

Executive Summary:

Second paragraph fourth line, " support workers to perform **routine** work". Absolutely nothing performed in an NPP should be considered "routine". Use of the word in day to day activities can lessen one's hazard recognition. Long been a reviled word in American HU parlance. Never heard a US NRC representative use this word, I would have coached them if I did. Suggest you replace "routine" with "repetitive" or something similar.

Fourth paragraph, "graded approach to implementing a human performance program, where licensees may tailor their program to the specific risks and characteristics of the individual facility or activity". Certainly true in some aspects of HU, such as pre job briefs, but be careful with this logic. Give specific examples and a suggested framework. Management may be tempted to use a graded approach that benefits productivity at the expense of risk management.

Human Performance [page two] " Why Does Human Performance Matter?

Third and fourth paragraph use the dreaded word routine. See executive summary suggested changes.

Human Performance [page two, three, 2.]

HU can be considered as "the behaviors and the results of human activities when carrying out work tasks". This is the very dated (and erroneous) definition of HU, as represented in $P = B + R$. You are correct in noting we can get good results with bad behaviors. But if true the regulator will never see/know it. You'll be influenced by management feedback that the HU program is working because we achieve positive results. Each delta/deviation will be focused on individual failure/non compliance. The piece that's missing from the definition? Sustainability. By a new HU definition, of say, Performance = Behaviors + Results that yield sustainability, you reduce managements focus on individual errors and heighten attention to system weaknesses that drive undesired results.

Human Performance and Human Factors [Page 4, third paragraph]

Use of the word "routine" again.

Q2. Propose any changes to HU factors definition:

In one section only in the white paper I saw the term "defence in depth". Otherwise it's mostly silent in DIS – 16 – 05. Understand you will never, ever have a nuclear safety/HU event driven solely by individual error. Events are ALWAYS a weakness in managed defenses (defense in depth). The exceptions are industrial safety events, which are commonly caused by individual rules violations. The one major defense that's lacking in the examples given? Walkdowns, both tabletop governance and source document reviews, and field walkdowns. Effective walkdowns identify risk and contradictions in advance. An effective walkdown would have identified any weaknesses in five of the bulleted items on the list of examples.

Human Performance Program, [page 4, 4.]

Last paragraph, last line, the word 'routine' again.

Human Performance Program [page 5]

The list of objectives should include, " An effective observation program that effectively shapes positive behaviors (or words to that effect).

The list of practices should include, "consistent consideration and application of managed defenses for risk significant steps and activities".

Elements of a Human Performance Program [page 6]

Q 4. Change twelfth bullet to, " safety analysis that reviews both human actions and the applied defense in depth".

Q 5. No suggested changes

7. Human Performance and Management Systems [page 8, third paragraph]

"A human performance program may be a documented but less formal road map". Danger, informality breeds inconsistency. I would recommend deleting this and requiring an HU program be a formal program. You will see licensees with formal HU programs outperform those with "less formal" road maps.

8. Graded Approach

Q 6. I can see certain elements of an HU program applying a graded approach, (e.g. pre job briefs) and would restrict "graded approach" to those internal elements of an HU program but not to the HU program itself.

Q 7. I'm of the opinion each Canadian licensee should apply a formal HU program. The elements of that program may vary licensee to licensee, but as previously stated informality breeds inconsistency, resulting in inconsistent performance. How would a regulator accurately assess those with informal programs? Which rules/requirements were not adhered to? Makes your job a lot harder.

Q8. Add critical step identification to range of factors considered.

Addendum:

The last truly meaningful change in the American nuclear power approach to HU occurred September 1996 (John Summers, INPO). The concept of $RE + MD = Oe$ (reducing individual errors plus managed defenses yields no events). This addition dramatically and positively shaped our approach to event prevention. Please see the INPO reference manual for details. While a good document, DIS – 16 – 05 is virtually silent on defense in depth. As written, it's more than a few years behind established and accepted approaches to human error/event prevention.