

**§ 197.535 Regulated areas.**

(a) Based on the employer's evaluation of the environmental monitoring, whenever the airborne concentration of benzene within an area exceeds or reasonably can be expected to exceed the permissible exposure limits, the person in charge shall mark the area as a regulated area.

(b) The person in charge shall restrict access to regulated areas to authorized persons wearing an appropriate respirator in compliance with § 197.550 and the personal protective clothing and equipment in compliance with § 197.555. The person in charge shall not allow any person to enter a regulated area without another individual in the vicinity to perform rescue or call for help. The second individual must maintain communication with the one entering the regulated area or keep that individual in sight. Also, the second individual must be located at the point of access during confined space entry.

(c) The boundaries of regulated areas must be indicated by barricades, other devices, or by painted areas on the vessel. A sign bearing the following legend in letters at least three inches high (except for the words "DANGER—BENZENE", which must be printed in letters at least 50 percent larger than the other words) must be posted at each access to the regulated areas:

DANGER—BENZENE  
REGULATED AREA  
CANCER CAUSING AGENT  
FLAMMABLE—NO SMOKING  
AUTHORIZED PERSONNEL ONLY  
RESPIRATOR REQUIRED

**§ 197.540 Determination of personal exposure.**

(a) *General.* (1) The employer shall ensure that one or more persons in each type of operation conducted on the vessel which involves the handling of or potential exposure to benzene are monitored. The monitoring must be conducted so as to determine the representative personal exposure of all persons engaged in each particular operation involving benzene. Monitoring

one vessel of a class is sufficient for all vessels of that class provided the procedures, equipment, work practices, cargo, and control equipment are substantially the same.

(2) For long duration operations, such as cargo loading or tank entry, the persons monitored must be monitored to determine the representative TWA for all persons engaged in the operation. The monitoring must be based on breathing zone air samples taken for the duration of the operation or for eight hours, whichever is less.

(3) For short duration operations, such as tank gauging or hose connection and disconnection, the persons monitored must be monitored to determine the representative short term exposure level for all persons engaged in the operation. The monitoring must be based on 15 minute breathing zone air samples. Brief period measuring devices may be used to determine whether monitoring for the short term exposure level is needed.

(4) If cargoes with different benzene concentrations are being carried on the vessel, an operation involving the lower concentration cargoes need not be monitored if the same type of operation involving the highest concentration cargo is monitored and found to be below the action level.

(5) Initial monitoring must be conducted during weather conditions typical in the geographic area and during the time of day the operation is normally conducted. If the benzene level is above half the action level for the operation, additional monitoring must be conducted under those weather conditions that will maximize benzene exposure, such as low wind, stable air, and high temperature.

(6) The monitoring method used must be accurate to a confidence level of 95 percent to within plus or minus 25 percent for airborne concentrations of benzene equal to or greater than 0.5 ppm.

(b) *Initial exposure monitoring.* When benzene is first loaded as a cargo on board a vessel, an initial monitoring of each type of operation must be conducted to determine accurately the representative personal exposure of persons involved in the operation.