



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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July 8, 2022

MEMORANDUM TO: Michael X. Franovich, Director
Office of Nuclear Reactor Regulation
Division of Risk Assessment

FROM: Christian Araguas, Acting Director
Office of Nuclear Regulatory Research
Division of Risk Analysis

Christian Araguas

Signed by Araguas, Christian
on 07/08/22

SUBJECT: NUREG-2256, "INTEGRATED HUMAN EVENT ANALYSIS SYSTEM
FOR EVENT AND CONDITION ASSESSMENT"

Enclosed for your information and use is NUREG-2256 "Integrated Human Event Analysis System for Event and Condition Assessment (IDHEAS-ECA)." This report describes a human reliability analysis (HRA) method developed by the U.S. Nuclear Regulatory Commission (NRC) staff. This report is an update and replacement to an early version published as an NRC Research Information Letter RIL-2020-02.

The method is known as the Integrated Human Event Analysis System for Event and Condition Assessment (IDHEAS-ECA). It is based on NUREG 2198, "The General Methodology of an Integrated Human Event Analysis System." IDHEAS-ECA supports risk informed decisionmaking by providing an HRA method to be used in probabilistic risk assessment (PRA) applications. The NRC staff uses PRA in the review of risk-informed license amendment requests and evaluations of notices of enforcement discretion, operational events (e.g., Management Directive 8.3, "NRC Incident Investigation Program," and the accident sequence precursor program), and inspection findings (i.e., the significance determination process). IDHEAS-ECA was developed because, in recent years, the scope of application of HRA has expanded into situations beyond the scope of existing HRA methods.

IDHEAS-ECA is intended to apply to the same situations modeled by existing HRA methods (e.g., nuclear power plant internal events while at-power) and beyond (e.g., external events, low power and shutdown events, and events for which flexible and coping strategies (FLEX) equipment is used). The IDHEAS-ECA method provides step-by-step guidance for analyzing a human action and its context. It models a human action by using five macrocognitive functions: *Detection*, *Understanding*, *Decisionmaking*, *Action execution*, and *Inter-team coordination*. The failure of a human action is modeled with a set of cognitive failure modes and

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performance-influencing factors, which are then used to calculate the human error probability (HEP). The IDHEAS-ECA method includes a software tool that facilitates the documentation of the analysis of a human action and uses the results of the analysis as input to calculate the HEP. IDHEAS-ECA uses human error data documented in an NRC HRA database (referred to as IDHEAS-DATA) as the basis for HEP calculation.

Please contact Jing Xing from my staff if you have any questions regarding this report.

Enclosure:
As Stated

NUREG-2256 INTEGRATED HUMAN EVENT ANALYSIS SYSTEM FOR EVENT AND CONDITION ASSESSMENT" DATE July 8, 2022

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