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Comment On: NRC-2019-0062-0310

Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors

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General Comment

Attached please find our letter commenting on 10CFR53.710, Human Role

Attachments

Proposed 10CFR53 730 Human Role

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January 28, 2025
Regulations.gov NRC-2019-0062-0310

Mr. Christopher Regan
Director - Division of Rulemaking, Environmental, and Financial Support
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Subject: Human Role - Proposed 10CFR53.730

The Nuclear Regulatory Commission (NRC) has requested comments on the proposed risk-informed, performance-based, and technology-inclusive regulatory framework for commercial nuclear plants known as Part 53 of the Code of Federal Regulations (CFR). This correspondence involves 10CFR53.730 Human Role.

As a general remark, the proposed section is an example of NRC Staff attempts to manufacture new requirements never previously employed, as we observed in a number of earlier letters. In our opinion, the staff needs to fully embrace Congressional direction to efficiently modernize the nuclear licensing process and abandon their heavily prescriptive ways of the past.

The NRC staff is effectively proposing to control all aspects of plant operations with no sound reason for taking such an approach. The inevitable result will be stifling on-going attempts to improve the man-machine interface, with the plant locked into archaic interfaces improperly mandated by the NRC staff. That is more or less the situation involving the current fleet of reactors.

We are also of the opinion that the NRC staff is overly fixated on manual reactor operations. The vast majority of operations occur using automatic control systems, augmented by in-depth procedural controls, as ultimately backstopped by the automatic operation of the reactor protection system. In our opinion, overemphasizing reactor operator roles diminishes plant safety because the management prerogative to protect the asset is short-circuited by unnecessary bureaucratic regulations that place reactor operators at the pinnacle of control. The operators work for the plant owners and their positions cannot subvert management rights. Management level skills are not normally expected with plant operators, as their expertise lies with day-in-and-day-out running of the plant. This observation will be expanded upon in separate correspondence.

We have proposed complete deletion of the proposed 10CFR53.730 owing to undue complexity, existence of other 10CFR53 elements that already address the germane issues, and potential legal problems as detailed in attachment (1).

Regards,

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January 28, 2025
Regulations.gov NRC-2019-0062-0310

A small business of the state of Kansas developing patented advanced reactor energy plants.

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Attachment (1): Detailed Comments – 10CFR53.730

This correspondence constitutes notification that our firm is likely to suffer serious financial harm if the regulation is enacted as currently constituted.
Suggested remedies are included in this correspondence.



January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

Original proposed text, **RECOMMENDED MODIFICATIONS**, recommended deletions.

§ 53.730 ~~Human Role.~~

~~Defining, fulfilling, and maintaining the role of personnel in ensuring safe operations.~~

~~Each applicant for or holder of an OL or COL for a commercial nuclear plant under this part must comply with the following:~~

~~(a) *Human factors engineering design requirements.* The plant design must reflect state-of-the-art human factors engineering principles for safe and reliable performance in all locations that human activities are expected for performing or supporting the continued availability of plant safety or emergency response functions.~~

~~(b) *Human system interface design requirements.* The plant design must provide for the following to support operating personnel in monitoring plant conditions and responding to plant events:~~

~~(1) Features for displaying to operating personnel a minimum set of parameters that define the safety status of the plant and are capable of displaying both the full range of important plant parameters and data trends on demand, as well as indicating when process limits are being approached or exceeded;~~

~~(2) Automatic indication of the bypassed and operable status of safety systems;~~

~~(3) Direct indication of SSC status that relates to the ability of the SSC to perform its safety function, such as relief and safety valve position (*i.e.*, open or closed) for barriers important to fulfilling safety functions of with such devices, and ultimate heat sink and cooling system status and availability;~~

~~(4) Instrumentation to measure, record, and display key plant parameters related to the performance of SSCs and the integrity of barriers important to fulfilling safety functions to support operators in monitoring plant conditions and responding to plant events. Examples include temperatures and pressures within important systems or structures, core or fuel system conditions (including possible damage states), temperatures and levels associated with cooling functions, combustible gas concentrations, radiation levels in systems and within structures, and radioactive effluent releases;~~

~~(5) Leakage control and detection in the design of systems that pass through barriers important to fulfilling safety functions for the release of radionuclides. An example is an SSC that penetrates a containment structure that might contain radioactive materials that could contribute to the source term during an accident;~~

~~(6) Monitoring of in-plant radiation and airborne radioactivity as appropriate for a broad range of normal operating and accident conditions; and~~

~~(7) For self-reliant mitigation facilities, the plant design must also provide the generally licensed reactor operators with the capability to do the following:~~

~~(i) Receive plant operating data, including reactor parameters and information needed for the evaluation of emergency conditions.~~

~~(ii) Immediately initiate a reactor shutdown from their location.~~

~~(iii) Promptly dispatch operations and maintenance personnel.~~

~~(iv) Immediately implement responsibilities under the facility emergency plan, as applicable.~~

~~(c) *Concept of operations.* A concept of operations that is of sufficient scope and detail to address the following must be provided:~~

~~(1) Plant goals;~~

~~(2) The roles and responsibilities of operating personnel and automation (or any combination thereof) that are responsible for completing plant functions;~~

~~(3) Staffing, qualifications, and training;~~

~~(4) The management of normal operations;~~



January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

- ~~(5) The management of off-normal conditions and emergencies;~~
- ~~(6) The management of maintenance and modifications; and~~
- ~~(7) The management of tests, inspections, and surveillances.~~
- ~~(d) *Functional requirements analysis and function allocation.* A functional requirements analysis and a function allocation must be provided that are sufficient to demonstrate compliance with the following:~~
 - ~~(1) The functional requirements analysis must address how safety functions and functional safety criteria are satisfied, and~~
 - ~~(2) The function allocation must describe how the safety functions will be assigned to human action, automation, active safety features, passive safety features, and/or inherent safety characteristics.~~
- ~~(e) *Operating experience.* A program, during construction and during operation, as applicable, for evaluating and applying operating experience must be developed, implemented, and maintained.~~
- ~~(f) *Staffing plan.* A staffing plan must be developed and comply with the following:~~
 - ~~(1) The staffing plan must include a description of how engineering expertise will be available to the on-shift operating personnel during all plant conditions, to assist if they encounter a situation not covered by procedures or training. Engineering expertise includes familiarity with the operation of the plant for which the expertise is provided and one of the following:
 - ~~(i) A bachelor's degree in engineering, engineering technology, or physical science from an institution accredited by a U.S. government recognized accrediting body or equivalent; or~~
 - ~~(ii) A Professional Engineer's license from a U.S. State or territory.~~~~
 - ~~(2) Applicants for or holders of OLs or COLs for interaction-dependent mitigation facilities must include within their staffing plans a description of how the proposed numbers, positions, and qualifications of operators and senior operators across all modes of plant operations will be sufficient to ensure that plant safety functions will be maintained. This description must be supported by human factors engineering analyses and assessments.~~
 - ~~(3) Applicants for or holders of OLs or COLs for self-reliant mitigation facilities must include within their staffing plans a description of how generally licensed reactor operator staffing that is both sufficient to continually monitor the operations of fueled reactors and to provide for a continuity of responsibility for facility operations at all times during the operating phase will be maintained.~~
 - ~~(4) Applicants for or holders of OLs or COLs under this part must include within their staffing plans a description of how the numbers, positions, and responsibilities of personnel contained within those plans will adequately support all necessary functions within areas such as plant operations, equipment surveillance and maintenance, radiological protection, chemistry control, fire brigades, engineering, security, and emergency response.~~
 - ~~(5) The staffing plan must be approved by the NRC as part of its approval of the OL or COL for the plant. The approved staffing plan is subject to the requirements of § 53.1565.~~
- ~~(g) *Training, examination, and proficiency programs.* Develop, implement, and maintain programs that comply with the following requirements. These programs must be approved by the NRC as part of its approval of the OL or COL for the plant:~~
 - ~~(1) For those applicants for or holders of OLs or COLs for interaction-dependent mitigation facilities:
 - ~~(i) The operator licensing initial training program required under § 53.780(a);~~
 - ~~(ii) The operator licensing initial examination program required under § 53.780(b);~~
 - ~~(iii) The operator licensing requalification program required under § 53.780(c); and~~
 - ~~(iv) The operator proficiency program required under § 53.780(g).~~~~



January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

~~(2) For those applicants for or holders of OLS or COLs for self-reliant mitigation facilities, the generally licensed reactor operator training, examination, and proficiency programs required under § 53.815.~~

~~(3) The operator licensing requalification programs required under § 53.780(c) or § 53.815(b) must be implemented upon commencing the administration of initial examinations under the operator licensing examination program required under § 53.780(b) or § 53.815(b), respectively.~~

NRC Staff Justification

Section 53.730 would provide performance-based and technology-inclusive requirements for assessing the role of personnel in facility safety, applying human-system considerations within facility design, and incorporating operational approaches that are consistent with design-specific safety considerations. Most of these requirements would be adapted from portions of §§ 50.34(f) and 50.54 and 10 CFR part 55, "Operators' Licenses," with considerable modification in order to reflect the introduction of new technologies and possible changes in the roles of personnel in preventing and mitigating events. The NRC is proposing that these technical requirements would, together, serve as a component of the required content of applications for OLS and COLs under part 53. Additionally, the NRC proposes that the specific technical requirements associated with HFE, human-system interface design, concept of operations, functional requirements analysis, and function allocation would serve as a component of the required content of applications for standard DCs, standard design approvals, MLs, and CPs, as well.

Human factors engineering is essential to facilitate the role of personnel in facility safety in a manner that is both effective and reliable. The NRC proposes to adapt § 53.730(a) from the HFE design requirements of § 50.34(f)(2)(iii). A key difference would be that the requirement would now be focused on settings where personnel fulfill their safety or emergency response roles wherever they may occur. The NRC additionally proposes to include within the scope of this requirement activities for assuring the continued availability of plant equipment that is needed for safety, and envisions that this may encompass relevant maintenance, inspections, and testing as well. The NRC intends that this requirement would be associated with staff guidance for conducting scalable reviews of HFE that is planned to accompany part 53.

Human-system interfaces provide vital information to operators across a spectrum of operating conditions that can range from normal operations through severe accident conditions. The specific types of information that must be available to support operations staff during such conditions include, in part, those associated with safety function parameters, safety system status, possible core damage states, barrier integrity, and radioactive leakage. Due to the importance of such information, the NRC proposes under § 53.730(b) to require such human-system interface design features for all facilities, irrespective of other flexibilities proposed under part 53. Therefore, the NRC proposes to adapt specific post-Three Mile Island requirements of § 50.34(f) in a technology-inclusive manner as detailed in the following:

- Paragraph (b)(1) would be adapted from § 50.34(f)(2)(iv).
- Paragraph (b)(2) would be adapted from § 50.34(f)(2)(v).
- Paragraph (b)(3) would be adapted from § 50.34(f)(2)(xi), 50.34(f)(2)(xii), and 50.34(f)(2)(xxi).
- Paragraph (b)(4) would be adapted from § 50.34(f)(2)(xvii), 50.34(f)(2)(xviii), 50.34(f)(2)(xix), and 50.34(f)(2)(xxiv).
- Paragraph (b)(5) would be adapted from § 50.34(f)(2)(xxvi).
- Paragraph (b)(6) would be adapted from § 50.34(f)(2)(xxvii).

In addition to the requirements of § 53.730(b)(1) through (6), a further set of human-system interface design requirements applicable only to those facilities that will be staffed by GLROs would be provided under § 53.730(b)(7). This prescriptive set of design requirements for those facilities which demonstrate compliance with the criteria of § 53.800 would recognize that the application of HFE under § 53.730(a) is anticipated to be significantly reduced at such facilities in the absence of an expected operator role for the fulfillment of safety functions. However, it should be noted that the capability for an immediately initiated, manual reactor shutdown would be conservatively mandated irrespective of any other design considerations.

The NRC proposes § 53.730(c) to require the submittal of a concept of operations that is of sufficient scope and detail to appropriately inform the staff. The development of a concept of operations can facilitate a clear



January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

understanding on the part of the NRC for potential novel operating concepts. Additionally, such information is likely to reduce the degree of resources and interactions needed for the NRC to obtain the understanding necessary to enable flexible requirements in areas such as staffing, operator qualifications, and HFE. The NRC proposes § 53.730(d) to require the submittal of both a Functional Requirements Analysis and a Function Allocation. The identification of design-specific safety functions and how they are fulfilled serves as a primary means for achieving technology-inclusive requirements within areas such as staffing, operator qualifications, and HFE. The Functional Requirements Analysis and Function Allocation processes (which are both HFE methods derived from systems engineering principles), provide an effective means to identify both how safety functions will be satisfied and how to characterize any associated operator role in doing so. A Functional Requirements Analysis shows what features, systems, and human actions are relied upon to demonstrate safety (*i.e.*, fulfill safety functions). A Function Allocation then describes how safety functions are assigned to both personnel and automatic systems. However, an important adaptation of the Function Allocation for use under the proposed rule would be the further need to not only describe allocations of safety functions to human action and automation, but also to identify allocations made to active safety features, passive safety features, or inherent safety characteristics as well.

Operating experience provides an important source of information by which to inform various aspects of facility design and operations. Accordingly, the NRC proposes in § 53.730(e) to adapt the requirements of § 50.34(f)(3)(i) for requiring an operating experience program.

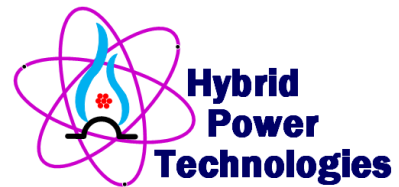
New technologies may involve concepts of operations that are more conducive to customizable licensed operator staffing requirements than the prescriptive requirements of § 50.54(m). Analyses and assessments that are based on HFE principles provide a performance-based means of determining licensed operator and senior operator staffing needed to support safe operations. In contrast, for those facilities required to be staffed by GLROs, the NRC anticipates that the operator staffing plans will reflect a simpler approach of showing that a continuity of responsibility will be maintained for facility operations throughout the operating phase, with at least one GLRO providing continuous oversight and remaining immediately available when any units are fueled. Additionally, a revised approach to the traditional position of the shift technical advisor that focuses on the availability of engineering expertise as a means of addressing uncertainties and abnormal circumstances is more suitable within the context of part 53 and is intended to be applicable to all facilities, irrespective of other design and staffing considerations.

Consistent with this approach, the NRC proposes under § 53.730(f) to require the submittal of a staffing plan that details operations staffing, how engineering expertise will be provided, and what staffing will be available to provide other needed support functions. The NRC intends that this requirement would be associated with staff guidance for reviewing operations staffing plans that is planned to accompany part 53 and that, following NRC approval of the OL or COL, the staffing plan would become a condition of the facility license. The NRC intends that, at a minimum, the approved licensed operator and senior operator (or, if applicable, GLRO) staffing, positions, and personnel locations will be incorporated into corresponding requirements within the facility TS and that a license amendment would thus be required for any subsequent changes.

Operator training and qualification programs provide an essential component of supporting human performance in implementing tasks with safety implications. Such programs must include components that cover the stages of initial training, examination, and continuing training. Additionally, recognizing the potential for varying concepts of operations to affect traditional, prescriptive approaches to operator proficiency, the NRC proposes under part 53 to allow facilities to develop operator proficiency programs based on facility-specific considerations.

Therefore, the NRC proposes in § 53.730(g)(1) to require approval as part of its approval of the OL or COL, of the programs that will be used for the initial training, initial examination, requalification training and examination, and proficiency of both licensed operators and senior operators. In a corresponding manner, the NRC proposes in § 53.730(g) (2) to require approval of the programs that will be used for the GLRO equivalents of each of these programs for facilities with such staffing. The NRC intends that examination program requirements would be associated with staff guidance for the review of tailored examination processes that are planned to accompany part 53. Following the completion of an initial training program, continuing training programs provide an important means of sustaining the knowledge and abilities of

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January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

individuals. The NRC is proposing to adapt the requirements of § 50.54(i-1) in § 53.730(g)(3) to require that operator continuing training programs be in effect to support operator performance. Under part 53, the NRC proposes to require these programs to be in effect concurrent with when the initial operator examinations first commence, in effect putting the programs in place only when they are needed. This represents a modification of the comparable requirement of § 50.54(i-1), which links the commencement of these programs to a timeline driven by the licensing of the facility.

The authorization to manipulate controls of the facility that directly affect reactivity or power level is restricted to individuals who are either licensed operators, licensed senior operators, or GLROs. However, for practical purposes, situations in which an individual is participating in an approved training program or reestablishing proficiency may also call for them to operate the controls of the facility under the cognizance of a licensed individual. The NRC is proposing to adapt the requirements of § 55.13 in § 53.735 to accomplish this, with a notable difference being the incorporation of GLROs.

HYBRID PWR COMMENTS.

As a general remark, the NRC staff is manufacturing new requirements that do not exist in the current 10CFR50. References to 50.34 are inappropriate for justifications as the cited CFR elements involve the content of Safety Analysis Reports, not the specification of the details of operational programs. In our opinion the proposed section is an egregious example of empire building while being out of proportion risk.

As a general remark, the proposed section is decoupled from the risk informed requirements of the Nuclear Modernization Act of 2019. More to the point, the NRC staff is attempting to interfere with routine plant operations based on the dubious assumption that such efforts require in-depth regulatory oversight and control of plant operators. Reactor operations involve automated systems, with the impacts of control rod manipulation inherently limited by the control systems, not the operators. The NRC staff is overly fixated on human actions that are not particularly that risk significant.

As currently configured, the entire section is unbounded with no success criteria, and that subjects the applicant to all-manner of costly and unnecessary burdens dealing with the whims of the staff. In our opinion, the NRC Staff is imposing illogical requirements that wash through all facets of the regulatory process. Such an approach is outside the law concerning reasoned decision making - see Michigan v. EPA, 576 U.S. 743, 750 (2015). The proposed requirements are of doubtful legality and should be removed.

As a general remark, we have previously advised of serious issues involving “human factor” in guidance document concerns (see our letter of July 23, 2023, DANU-ISG-2022-05 Human Systems Considerations, Regulations.gov NRC-2022-0074 thru 0082). The NRC Staff should abandon attempts to build a new bureaucratic empire involving human factors.

As a general remark, a number of the proposed elements of 10CFR53.730 involve design considerations that more properly belong in other sections, provided there is a reasonable link to being risk informed.

As a general remark, normal operation of the facility does not merit NRC undue oversight. Rather, the risk lies with limiting design basis events and that is where the regulatory emphasis should be directed.

As a general remark, the NRC staff appears to be heavily invested in attempting to add requirements that have no precedence in 10CFR50. The NRC staff justification appears to be some form of a marketing campaign.

§ 53.730 (a) Human factors engineering design requirements. Unclear why the NRC staff is attempting to control the design process from a CFR section involving operations. There are no current requirements in 10CFR50 involving the proposed element. The NRC staff requirements are open ended with no discernable acceptance criteria. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA,



January 28, 2025
Regulations.gov NRC-2019-0062-0310

Attachment (1): Detailed Comments – proposed 10CFR53.730

576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed. Delete this section in its entirety.

§ 53.730 (b) Human system interface design requirements. Unclear why the NRC staff is attempting to control the design process from a CFR section presumably involving operations. There are no current requirements in 10CFR50 involving the proposed element. The NRC staff requirements are open ended with no discernable acceptance criteria. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed. Delete this section in its entirety.

§ 53.730 (c) Concept of operations. The NRC staff requirements are open ended with no discernable acceptance criteria. There are no current requirements in 10CFR50 involving the proposed element. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed.

§ 53.730 (d) Functional requirements analysis and function allocation. The design process, which employs consensus industry/codes standards, inherently involves evaluating the need for instrumentation, controls, automation, and the man-machine interfaces. There are no current requirements in 10CFR50 involving the proposed element. The proposed section subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed.

§ 53.730 (e) Operating experience. The NRC staff requirements are open ended with no discernable acceptance criteria. There are no current requirements in 10CFR50 involving the proposed element. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed.

§ 53.730 (f) Staffing Plan. Unclear why the NRC staff is attempting to control how the entire facility is staffed. There are no current requirements in 10CFR50 involving the proposed element. The NRC staff requirements are open ended with no discernable acceptance criteria. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed. As a general observation, modern power plants are heavily automated, with man-machine considerations a part of the design process. Staffing needs are generally based on the level of plant automation. However, the NRC staff is attempting to balloon staffing levels based on the manufacturing of “humans factors” requirements decoupled from ris..

§ 53.730 (g) Training, examination, and proficiency programs, Unclear why this section exists, as 53.815 and 53.830 cover the topic. The NRC staff requirements are open ended with no discernable acceptance criteria. Subjects the applicants to the whims of the staff with no particular linkage to risk informed, contrary to Nuclear Modernization Act of 2019. Example of ill-defined requirements that are outside of reasoned decision making (see Michigan v. EPA, 576 U.S. 743, 750 (2015)). The proposed requirements are of doubtful legality and should be removed.