alert the operator and shut down the electric heater should the heater temperature increase above 110°C. This is slightly above the 107°C referenced in ASME N509, Subsection 5.5.1, but well within the available margin. Per ASME N509, Section 4.9, higher temperatures (above 150°C) may lead to significant desorption of iodine from the charcoal. Potential ignition of the charcoal occurs at a much higher temperature (290°C per ERDA 76-21, Subsection 3.4.2) and is also not a concern. Note that the ABWR CRHA filter train charcoal will meet the more stringent physical property specification of ASME N509, Table 5-1, for ignition temperature (330°C).

Relative humidity is maintained by controlling the temperature across the heater. A low temperature alarm indicates a potential failure such that the relative humidity in the process stream may not be maintained. Under these circumstances, the operator should stop the malfunctioning train and initiate the redundant train to mitigate the offsite releases. Additional temperature and relative humidity indication and high alarms are provided between the first HEPA filter and the charcoal adsorber and are described in the later section of this response. The ABWR design meets the intent of SRP Table 6.5.1-1.

#### **Prefilter**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Pressure drop (indication high alarm signal)	None
ABWR CRHA filter train	Pressure drop (indication)	None

The SRP includes a high alarm signal for monitoring pressure drop across the prefilter. A higher than design differential pressure indicates filter clogging with reduced the flow across the filter. This condition is alarmed in the MCR via the low flow (flowmeter) alarm. The redundant CRHA filter train is available to mitigate any potential offsite release.

The ABWR design does not have this alarm. Local instrumentation for prefilter pressure drop measurement is used for testing purposes. A high alarm signal would not be appropriate during testing given the direct indication available on the instrument rack and main control room (MCR). Low system flow is alarmed in the control room should fan runback occur from any cause. Operation of the CRHA filter train to mitigate any potential offsite release will not be affected by the absence of the alarm on the local panel.

#### **First HEPA Filter (Pre-HEPA)**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Pressure drop (indication, high alarm signal)	None
ABWR CRHA filter train	Pressure drop (indication); DPI107	None

**Local**—The local panel has indication for confirming the proper pressure drop across the HEPA filter during testing. The direct indication available on the instrument rack. A higher than design differential pressure indicates filter clogging with reduced the flow across the filter. Low system flow is alarmed in the control room should fan runback occur. Operation of the CRHA filter train to mitigate any potential offsite release will not be affected by the absence of a local high alarm. During system operation, it is not expected that the HEPA filter would exhibit an excessively high pressure drop by virtue of the periodic testing for pressure drop and filter efficiency performed in accordance with the schedules specified in the Technical Specifications. However, a pressure drop (indication) is provided.

**MCR**—ABWR CRHA filter train design complies with SRP Table 6.5.1-1.

#### **Space between First HEPA Filter and Adsorber**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	None	None
ABWR CRHS filter train	None	Moisture (single division of redundant indication each with high alarm).

As mentioned previously, direct moisture indication is provided to assure relative humidity is less than 70% in the gases entering the charcoal adsorber. Relative humidity is a fundamental parameter for system function and has been emphasized in instrumentation design.

The ABWR CRHA HVAC filter train design exceeds the requirements of SRP Table 6.5.1-1 and ASME N509, Table 4-1.

#### **Adsorber**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	None	None
ABWR CRHA filter train	Pressure drop (indication)	Temperature (high alarm)

The ABWR CRHA filter train design provides a single division of high and high-high temperature alarm downstream of the charcoal adsorber. The purpose of this alarm is to alert the operator to the potential for desorption of iodine from the charcoal (if the CRHA filter train is operating post-accident) and to alert the operator to the increasing temperature caused by the radioactive iodine decay heat. The setpoint for this alarm signal is 155°C. The purpose of high-high alarm is to permit manual deluge actuation by the operator. Pressure drop is provided at a local rack (for testing) and in MCR.

The ABWR CRHA filter train design exceeds the requirements of SRP Table 6.5.1-1.

#### **Space between Adsorber and Second HEPA Filter (Post-HEPA)**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Temperature (two-stage high alarm signal)	Temperature (indication, two-stage high alarm signal)
ABWR CRHA filter train	None	None

**Local**—Local temperature alarms are not provided since the area is not continuously manned. Appropriate alarms and indication are provided in the control room along with the necessary controls to respond to a high temperature signal.

**MCR**—The temperature instrument attached to the adsorber has a two-stage high alarm function instead of an instrument in the space between the adsorber and second HEPA filter.

**Second HEPA (Post HEPA)**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Pressure drop (indication, high alarm signal)	None
ABWR CRHA filter train	Pressure drop (indication)	Pressure drop (indication)

**Local**—The local panel has indication for confirming the proper pressure drop across the HEPA filter during testing. Like the prefilter and first HEPA filter, a high alarm signal would not be appropriate during testing given the direct indication on the rack. Low system flow is alarmed in the control room should fan runback occur. Operation of the CRHA filter train to mitigate any potential offsite release will not be affected by the absence of a local high alarm.

**MCR**—pressure drop indication is provided.

<b>[Process] Fan</b>	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	(Optional hand switch and status indication)	Hand switch, status indication
ABWR CRHA filter train	None	Hand switch, status indication (run/stop)

<b>Valve/Damper Operator</b>	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	(Optional status indication)	Status indication
ABWR CRHA filter train	None	Hand switch, status indication(Open/closed), position indication

The ABWR CRHA filter train design exceeds the requirements of SRP Table 6.5.1-1. Valve position indication (and control) is provided on the inlet dampers.

<b>Deluge Valves</b>	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	Hand switch, status indication	Hand switch, status indication
ABWR CRHA filter train	None	None

Manual deluge capability is provided on the ABWR CRHA filter train with local indication at valves. Inadvertent wetting of the charcoal has led to system unavailability in operating plants. Remote deluge control, either from local panel or the main control room is not provided. Whenever the deluge capability is required, an operator has to connect the fire hose connection to the CRHA filter train deluge connection and manually open both the valves. As such status indication (open/closed) is not required. System availability is improved without compromising fire protection requirements. ASME N509-1989 shows a move away from remote-operated valves. Hand switches and status indications are required only for power actuated valves.

#### **System Inlet to Outlet**

	<b>Local Panel</b>	<b>Main Control Room</b>
SRP Table 6.5.1-1	None	Summation of pressure drop across total system, high alarm signal
ABWR CRHA filter train	None	None

Per ASME N509-1989,  $\Delta P$  across the entire system is not required if each component whose pressure drop is subject to change over time has individual alarm or indication in main control room. Each component whose pressure drop is subject to change over time has pressure drop indication in the MCR. The ABWR CRHA filter trains design meets the requirements of SRP Table 6.5.1-1.