



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 29, 2024

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

FROM: Christian Araguas, Director *Christian Araguas* Signed by Araguas, Christian
Division of Risk Analysis on 04/29/24
Office of Nuclear Regulatory Research

SUBJECT: RESEARCH INFORMATION LETTER (RIL) 2024-04, "HUMAN
RELIABILITY ANALYSIS FOR CALCULATING EFFECTS OF
PERFORMANCE INFLUENCING FACTORS: A REVIEW OF
HISTORICAL APPROACHES"

Enclosed for your information and use is Research Information Letter (RIL) 2024-04, "Human Reliability Analysis for Calculating Effects of Performance Influencing Factors: A Review of Historical Approaches."

RES developed the Integrated Human Event Analysis System for Event and Conditional Assessment (IDHEAS-ECA) human reliability analysis (HRA) method by the direction of SRM-M140529 "the staff should develop application specific guidance as part of its Integrated Decision-tree Human Event Analysis System (IDHEAS) project." The ACRS recommended the Commission (ADAMS Accession No. ML21076A421) that "IDHEAS-ECA provides a specific derived application... Peer review is needed."

This report captures research completed by Pacific Northwest National Laboratory (PNNL) under contract by RES/DRA, to evaluate whether technical discrepancies between IDHEAS-ECA and various existing HRA methods in modeling performance influencing factors (PIFs) cutdown IDHEAS-ECA's technical basis. Specifically, IDHEAS-ECA uses addition to combine multiple PIFs' effects on human error probabilities (HEP) while other HRA methods rely on multiplication to account for the combined effects; and IDHEAS-ECA distinguishes two types of PIF effects (base HEP and multiplier) while others only have multiplier.

PNNL interviewed the developers of the HRA methods of interest and concluded that their PIF models follow a legacy practice and do not have sound technical bases against IDHEAS-ECA's PIF model, which was supported by a few meta studies and data analyses.

CONTACT: Y. James Chang, RES/DRA/HFRB
301-415-2378, James.Chang @nrc.gov

The staff intends to move forward with posting this document on NRC's RIL public website 14 days after the date of this memo.

Please notify the responsible staff contact if you have any questions concerning the impending publication of this report.

Enclosure: RIL 2024-04

RIL 2024-04 HRA Methods for Calculating Effects of PIFs-Review of Historical Approaches DATE April 29, 2024

DISTRIBUTION:

MReisi-Fard, RES/DRA
 JEvans, NRR/DRA
 KCoyne, NMSS/REFS
 KDickerson, RES/DRA/HFRB
 CHunter, RES/DRA/PRB
 LEnos-Sylla, RES/DRA/PRAB
 JXing, RES/DRA/HFRB
 JGrasso, OCHCO/ADHRTD/NRANB
 MKhanna, NRR/DRA
 SWeerakkody, NRR/DRA
 MKichline, NRR/DRA/APOB
 JHanna, R-III/DRP
 QPan, RES/DRA/PRAB
 EO'Donnell, RES/DE/RGGIB

ADAMS Accession No.: ML24089A051; ML24089A053

| | | | | |
|--------|--------------|---------------------|--------------|--------------|
| OFFICE | RES/DRA/HFRB | NRR/DORL/LPMB | NRR/DRA/APOB | RES/DRA |
| NAME | YHsien | YH MValentin-Olmeda | MV AZoulis | AZ CAraguas |
| DATE | Apr 1, 2024 | Apr 1, 2024 | Apr 4, 2024 | Apr 29, 2024 |

OFFICIAL RECORD COPY