

Meeting the challenge of hazardous area installations

Ballast water management systems (BWMS) create unique challenges on tankers with hazardous areas, says **John P. Dooley***

Hazardous areas are those areas where flammable or explosive gas and air mixtures are (or may be) present in quantities that require special precautions for the construction and use of electrical equipment and machinery. Ballast water is considered hazardous when ballast tanks share a common bulkhead with hazardous cargo tanks. Installation of a ballast water treatment system (BWMS) on a tanker must follow detailed regulatory requirements for hazardous areas.

Regulators view BWMS as a new technology and installations are considered novel. Class engineers tend to be highly conservative in surveys, reviews and approvals of any BWMS installation. Safety assessments and ship-specific installation risk assessments are routinely required for class approval. Class rules are critical and must be strictly followed for a successful installation.

The major considerations for installing BWMS on tankers are (1) establishing and defining criteria for the installation of electrical equipment in hazardous areas; and (2) selecting proper equipment with regards to their explosion-proof (or EX) rating. Class and statutory requirements are aimed at lowering the risks associated with combining electrical equipment and a potentially explosive atmosphere.

The US Coast Guard (USCG) does not accept ATEX (the two European Directives for controlling explosive atmospheres) as an acceptable certifier of explosion-proof equipment. All explosion-proof equipment installed on US-flagged vessels must be certified by one of the USCG-accepted testing agencies (i.e. UL/CSA, IECEx or FM). These agencies must use independent testing laboratories that meet the requirements established by IEC 60079. Additionally, the cargo pump room for all US-flagged tankers is classified as Zone 0 – whereas the cargo pump room of a vessel flagged by other IMO states is classified as Zone 1.

Most BWMS include a filtration system to remove sediments greater than 40µm and a treatment system for disinfection of non-indigenous species. BWMS, by nature of their functionality and interface with vessel operations



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on tankers, will need to be installed partially in hazardous areas (i.e. filter in cargo pump room or on the deck above cargo space), and partially in nonhazardous areas (i.e. control panel in the engineroom and the remote control panel in the cargo control room). The treatment system for disinfection may be required to be in a hazardous or nonhazardous area, depending on the treatment type and methodology. In some cases a separate treatment system will be required in the engineroom for treatment of the aft peak tank.

Choice Ballast Solutions (Choice) collaborates with Ecochlor Inc to provide solutions for the installation arrangement of BWMS on tankers. The Ecochlor system includes filtration followed by a side-stream injection of a dilute solution of chlorine dioxide. During ballasting, the full flow discharge from the ballast pumps must be treated with the filters. The chlorine dioxide is injected into the ballast water downstream of the filters. No further treatment is required on de-ballasting. Successful installation arrangements were developed on tankers with a pump room, tankers with submerged pumps and on tanker barges.

Filters are located in close proximity to the ballast water pumps. On tankers with a pump room the filters can be provided with intrinsically safe controls for installation in a Zone 0 or Zone 1 pump room. On tankers with submerged pumps, the filters were located in a Zone 1 filtration deckhouse. For tankers with an aft peak tank, a secondary, smaller filtration system was arranged in the nonhazardous engineroom.

The skid-mounted treatment system can be

located in any convenient location. It requires a supply of filtered motive water from the sea chest, cooling water, or other available source. A single chlorine dioxide generator will treat ballast water in the main ballast lines and the aft peak tank. The treatment system can be located in a nonhazardous location (i.e. aft of the superstructure), or a within a nonhazardous treatment deckhouse (in compliance with all class rules) in a Zone 1 area on the deck.

The main challenge for a BTWS with side-stream dosing is the location of the treatment system and the resulting piping arrangement for motive water. Class rules state that hazardous fluids may not be routed back to nonhazardous areas. This is an issue for treatment of the aft peak tank on tankers, and also for the classification of the nonhazardous treatment deckhouse located within a hazardous area. Routing the motive water piping from the nonhazardous engineroom through a hazardous area on the deck renders the motive water hazardous. Any space the hazardous fluid enters must be reclassified as hazardous, which is unacceptable. So equipment arrangements were designed to satisfy the safety concerns and overcome these challenges: on tankers with aft peak tanks, the treatment deckhouse was arranged in a nonhazardous location. On tanker barges the motive water is drawn from an adjacent, nonhazardous generator house to the treatment deckhouse. **TST**

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