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

April 1, 2022

MEMORANDUM TO: Christopher Regan, Director
                   Division of Reactor Oversight
                   Office of Nuclear Reactor Regulation

FROM: Mark Thaggard, Director   Signed by Thaggard, Mark
                   Division of Risk Analysis   on 04/01/22
                   Office of Nuclear Regulatory Research

SUBJECT: RESEARCH INFORMATION LETTER
                   (RIL 2020-07) "COGNITIVE TASK ANALYSIS TECHNICAL
                   BASIS AND GUIDANCE DEVELOPMENT"

The Office of Nuclear Regulatory Research (RES) is providing for your information and use Research Information Letter (RIL) report, "Cognitive Task Analysis Technical Basis and Guidance Development" (RIL 2020-07). This report presents an overview of the cognitive task analysis approach, detailed summaries of the various cognitive task analysis methods, and how they may be useful in the nuclear domain. This RIL also provides a roadmap for suggested updates to existing NRC human factors engineering (HFE) guidance, namely Human Factors Engineering Program Review Model (NUREG-0711) for the integration of cognitive task analysis perspectives and techniques. This RIL represents challenges for HFE reviews that may arise in advanced reactor designs. Publication helps NRC remain current with state-of-the-art human factors principles (required by 10 CFR 50.34) and supports development of innovative designs.

As control rooms shift towards digital systems and missions become more diverse and complex, the operator's role shifts from physical action towards cognitive work and supervisory control. The result of these changes is that the labor of operators becomes less physical and more mental, which requires a reexamination of the methods used to describe operator tasks and assess task load. Cognitive task analysis (CTA) is a broadly applicable set of tools that have a well-established history in other domains that have made the same shift from analog to digital and from physical to supervisory control. This historical context suggests that CTA, when thoughtfully applied, will aid system designers in developing instrumentation and controls and human system interfaces that successfully account for the mental load those systems induce.

CONTACT: Kelly Dickerson, RES/DRA/HFRB
            301-415-3917

C. Regan   -2-

Task analysis (addressed in NUREG-0711) identifies the specific tasks needed to accomplish human actions, and the information, control, and task support required to complete those tasks. CTA is a task analysis method that is well-suited to the development and analysis of advanced reactor designs where support for operator cognitive activities is the principal concern. CTA is not addressed in existing NRC guidance. The RIL establishes a technical basis for assessing use of CTA by licensees in design development. The guidance suggested in this RIL will have near-term utility in supporting the evaluation of future plant designs.

RES has worked closely with NRR to ensure that the cognizant staff members from each organization were satisfied with the quality and completeness of the work products prior to transmittal of the final report. We expect that this close working relationship will continue.

RES has established an online quality survey to collect feedback from user offices on the usefulness of RES products and services. This survey can be found online at this hyperlink.

RES would appreciate the responsible manager or supervisor completing this short—about 5 minutes—survey within the next 10 working days to present your office's views of the delivered RES product.

Enclosure:
RIL 2020-07; Cognitive Task Analysis
Technical Basis and Guidance Development

Memo to Christopher Regan - RIL2020-07 Cognitive Task Analysis DATE April 1, 2022

DISTRIBUTION:
CRegan, NMSS/DFM
NHughes, RES/DRA/HFRB
RFurstenau, RES
LNist, NRR/DRO/IOLB
BGreen, NRR/DRO/IOLB/HFT
DDesaulniers, NRR/DRO
JSeymour, NRR/DRO/IOLB/HFT
JVazquez, NRR/DRO/IOLB/HFT
DKi, NRR/DRO/IOLB/HFT
KMartin, NRR/DRO/IOLB/HFT
EO'Donnell, RES/DE/RGGIB
SFleger, RES/DRA/HFRB

ADAMS Accession No.: ML22087A401; Memo ML22087A405

OFFICE	RES/DRA/HFRB	RES/DRA		
NAME	KDickerson *KD*	MThaggard *MT*		
DATE	Mar 31, 2022	Apr 1, 2022		

OFFICIAL RECORD COPY