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

Plant:_____ **Initiating Event:**_____ **Sequence Number:**___ **Basic Event Code:** HEP-RECG-FW-LOI_

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		**Extra time is available due to leakage and boil off ratio.**
	Barely adequate time <20 min	10		
	Nominal time ≈ _30 min	1		
	Extra time >60 min	0.1	X	
	Expansive time >24 hrs	0.01		
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 inadequate.**
	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	
	Good	0.8		

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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.1	x2	x1	x.5	x.5	x1	x1	x.8	=2E-4 Diagnosis Failure Probability

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

Plant:_____ **Initiating Event:**_____ **Sequence Number:**____ **Basic Event Code:** HEP-RECG-FW-LOI_

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-FW-LOI

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 - Not Applicable. Why?_____
Same	Close	Same	-	complete	If this error is the **3rd error in the sequence**, then the dependency is at least **moderate.**
					If this error is the **4th error in the sequence**, then the dependency is at least **high.**
					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})