

statements from the draft regulatory guide: "The analysis must address an accident that releases hydrogen generated from 100 percent fuel clad-coolant reaction accompanied by hydrogen burning. Systems necessary to ensure containment integrity must also be demonstrated to perform their function under these conditions." The above changes remove the misleading language and clarify the applicability of the section.

### C. Monitoring Systems

A private citizen expressed concern about the adequacy and survivability of non safety-related hydrogen and oxygen monitors for assessing hydrogen and oxygen levels after an accident. A reactor licensee stated that the changes to the requirements for hydrogen and oxygen monitoring would actually increase the reliability of hydrogen and oxygen monitoring equipment. A monitor vendor indicated that high-quality commercial grade hydrogen monitors may be susceptible to radiation-induced calibration degradation. The vendor also indicated that these monitors are susceptible to damage from aerosols released during the accident. The vendor believes that commercial grade detectors located inside containment would probably not function in a post-accident environment without verification testing and test-based modifications. The vendor claimed the more severe the accident, the less likely the sensors would properly operate due to increased radiation exposure and increased aerosol loading. In addition, the vendor believes that remote sampling lines for monitors located outside of containment are susceptible to clogging from high-solid aerosols. The vendor suggests it is prudent to retain the safety-related status of hydrogen monitors to ensure comprehensive qualification testing.

The NRC believes that the changes to the requirements for hydrogen and oxygen monitors will continue to ensure acceptable monitor performance. If the changes result in a decrease in monitor reliability, it will not be significant and will not affect public health and safety because the functions served by the monitoring systems are not risk-significant for core melt accident sequences. This conclusion is supported by studies documented in the Feasibility Study (Attachment 2 to SECY-00-0198) which indicate the relatively low risk significance of monitoring systems. Because large, dry and sub-atmospheric containments are robust enough to withstand the effects of hydrogen combustion during full core melt accident sequences, hydrogen

monitoring is not risk-significant for these containment designs. For BWR Mark I and Mark II containments, hydrogen monitoring systems are not risk-significant in the early stages of a core melt accident because these containments are inerted. For control of combustible gases generated by radiolysis in the late stage of a core melt accident, oxygen monitors are more important than hydrogen monitors for these designs. For this reason, the design and qualification requirements for oxygen monitors are more stringent than they are for hydrogen monitors. During core melt accidents in BWR Mark III and ice condenser containments, the hydrogen igniter systems are initiated by high containment pressure. Because hydrogen monitors are not needed to initiate or activate any mitigative features during these accidents, they are not risk-significant for reducing the combustible gas threat as long as the hydrogen igniters are operable. If the igniters are not operating (such as during station blackout) hydrogen monitoring does not reduce risk since the containment cannot be purged or vented without electrical power. Nevertheless, the amended rule requires licensees to retain hydrogen monitors (and oxygen monitors in Mark I and Mark II BWRs) for their containments because they are useful in implementing emergency planning and severe accident management mitigative actions for beyond design basis accidents.

As noted in sections III C. and D. of this Supplementary Information, as a consequence of eliminating the design-basis LOCA hydrogen release, the oxygen and hydrogen monitors are no longer required to mitigate potential consequences of combustible gases during design-basis LOCA accidents; thus the monitors are not required to be safety-related and need not meet the procurement, quality assurance, and environmental qualification requirements for safety-related components. Even though amended § 50.44 reclassifies requirements for monitoring systems, the hydrogen and oxygen monitoring systems are still required by the rule to be functional, reliable, and capable of continuously measuring the appropriate parameter in the beyond-design-basis accident environment. Thus, licensees must consider the effects of radiation exposure and high-solid aerosols on monitor performance if they will be present in the post-accident environment for the specific type of facility and monitoring system design. The change made by the amended rule

is that licensees are no longer required to use only safety-grade monitoring equipment. For a particular facility and monitoring system design, licensees will, in many cases, be able to select appropriate, high quality, commercial-grade monitors that will meet the performance requirements in the rule. In other cases, if no suitable commercial-grade monitors are available, safety-grade monitors may still be necessary. Also, because there are more types and designs of commercial-grade monitors available than there are safety-grade, the ability to use commercial-grade equipment may make it possible for licensees to select a better-suited monitor for their particular application. For example, it is stated in Attachment 2 to SECY-00-0198 that existing safety-grade hydrogen monitors have a limited hydrogen concentration range and are not the optimum choice. Commercial-grade monitors have the ability to monitor a wider range of hydrogen concentration and could be a better solution.

Because the amended rule implements a performance-based requirement for hydrogen and oxygen monitors to be functional, reliable, and capable of continuously measuring the appropriate parameter in the beyond-design-basis accident environment, licensees will have to ensure that their procurement and quality assurance processes for such equipment address equipment reliability and operability in the beyond design basis accident environmental conditions for the specific facility and monitoring system design. Licensees who do not consider reliability and operability in appropriate environmental conditions when designing and procuring monitoring equipment could be found by NRC inspectors to be in violation of the amended rule.

Another vendor asked if additional requirements beyond commercial grade will be imposed on the monitor's pressure retaining components because the analyzer loop forms part of the containment boundary. The monitor's pressure retaining components must meet current regulations concerning containment penetrations. This vendor also asked if their conclusion that grab samples cannot replace continuous monitoring is correct. The NRC has determined that grab samples cannot replace continuous monitoring. However, grab samples may be taken to verify hydrogen concentrations in the latter stages of the accident response.

A vendor asked if two trains of equipment would be an appropriate solution for ensuring analyzer availability. The NRC cannot respond to