

Tabletop Human Factors Engineering (HFE) Example Background

The single example provided below is intended to be the complete LAR submittal for HFE, at the expected level of detail to be provided. The License Amendment Request (LAR) content starts at the heading “HFE Evaluation of the RTS, ESF, and PPS Modernization with Minor MCR Modification” below. The materials provided up to the header provide a context for this example, which would normally be provided by the rest of the LAR.

This example is loosely based on the Diablo Canyon Reactor Trip System (RTS) and Engineered Safety Features (ESF) LAR, with additions and modifications to provide HFE examples beyond just the Maintenance and Engineering interface with the Engineering Work Station (EWS). The changes in the example include modernizing the Plant Protection System (PPS), which is a difference from Diablo Canyon. The following assumptions provide the background which would be in the rest of the LAR:

1. The LAR is focused on the replacement of the RTS and ESF channels and the PPS divisions.
2. The replacement requires only minor changes in the Main Control Room (MCR) Human-Systems Interface (HSI). There are no meters added by this modification. There are no safety related flat panels or video display units added by this modification. There is no aggregation of safety information. Non-safety related information from the safety system is displayed in the non-safety related Plant Process Computing System. This LAR does not install automated procedures.
3. No existing manual function controls are moved or eliminated.
4. There are no changes to the system safety functions or to the safety related operator task/function assignments, including changing functions from manual to automatic or automatic to manual, which is a difference from Diablo Canyon.
5. There are new processes and implementing procedures that replace the existing procedures for surveillance testing and equipment calibration, including the EWS.
6. There are new as well as revised alarm response procedures to deal with the changes in the system’s architecture and enhanced self-test and diagnostics capabilities.
7. There are no procedure changes for off-normal conditions resulting from this change.
8. The Maintenance and Engineering workstation has been evaluated by the licensee for its intended purpose.

The following document the changes, or reaffirms the lack of change, in the Main Control Room for the replacement:

1. The existing bypass switches remain. Additional bypass switches will be added to reflect the architecture and capability changes provided, which may result in switch layout changes.
2. The existing discrete indicators remain. Any remaining incandescent bulbs in the entire Main Control Room will be replaced with light emitting diodes (LEDs). Some new discrete indicators will be installed.

3. The existing panel meters will not be changed in any way by this LAR.
4. The existing Bypassed Indication and Status Indication (BISI) is rearranged slightly. The rearrangement will consider the new indication to be provided on the Vertical Board.

The ISG-06 discussion does not define a location for such additional materials. The licensees could spread HFE at appropriate locations throughout the LAR, which may be appropriate and required for LARs that have major HFE implications. The licensee should place this limited HFE evaluation in a single location, perhaps after the New System Architecture in D.2.2 or New Functions in D.2.3. The potential location of this text should consider the document flow to incorporate the HFE discussion.

HFE Evaluation of the RTS, ESF, and PPS Modernization with Minor MCR Modification

There are no changes to any important human actions (i.e., operator actions credited in the D3 analysis or credited in the design bases analyses described in FSAR Chapter 15) so no HFE Evaluations are required.

If the digital I&C modification adds or changes important human actions, then the appropriate human factors evaluations would be performed.