



# U.S. NRC

United States Nuclear Regulatory Commission

*Protecting People and the Environment*



## ***Main Control Room HVAC***

# Learning Objectives:

1. State the purposes of the Main Control Room HVAC Systems.
2. Describe the major differences between the Main Control Room HVAC Systems of the AP1000 and currently operating Westinghouse plants.

# Introduction

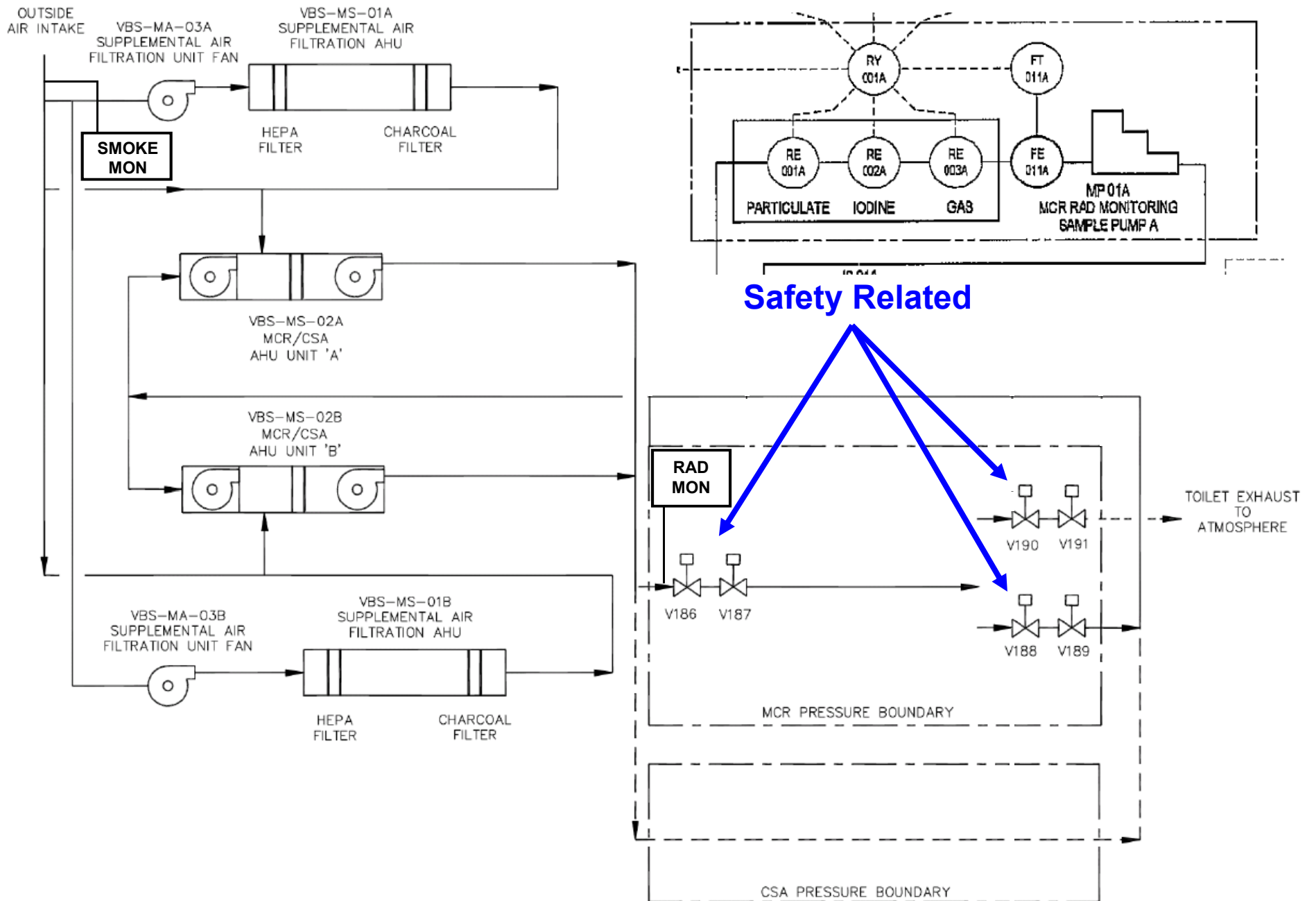
- During normal operations the nuclear island nonradioactive ventilation system (VBS) serves the main control room (MCR).
- The main control room emergency habitability system (VES) provides main control room habitability in the event of a design-basis accident (DBA).

# VBS Nonsafety-Related Functions

- Provides HVAC to MCR and adjacent areas when ac power is available.
- Isolates the main control room and adjacent areas from the normal outdoor air intake and provides filtered outdoor air when a high gaseous radioactivity concentration is detected in the main control room supply.
- Isolates the main control room and adjacent areas from the normal outdoor air intake and provides 100 percent recirculation air when a high concentration of smoke is detected in the outside air intake.

# VBS Safety-Related Functions

- Monitors supply air for radioactive particulate and iodine.
- Isolates MCR boundary HVAC penetrations on hi-hi rad (particulate or iodine) or on extended loss of ac.



**Nuclear Island Nonradioactive Ventilation System (Fig. 6.4-1)**

# Nuclear Island Nonradioactive Ventilation System



- The protection and safety monitoring system automatically isolates the MCR when:
  - AC power is unavailable for > 10 minutes, or
  - “hi-hi” radioactivity (particulate or iodine) is detected in the MCR supply air duct.
- Signals also initiate the MCR Emergency Habitability System.
- MCR isolation can also be initiated by manual actuation.

# Main Control Room Emergency Habitability System

- Provides emergency ventilation and pressurization for the MCR.
- Provides passive heat sinks for the MCR, instrumentation and control rooms, and dc equipment rooms.

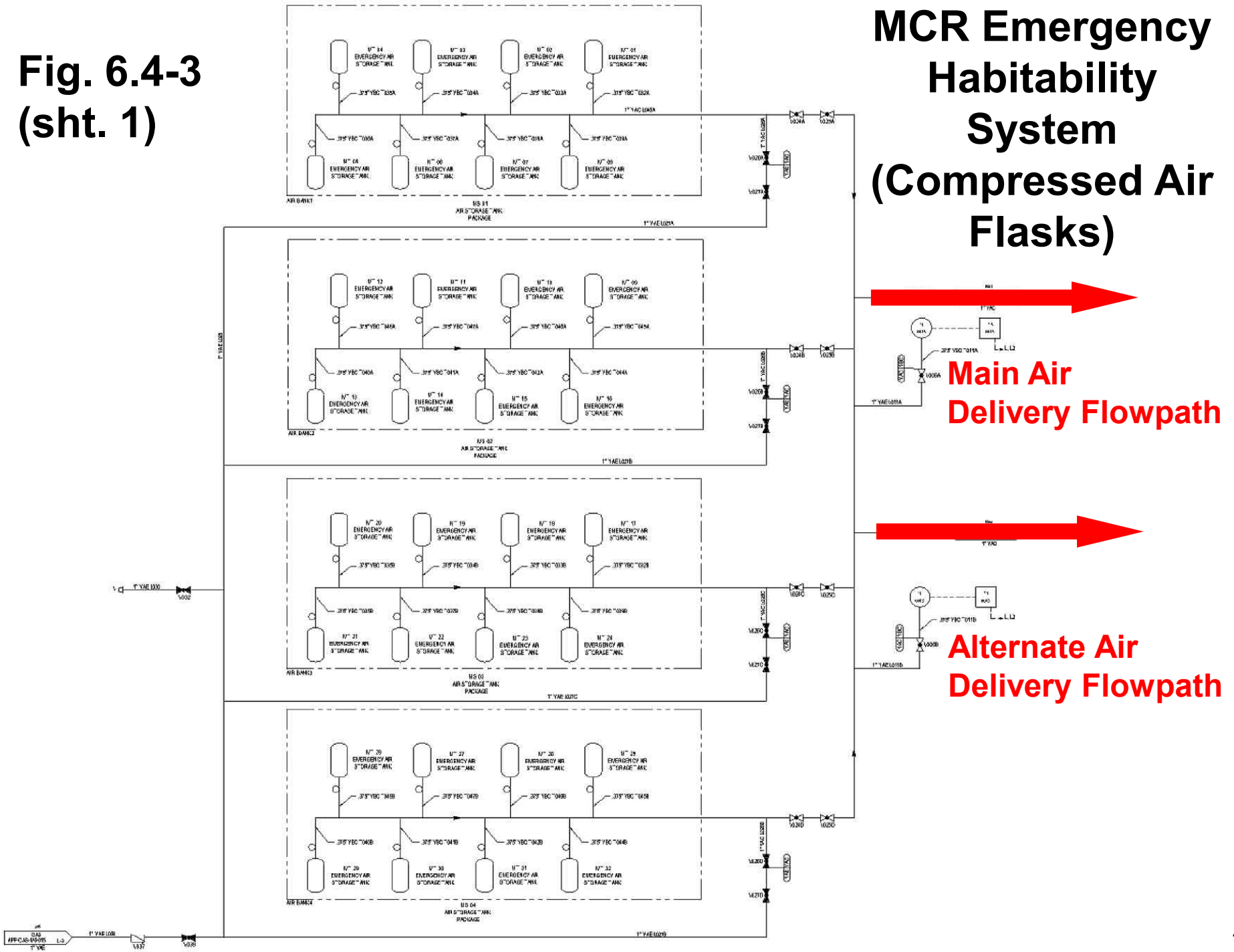


# MCR Emergency Habitability System

- Uses compressed air storage tanks to deliver the required air flow to the MCR.
- Tanks are sized for 72 hours of operation.
- Makeup is provided by a connection to a breathable quality air compressor.

**Fig. 6.4-3  
(sht. 1)**

# MCR Emergency Habitability System (Compressed Air Flasks)

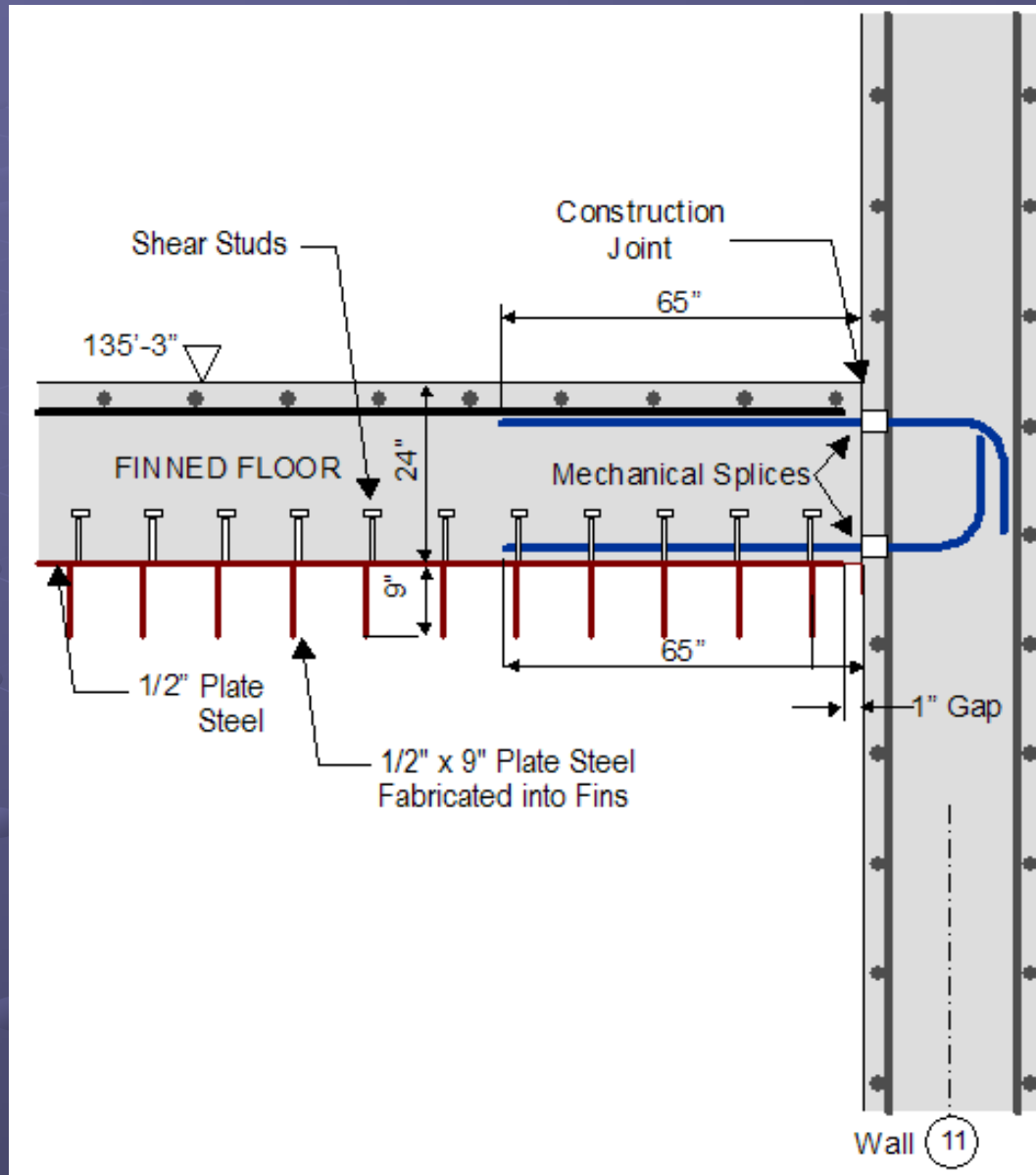




# MCR Emergency Habitability System

- Passive heat sinks utilized for the MCR, instrumentation and control rooms.
- Designed to limit the temperature rise inside each room during the 72-hour period.
- Consist primarily of the thermal mass of the concrete that makes up the rooms' ceilings and walls.
- Metal plates enhance the heat transfer from the room air to the concrete.

# Passive Heat Sinks





Questions?

**A safety-related function of the nuclear island nonradioactive ventilation system is:**

- A. To filter intake air for the MCR after a DBA.**
- B. To isolate the MCR boundary on a hi-hi radiation signal or on an extended loss of AC power.**
- C. To isolate the MCR boundary on a hi-hi chlorine signal.**
- D. To filter intake air for the MCR after a loss of AC power.**

**After a DBA the MCR temperature is maintained by:**

- a. Safety-related chilled water units in the nuclear island nonradioactive ventilation system.
- b. Safety-related chilled water units in the MCR emergency habitability system.
- c. The passive heat sinks of the MCR emergency habitability system.
- d. The passive heat sinks of the nuclear island nonradioactive ventilation system.