

# Human Factors Engineering Analysis Tool

A new software tool enables the easy and quick selection of applicable regulatory guidelines as a starting point for human factors engineering (HFE) analyses. Once selected, each guideline can be viewed on screen. The software tracks and reports the status of HFE analyses and may be accessed simultaneously by multiple users.

## Background

One of the human factors engineering standards used in the design of human-system interfaces for process control systems at the Savannah River Site is NUREG 0700, "Human-System Interface Design Review Guidelines," issued by the Nuclear Regulatory Commission (NRC). NUREG 0700 includes over 1,650 distinct guidelines. NRC provides a software tool, the Design Review Guide, to assist in the NUREG 0700 guideline analysis process. However, the burden for selecting which of the 1,650 guidelines are applicable to a given process is placed on the user. Manual selection of appropriate guidelines can be tedious. It also can lead to inconsistencies among analyses due to different user preferences or interpretations.



## Guidelines are presorted by applicability

In developing the Human Factors Engineering Analysis Tool (HFE-AT), a team of HFE subject matter experts reviewed and categorized all 1,650+ NUREG 0700 guidelines.

The Guidelines were sorted into the following categories:

- System technical applicability (computer based or non-computer based).
- System functional applicability (safety basis or non-safety basis).

The guidelines also were sorted by the following types:

- General concept: highest level or most general description of a topic that is common to two or more guidelines.
- Supporting detail: guidelines that address specific details associated with general concepts.
- Stand-alone: any other guideline that is sufficiently important to be considered individually.

## Graded approach used to select guidelines

The selection of type is dependent on the selection of category. For example, supporting detail guidelines will only be selected for safety basis analyses. This system default mode can, however, be overridden by the user who may view and select specific supporting details for non-safety basis analyses.

The user also can enter specific user-defined guidelines in addition to the preloaded guidelines.

As an example of its inherent efficiency, the FHE-AT software consistently selects only 620 of the NUREG 0700 guidelines as a starting point for typical analyses involving computer-based, non-safety basis process control systems.

## at a glance

- automates guideline selection
- uses a graded approach
- increases efficiency and consistency of analysis
- enables multiple users to perform simultaneous analyses
- tracks status of analyses
- copyrighted

## Tracks HFE Analysis

Once the guidelines are selected, the HFE-AT software allows the user to view each selected guideline to analyze compliance of the process control system, structure, or component with the guideline. The user then clicks one of the following status option buttons to record the results of the analysis:

- Not Stated
- Hold
- Discrepancy – Analysis Required
- Not Applicable
- Discrepancy – Use As Is
- Compliant

The user can record comments and/or attach electronic documents to support the selected status. For example, a dispositioned nonconformance report can be attached to support a status of “Discrepancy – Use As Is.” Multiple users can access HFE-AT over a network to expedite guideline reviews.

## Extra Features are user-friendly

An automated guideline status report displays the total number of applicable guidelines by type and the number of reviewed guidelines by status option. Additional features include a keyword find function and a handy dictionary. Clicking on any underlined word will bring up a definition of the word.

## System Requirements

An IBM compatible PC with Microsoft Windows 95 or higher is required to run the application. At least 32 MB of RAM and 100 MB of storage are required to enable multiple analyses to be saved. The HFE-AT Software tool employs a Microsoft Access relational database and provides a Microsoft Visual Basic user interface.

## Technology transfer

The Savannah River National Laboratory (SRNL) is the U.S. Department of Energy’s (DOE) applied research and development laboratory at the Savannah River Site (SRS). With its wide spectrum and expertise in areas such as homeland security, hydrogen technology, materials, sensors, and environmental science, SRNL’s cutting edge technology delivers high dividends to its customers.

The management and operating contractor for SRS and SRNL is Savannah River Nuclear Solutions, LLC. SRNS is responsible for transferring its technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

## for more information

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## Partnering opportunities

SRNS invites interested companies with proven capabilities in this area of expertise to develop commercial applications for this product under a licensing agreement or license the software for their own use. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities, and milestones for commercializing this invention. Qualifications should include past experience at bringing similar products to market, reasonable schedule for product launch, sufficient manufacturing capacity, established distribution networks, and evidence of sufficient financial resources for product development and launch.