

Name _____

Master UPC

EVALUATION:

- EMERGENCY OPERATION PROCEDURES
- SEVERE ACCIDENT MANAGEMENT GUIDES

Questions:	5
Points:	75
Time:	40 min

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QUESTION 1 [20 points 10 min]

CONTROL ROOM OPERATIONS

Using the procedure attached explain the actions to take by operators in the following cases:

a) Neutron flux - NOT DECREASING

→ Manually trip the reactor.
(If not, go to FR-S-1 step 1)

b) All turbine stop valves – CLOSED

→ Verify power to AC Emergency Busses. (Go to next step)

c) AC emergency busses - ONE ENERGIZED

→ Try to restore power to deenergized AC emergency busses.

d) SI - NOT REQUIRED

→ Go to ES-0.1, step 1 (Reactor trip response)

e) SI - REQUIRED and ONLY ONE TRAIN ACTUATED

→ Manually actuate the other train

- | | | |
|---|---|---|
| 1 | Verify Reactor Trip: <ul style="list-style-type: none">• Rod bottom lights - LIT• Reactor trip and bypass breakers - OPEN• Rod position indicators - AT ZERO• Neutron flux - DECREASING | Manually trip reactor. <u>IF</u> reactor will <u>NOT</u> trip, <u>THEN</u> go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1. |
| 2 | Verify Turbine Trip: <ul style="list-style-type: none">a. All turbine stop valves - CLOSED | <ul style="list-style-type: none">a. Manually trip turbine. |
| 3 | Verify Power To AC Emergency Busses: <ul style="list-style-type: none">a. AC emergency busses - AT LEAST ONE ENERGIZEDb. AC emergency busses - ALL ENERGIZED | <ul style="list-style-type: none">a. Go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.b. Try to restore power to deenergized ac emergency busses. |
| 4 | Check SI Status: <ul style="list-style-type: none">a. Check if SI is actuated:b. Verify both trains of SI - ACTUATED | <ul style="list-style-type: none">a. Check if SI is required. <u>IF</u> SI is required, <u>THEN</u> manually actuate. <u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> go to ES-0.1, REACTOR TRIP RESPONSE, Step 1.b. Manually actuate SI. |

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QUESTION 2 [20 points 10 min]



EMERGENCY PROCEDURES

Describe the difference between Optimal Recovery Guidelines and Critical Safety Function restoration procedures.

Optimal Recovery Guidelines is a procedure based on the symptoms observed that the operator must follow in case of emergency. It starts always with a reactor trip, and then the operator must perform the actions in the correct order, so as to bring the plant at safe end conditions.

However, the operator should check at the same time that some critical parameters of the plant are not evolving in an uncontrolled or unsafe way. These safety variables are representative of the integrity of the different safety barriers: flux and power, temperature of RCS and cooling of core, heat sink, containment building, inventory RCS. The CSF procedures provide an initial decision tree: whenever the operator notice an increase of one safety variable above a critical fixed value (define in the CSF), he must stop all other activity or task on progress, including ORG procedures, to focus on the restoration of a normal/acceptable value for this parameter ^(following CSF procedures). To make his decision some colours are provided: red and orange are prioritization tasks. Also there is a special order of importance between those variables.

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QUESTION 3 [10 points 5 min]

EMERGENCY PROCEDURES

Describe which of the following fission products barriers are protected by Each Critical Safety function

- a) *Fuel Matrix and Fuel Clad*
- b) *RCS Pressure Boundary*
- c) *Containment Vessel*

ANSWER CHART:

Subcriticality (S)	a				
Core cooling (C)	a				
Heat sink (H)	a	b			
RCS integrity (P)		b			
Containment (Z)			c		
RCS Inventory (I)	a	b			

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QUESTION 4 [15 points 10 min]

EMERGENCY PROCEDURES

For each accident condition, state the behaviour (increase, decrease or constant) of the parameters within the first minutes of the accident:

NOTE: Answer "I" for increase, "D" for decrease and "C" for constant.

	REACTOR TRIP	LARGE LOCA	SMALL LOCA	MSLB	SGTR	ATWS (WITH LOSS OF FW)
RCS pressure	D	D	D	XD	D	I
PZR level	D	D	small D (nc)	I	D	I
SG pressure	small I (nc)	C D	D	D	I	I
SG level	D C	C I	C	D	D I	D
Containment pressure	C	I	I	I C	C	C
Containment radiation	C	I	I	C	C	C
Secondary circuit radiation	C	C	C	C	I	C

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QUESTION 5 [10 points 5 min]



SAFETY ACCIDENT MANAGEMENT GUIDES

A set of actions considered in the SAMG is listed in a table below. Relate each one of them to the guide or guides in which they are executed.

Actions	SAG Guide
Depressurize containment	SAG-6,5
Burn hydrogen	SAG-7
Operate containment heat sinks	SAG- 4 6
Depressurize SG	SAG-1 SAG-2
Pressurize containment	SAG-7
Operate auxiliary building ventilation	SAG- 4 5

- SAG-1 : SG water injection
- SAG-2 : RCS depressurization
- SAG-3 : RCS injection
- SAG-4 : Containment injection
- SAG-5 : Fission products release control
- SAG-6 : Containment conditions control
- SAG-7 : Hydrogen containment concentration reduction
- SAG-8 : Containment Inundation