

# **REGULATORY ANALYSIS**

## **REGULATORY GUIDE 1.106, REVISION 2 THERMAL OVERLOAD PROTECTION FOR ELECTRIC MOTORS ON MOTOR-OPERATED VALVES**

### **Statement of the Problem**

Electric motor-operated valves used in nuclear power plants may be disabled by heat buildup in the motor internal parts. The root cause of the failures could be insulation breakdown or rotor metal damage or both. Thermal overload protection devices can be used to protect against such deficiencies by cutting off power to the motor when a condition exists where the motor is experiencing heat buildup. However, thermal overload protection devices can disable safety-related motor-operated valves and prevent the valves from actuating to fulfill a safety function. Consequently, the industry guidance must be followed to ensure that the thermal overload device does not become a source of failure. The existing guide dates to 1977 and the regulatory position is based in part on Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard 279-1971, “Thermal Overload Protection for Electric Motors on Motor-Operated Valves.” That standard has been superseded by IEEE Standard 603-2009, “Criteria for Safety Systems for Nuclear Power Generating Stations,” pointing out the need to see if Regulatory Guide (RG) 1.106 is acceptable as is, if it needs to be withdrawn, or if it should to be updated.

### **Objective**

The objective of this regulatory action is to insure the necessary guidance and criteria is available to applicants/so they can properly protect the motor-operated valve motor from excessive heat while ensuring that the motor-operated valve is not disabled by either spurious or premature trips of the thermal overload protection device, which could prevent the valve from performing its intended safety function.

### **Alternative Approaches**

The U.S. Nuclear Regulatory Commission (NRC) staff considered the following alternate approaches for RG 1.106:

- a. Do not revise RG 1.106
- b. Withdraw RG 1.106
- c. Revise RG 1.106.

#### **Alternative 1: Do Not Revise RG 1.106**

Under this alternative, NRC would not revise or issue additional guidance, and the current guidance would be retained. If NRC does not take action, no changes will result in costs or benefit to the public, licensees, or NRC. However, the “no action” alternative would not address identified concerns with the current version of the RG. NRC would continue to review each application on a case-by-case basis. This alternative provides a baseline condition from which any other alternatives will be assessed. Moreover, Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard 279-1971 referred in the regulatory position of RG 1.106, Revision 1, “Thermal Overload Protection for Electric Motors on Motor-Operated Valves,” has been superseded by IEEE Standard 603-2009, “Criteria for Safety Systems for Nuclear Power Generating Stations.” This can cause confusion among the users of the RG by referencing out-of-date standards.

## Alternative 2. Withdraw RG 1.106

Withdrawing this regulatory guide would leave a void in NRC's regulatory guidance relative to thermal overload protection of electric motors on motor-operated valves. By eliminating guidance for future applicants, the content of future applications could vary from applicant to applicant, thereby making the review of these applications more burdensome for the staff. The burden on applicants would be greater under this alternative than under Alternative 1 or Alternative 3 because applicants would spend more time preparing applications due to the lack of guidance.

## Alternative 3: Revise RG 1.106

Under this alternative, NRC would revise RG 1.106 to provide additional guidance that is clear and concise to protect the motor-operated valve motor from excessive heat while ensuring that the motor-operated valve is not disabled by either spurious or premature trips of the thermal overload protection device, which could prevent the valve from performing its intended safety function. This RG will also eliminate any margin for confusion or misinterpretation that was associated with Revision 1. This will also update the guide to the latest industry standards.

## **Comparison of Alternatives**

For Alternative 1, the benefit would be that no agency resources would be committed to revising the regulatory guide. Applicants would continue to use guidance with which many are already familiar with. They would not incur any costs needed to revise their method of implementing the guide. However, RG 1.106 would not contain the most current guidance in accordance with an industrial consensus standard.

For Alternative 2, withdrawing the guide could be done at very modest cost. The benefit would be removal of a guide that does not reflect the changes relative to an industrial consensus standard since 1971. The impact of withdrawal is significant. By eliminating guidance for future applicants, the content of future applications could vary from applicant to applicant, thereby making the review of these applications more burdensome for the staff. Likewise, due to the lack of guidance, applicants would be burdened by spending more time preparing applications than under Alternative 1 or 3.

For Alternative 3, the value to the NRC staff and its applicants in revising the guide would be the benefits associated with providing guidance consistent with the most recent version of an industrial consensus standard. The impact on the NRC would be costs associated with updating the guide along with reviewing and providing comments to the NRC during the public comment period and possible revisions to existing licensing plans.

## **Conclusion**

NRC intends to revise and issue RG 1.106, Revision 2 to enhance the licensing process and to provide guidance for compliance with the applicable regulations in 10 CFR Part 50. The staff has concluded that the proposed regulatory action will increase safety and reduce any unnecessary burden that could arise by the misinterpretation of the current guidance in RG 1.106, Revision 1. Moreover, the staff does not foresee any adverse effects associated with issuing a revision of this RG. In doing this regulatory analysis, the staff considered the components of the guide to see what the individual costs might be. The staff concluded that this RG does not have separate components in the regulatory position. Therefore the agency proposed action consists of a single technical requirement/recommendation.