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## **TECHNIQUES FOR IMPROVING OPERATOR RESPONSE TO ABNORMAL OPERATIONS**

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### **Abstract**

Safety alarms are among the most commonly identified instrumented safeguards implemented to reduce the risk of hazardous events. Unlike safety interlocks or permissives, alarm safeguards are entirely dependent on operator action to be effective. The probability of an operator error in taking the needed action can be made worse by inadequate consideration of human factors during the design of the control system and human interfaces in the control room and field. Techniques that can improve the likelihood of successful operator response to a safety alarm include:

- Selecting alarm setpoints to allow more time for response
- Specifying safeguard sequencing to reduce impact of abnormal event recovery
- Optimizing human machine interface (HMI) displays to support effective troubleshooting during abnormal events
- Challenging the alarm interface design to verify clarity and ease of use
- Training operators using process simulators to improve speed and accuracy of troubleshooting during abnormal events
- Periodically validating the operator's effectiveness in responding to abnormal operation and alarm events
- Managing the oversight and safety culture for desired operator action

