



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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September 20, 2022

MEMORANDUM TO: Eric Benner, Director  
Division of Engineering and External Hazards  
Office of Nuclear Reactor Regulation

FROM: Jason Paige, Branch Chief  
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SUBJECT: INSTRUMENTATION AND CONTROLS LESSONS LEARNED  
REPORT ON BOEING 737 MAX AIRCRAFT CRASH EVENTS

A handwritten signature in black ink, appearing to read "Chris Cook".

Signed by Cook, Chris  
on 09/20/22

An Instrumentation and Control (I&C) Lessons-Learned Team has completed the enclosed summary report, "Boeing 737 Crashes: Lessons Learned for NRC Digital Instrumentation and Controls Evaluation Process." This report summarizes our review of several investigative reports about the technical and regulatory lessons learned associated with the Boeing design process and Federal Aviation Administration certification process of the Boeing 737 MAX Maneuvering Characteristics Augmentation System (MCAS). The purpose of the review was to evaluate the recommendations and findings of these reports regarding failures that led to poor implementation of MCAS and two 737 MAX aircraft crashes. The report documents the staff's evaluation of the findings and recommendations from these investigative reports and considers how applicable lessons learned could be leveraged within the NRC's digital I&C regulatory process.

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The team has determined that no significant gaps exist in the NRC's regulatory infrastructure for digital I&C licensing and inspection as related to the findings and recommendations of the investigative reports. However, the enclosed report identifies aspects of the NRC's current digital I&C regulatory program and staff organizational capabilities that should be maintained or could be further enhanced to ensure the continued safe use of evolving digital I&C technologies in regulated nuclear facilities.

The I&C team will continue to communicate and coordinate with our colleagues from the human factors, risk assessment, inspection oversight, and operational experience areas to increase awareness of the importance of these identified aspects when implementing the digital I&C regulatory program. The staff will consider the lessons and recommendations of this report during significant guidance development activities as appropriate. The staff also intends to communicate these lessons to the NRC's broader I&C community and incorporate them into the training program for I&C staff, which includes a study of major events and safety lessons relevant to I&C.

Finally, the NRC I&C community will reestablish an I&C technical review group to periodically review operational event assessments and operational experience data. This I&C review group will coordinate with our NRC operational experience colleagues as appropriate. The periodic assessments would consider operational issues or trends (if any) in digital implementation in the nuclear and other safety-focused industries, and review the lessons learned in this report, to ensure an appropriate internal safety culture and questioning attitude is maintained in our digital I&C regulatory program.

Enclosure:  
As stated

737 MAX Digital Lessons Learned Report DATE September 20, 2022

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