bcrecgFWStart.doc



12/17/99

# SPAR HRA Human Error Worksheet (Page 1 of 3) Best Case

**Plant:**_____ **Initiating Event:**_____ **Sequence Number:**_____ **Basic Event Code:** HEP-RECG-FWSTART_

**Basic Event Context:** _____

**Basic Event Description:** _____

Does this task contain a significant amount of diagnosis activity? YES X (start with Part I, p. 1) NO (skip Part I, p. 1; start with Part II, p. 2) Why?_____

## Part I. DIAGNOSIS

A. Evaluate PSFs for the diagnosis portion of the task.

| PSFs | PSF Levels | Multiplier for Diagnosis | | If non-nominal PSF levels are selected, please note specific reasons in this column |
|---|---|---|---|---|
| Available Time | Inadequate time | P(failure) = 1.0 | | **Time is expansive due to leakage and boil off ratio.** |
| | Barely adequate time <20 min | 10 | | |
| | Nominal time . _30 min | 1 | | |
| | Extra time >60 min | 0.1 | | |
| | Expansive time >24 hrs | 0.01 | X | |
| Stress | Extreme | 5 | | **Operator has had alarms, recognizes there is a problem.** |
| | High | 2 | X | |
| | Nominal | 1 | | |
| Complexity | Highly complex | 5 | | |
| | Moderately complex | 2 | | |
| | Nominal | 1 | X | |
| | Obvious diagnosis | 0.1 | | |
| Experience/Training | Low | 10 | | **Assumes a highly trained staff.** |
| | Nominal | 1 | | |
| | High | 0.5 | X | |
| Procedures | Not available | 50 | | **Assumes procedures that are in diagnosis.** |
| | Available, but poor | 5 | | |
| | Nominal | 1 | | |
| | Diagnostic/symptom oriented | 0.5 | X | |
| Ergonomics | Missing/Misleading | 50 | | **Assumes alarms for temperature and level.** |
| | Poor | 10 | | |
| | Nominal | 1 | | |
| | Good | 0.5 | X | |
| Fitness for Duty | Unfit | P(failure) = 1.0 | | |
| | Degraded Fitness | 5 | | |
| | Nominal | 1 | X | |
| Work Processes | Poor | 2 | | **Assumes a crew and procedures that interact well in a good facility.** |
| | Nominal | 1 | X | |

#1/7

| | |
|---|---|
| Good | 0.8 |

B. Calculate the Diagnosis Failure Probability

(1) If all PSF ratings are nominal, then the Diagnosis Failure Probability = 10E-2

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| (2) Otherwise, | Time | Stress | Complexity | Experience/ Training | Procedures | Ergonomics | Fitness for Duty | Work Processes | |
| Diagnosis: 10E-2x | .01 | x2 | x1 | x.5 | x.5 | x.5 | x1 | x.8 | =2x10-5 Diagnosis Failure Probability |

# SPAR HRA Human Error Worksheet (Page 2 of 3) Best Case

**Plant:**_____ **Initiating Event:**_____ **Sequence Number:**_____ **Basic Event Code:** HEP-RECG-FWSTART

**Basic Event Context:** _____

**Basic Event Description:** _____

## Part II. ACTION

A. Evaluate PSFs for the action portion of the task.

| PSFs | PSF Levels | Multiplier for Action | If non-nominal PSF levels are selected, please note specific reasons in this column |
|---|---|---|---|
| Available Time | Inadequate time | P(failure) = 1.0 | |
| | Time available . time required | 10 | |
| | Nominal time | 1 | |
| | Time available>50 x time required | 0.01 | |
| Stress | Extreme | 5 | |
| | High | 2 | |
| | Nominal | 1 | |
| Complexity | Highly complex | 5 | |
| | Moderately complex | 2 | |
| | Nominal | 1 | |
| Experience/Training | Low | 3 | |
| | Nominal | 1 | |
| | High | 0.5 | |
| Procedures | Not available | 50 | |
| | Available, but poor | 5 | |
| | Nominal | 1 | |
| Ergonomics | Missing/Misleading | 50 | |
| | Poor | 10 | |
| | Nominal | 1 | |
| | Good | 0.5 | |
| Fitness for Duty | Unfit | P(failure) = 1.0 | |
| | Degraded Fitness | 5 | |
| | Nominal | 1 | |
| Work Processes | Poor | 5 | |
| | Nominal | 1 | |
| | Good | 0.5 | |

B. Calculate the Action Failure Probability

(1) If all PSF ratings are nominal, then the Action Failure Probability = 10E-3

| (2) Otherwise, | Time | Stress | Complexity | Experience/ Training | Procedures | Ergonomics | Fitness for Duty | Work Processes | |
|---|---|---|---|---|---|---|---|---|---|
| Action: 10E-3 | x | x | x | x | x | x | x | x | = Action Failure Probability |

## SPAR HRA Human Error Worksheet (Page 3 of 3) Best Case

**Plant:**_____ **Initiating Event:**_____ **Sequence Number:**_____**Basic Event Code:** HEP- RECG-FWSTART

## PART III. CALCULATE THE TASK FAILURE PROBABILITY WITHOUT FORMAL DEPENDENCE ($P_{W/OD}$)

Calculate the Task Failure Probability Without Formal Dependence ($P_{w/od}$) by adding the Diagnosis Failure Probability (from Part I, p.1) and the Action Failure Probability (from Part II, p. 2).

If all PSFs are nominal, then

Diagnosis Failure Probability: _ Diagnosis Failure Probability: 10E-2

Action Failure Probability: +_ Action Failure Probability: +10E-3

Task Failure Without Formal Dependence ($P_{w/od}$) =_ $P_{(w/od)}$ = 1.1x10E-2

## Part IV. DEPENDENCY

For all tasks, except the first task in the sequence, use the table and formulae below to calculate the Task Failure Probability With Formal Dependence ($P_{wd}$).

If there is a reason why failure on previous tasks should not be considered, explain here: _____

### Dependency Condition Table

| Crew (same or different) | Time (close in time or not close in time | Location (same or different) | Cues (additional or not additional) | Dependency | Number of Human Action Failures Rule<br>- Not Applicable. Why?_____ |
|---|---|---|---|---|---|
| Same | Close | Same | - | complete | If this error is the **3rd error in the sequence**, then the dependency is at least **moderate**.<br><br>If this error is the **4th error in the sequence**, then the dependency is at least **high.**<br><br>This rule may be ignored only if there is compelling evidence for less dependence with the previous tasks. Explain above. |
| | | Different | - | high | |
| | Not Close | Same | No Additional | high | |
| | | | Additional | moderate | |
| | | Different | No Additional | moderate | |
| | | | Additional | low | |
| Different | Close | - | - | moderate | |
| | Not Close | - | - | low | |

Using $P_{w/od}$ = Probability of Task Failure Without Formal Dependence (calculated in Part III, p. 3):

For Complete Dependence the probability of failure is 1.

For High Dependence the probability of failure is $(1+ P_{w/od})/2$

For Moderate Dependence the probability of failure is $(1+6 \times P_{w/od})/7$

For Low Dependence the probability of failure is $(1+19 \times P_{w/od})/20$

For Zero Dependence the probability of failure is $P_{w/od}$

Calculate $P_{w/d}$ using the appropriate values:

$(1 + (*))/$ = Task Failure Probability With Formal Dependence ($P_{wd}$)