

SC. inv. 17-15-000

12/27/99

SPAR HRA Human Error Worksheet (Page 1 of 3) Sensitivity CasePlant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP-INV-OFFSITE

Basic Event Context: _____

Basic Event Description: _____

Does this task contain a significant amount of diagnosis activity? YES (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	Expansive time due to leakage and boil off ratio.
	Barely adequate time <20 min	10	
	Nominal time \approx 30 min	1	
	Extra time >60 min	0.1	
	Expansive time >24 hrs	0.01 X	
Stress	Extreme	5	Recognition of problems on going.
	High	2 X	
	Nominal	1	
Complexity	Highly complex	5	Recognition of need to move to last opportunity.
	Moderately complex	2 X	
	Nominal	1	
	Obvious diagnosis	0.1	
Experience/Training	Low	10 X	No training.
	Nominal	1	
	High	0.5	
Procedures	Not available	50 X	No procedures.
	Available, but poor	5	
	Nominal	1	
	Diagnostic/symptom oriented	0.5	
Ergonomics	Missing/Misleading	50	
	Poor	10	
	Nominal	1 X	
	Good	0.5	
Fitness for Duty	Unfit	P(failure) = 1.0	
	Degraded Fitness	5	
	Nominal	1 X	
Work Processes	Poor	2	
	Nominal	1 X	
	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.01	x2	x2	x10	x50	x1	x1	x1	x1	= .2 Diagnosis Failure Probability

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

Plant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP-INV-OFFSITE

Basic Event Context: 128 hours

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	Expansive time due to leakage and boil off ratio.	
	Time available \approx time required	10		
	Nominal time	1		
	Time available $> 50 \times$ time required	0.01		
Stress	Extreme	5	X	Last opportunity for success, stress is extreme.
	High	2		
	Nominal	1		
Complexity	Highly complex	5	X	Involves offsite personnel and special means.
	Moderately complex	2		
	Nominal	1		
Experience/Training	Low	3	X	No training.
	Nominal	1		
	High	0.5		
Procedures	Not available	50	X	No procedures.
	Available, but poor	5		
	Nominal	1		
Ergonomics	Missing/Misleading	50		
	Poor	10		
	Nominal	1	X	
	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/ Training Procedures Ergonomics Fitness for Duty Work Processes

Action: 10E-3 x.01 x5 x5 x3 x50 x1 x1 x.5 =3.75x10-2
Action
Failure Probability

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

Plant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP-INV-OFFSITE

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: .2

Diagnosis Failure Probability: 10E-2

Action Failure Probability: + .0375

Action Failure Probability: +10E-3

Task Failure Without
Formal Dependence ($P_{w/od}$) = .23

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

Modified for low dependency .32

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 .
	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	
		Additional	moderate		
Different	Close	Different	No Additional	moderate	
		Additional	low		
	Not Close	-	-	moderate	
		-	-	<u>low</u>	

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:

$$(1 + (19 \times .23)) / 20 = .32 \text{ Task Failure Probability With Formal Dependence } (P_{w/d})$$