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

Plant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP-RECG-FWST-SWBasic Event Context: Severe Weather

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 | Time is expansive 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 X | Stress is extreme due to severe weather. |
| | High | 2 | |
| | Nominal | 1 | |
| Complexity | Highly complex | 5 | |
| | Moderately complex | 2 | |
| | Nominal | 1 X | |
| | Obvious diagnosis | 0.1 | |
| Experience/Training | Low | 10 | Highly trained staff. |
| | Nominal | 1 | |
| | High | 0.5 X | |
| Procedures | Not available | 50 | High quality diagnostic procedures. |
| | Available, but poor | 5 | |
| | Nominal | 1 | |
| | Diagnostic/symptom oriented | 0.5 X | |
| 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 | Assumes a crew and procedures that interact well in a good facility. |
| | Nominal | 1 | |
| | Good | 0.8 X | |

B. Calculate the Diagnosis Failure Probability

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(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: $10E-2 \times$ | <u>01</u> | <u>x5</u> | <u>x1</u> | <u>x.5</u> | <u>x.5</u> | <u>x1</u> | <u>x1</u> | <u>x.8</u> | <u>=1E-4</u> Diagnosis Failure Probability |

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

Plant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP-RECG-FWST-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 available \approx time required | 10 | |
| | Nominal time | 1 | |
| | Time available $> 50 \times$ 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 Work
for Duty Processes

[illegible]

SPAR HRA Human Error Worksheet (Page 3 of 3) Best CasePlant: _____ Initiating Event: _____ Sequence Number: _____ Basic Event Code: HEP- RECG-FWST-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-3Task 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 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:

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