

12/27/99

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

Plant: \_\_\_\_\_ Initiating Event: \_\_\_\_\_ Sequence Number: \_\_\_\_\_ Basic Event Code: HEP-FW-START-SW

Basic Event Context: \_\_\_\_\_

Basic Event Description: \_\_\_\_\_

Does this task contain a significant amount of diagnosis activity? YES (start with Part I, p. 1) NO X (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	
	Barely adequate time <20 min	10	
	Nominal time ≈ 30 min	1	
	Extra time >60 min	0.1	
	Expansive time >24 hrs	0.01	
Stress	Extreme	5	
	High	2	
	Nominal	1	
Complexity	Highly complex	5	
	Moderately complex	2	
	Nominal	1	
	Obvious diagnosis	0.1	
Experience/Training	Low	10	
	Nominal	1	
	High	0.5	
Procedures	Not available	50	
	Available, but poor	5	
	Nominal	1	
	Diagnostic/symptom oriented	0.5	
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	2	
	Nominal	1	
	Good	0.8	

B. Calculate the Diagnosis Failure Probability

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(2) Otherwise,	Time	Stress	Complexity	Experience/ Training	Procedures	Ergonomics	Fitness for Duty	Work Processes	
Diagnosis: 10E-2x__	x__	x__	x__	x__	x__	x__	x__	x__	=__ Diagnosis Failure Probability

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

Plant: \_\_\_\_\_ Initiating Event: \_\_\_\_\_ Sequence Number: \_\_\_\_\_ Basic Event Code: HEP-FW-START-SW

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 expansive due to boil off and leakage ratio
	Time available $\approx$ time required	10	
	Nominal time	1	
	Time available $> 50 \times$ time required	0.01	X
Stress	Extreme	5	X
	High	2	
	Nominal	1	
Complexity	Highly complex	5	X
	Moderately complex	2	
	Nominal	1	
Experience/Training	Low	3	X
	Nominal	1	
	High	0.5	
Procedures	Not available	50	X
	Available, but poor	5	
	Nominal	1	
Ergonomics	Missing/Misleading	50	
	Poor	10	X
	Nominal	1	
	Good	0.5	
Fitness for Duty	Unfit	P(failure) = 1.0	
	Degraded Fitness	5	
	Nominal	1	X
Work Processes	Poor	5	
	Nominal	1	X
	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/ Procedures Ergonomics Fitness Work

## Training

## for Duty Processes

Action: 10E-3    x.01    x5    x5    x3    x50    x10    x1    x1    =.375  
 Action  
 Failure Probability

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

Plant: \_\_\_\_\_ Initiating Event: \_\_\_\_\_ Sequence Number: \_\_\_\_\_ Basic Event Code: HEP-FW-START-SW

### 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 ( $P_{w/od}$ ) = \_\_\_\_\_

$P_{(w/od)} = 1.1 \times 10E-2$

### 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 - Not Applicable. Why? _____
Same	Close	Same	-	complete	If this error is the <b>3rd error in the sequence</b> , then the dependency is at least <b>moderate</b> .
					If this error is the <b>4th error in the sequence</b> , then the dependency is at least <b>high</b> .
	Not Close	Different	-	high	This rule may be ignored only if there is compelling evidence for less dependence with the previous tasks. Explain above.
		Same	No Additional	high	
Different	Close	-	-	moderate	
				low	
	Not Close	-	-	moderate	
				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:

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