

# 2006 NRC Exam Writers Workshop

"Communicating Expectations - Achieving a  
Common Goal"

Simulator Operating Tests

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# **Simulator Operating Test ES-301 General Guidelines**

- Implements items 1-8 and 11-13 of 10 CFR 55.45(a)
- Team format with up to three applicants
- Surrogates

# Simulator Operating Test

## ES-301 General Guidelines

- Use of Surrogates:

Surrogates are used, as necessary, to round out a crew.

Retakes often require surrogates

NOT to be used to minimize applicant exposure to exam scenarios.



# Simulator Operating Test

## ES-301 General Guidelines

- Cannot duplicate test items from audit test unless mitigating actions are significantly different. (D.1.a)
- Incorporate facility and industry operating experience into the test (D.1.f)

# Simulator Operating Test

## ES-301 General Guidelines

- Ensure walk-through and simulator tests are NOT redundant, and do not repeat items from written. (D.1.h)
- Must get Chief Examiners permission to deviate from approved test (D.1.i)

# Simulator Operating Test ES-301 General Guidelines

- Modified Scenarios must be altered enough to prevent applicant from recognizing scenario (D.5.b)
- Ensure that there are enough evolutions/malfunctions for each individual. (D.5.d) **Form ES-301-5**

Facility:			Date of Exam:									Operating Test No.:							
A P P L I C A N T	E V E N T  T Y P E	Scenarios																	
		1			2			3			4			T O T A L	M I N I M U M(*)				
		CREW POSITION			CREW POSITION			CREW POSITION			CREW POSITION								
		S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P	S R O	A T C	B O P		S R O	A T C	B O P	R	I
RO  SRO-I  SRO-U	RX																1	1	0
	NOR																1	1	1
	I/C																4	4	2
	MAJ																2	2	1
	TS																0	2	2
RO  SRO-I  SRO-U	RX																1	1	0
	NOR																1	1	1
	I/C																4	4	2
	MAJ																2	2	1
	TS																0	2	2
RO  SRO-I  SRO-U	RX																1	1	0
	NOR																1	1	1
	I/C																4	4	2
	MAJ																2	2	1
	TS																0	2	2

	TS														5	4	3
RO	RX														1	1	0
	NOR														1	1	1
SRO-I	I/C														4	4	2
SRO-U	MAJ														2	2	1
	TS														0	2	2
RO	RX														1	1	0
	NOR														1	1	1
SRO-I	I/C														4	4	2
SRO-U	MAJ														2	2	1
	TS														0	2	2
RO	RX														1	1	0
	NOR														1	1	1
SRO-I	I/C														4	4	2
SRO-U	MAJ														2	2	1
	TS														0	2	2

Instructions:

1. Circle the applicant level and enter the operating test number and Form ES-D-1 event numbers for each event type; TS are not applicable for RO applicants. ROs must serve in both the "at-the-controls (ATC)" and "balance-of-plant (BOP)" positions; Instant SROs must do one scenario, including at least two instrument or component (I/C) malfunctions and one major transient, in the ATC position.
2. Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.5.d) but must be significant per Section C.2.a of Appendix D. (\*) Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a 1-for-1 basis.
3. Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirements **specified for the applicant's license level in the right-hand columns.**



# Simulator Operating Test

## ES-301 General Guidelines

- Ensure scenario allows examiner to evaluate each competency and rating factor. (D.5.d) **Form ES-301-6**
- Chief Examiner should approve scenario outline prior to developing details. (D.5.d)

Facility:					Date of Examination:					Operating Test No.:						
Competencies	APPLICANTS															
	RO/SRO-I/SRO-U				RO/SRO-I/SRO-U				RO/SRO-I/SRO-U				RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions																
Comply With and Use Procedures (1)																
Operate Control Boards (2)																
Communicate and Interact																
Demonstrate Supervisory Ability (3)																
Comply With and Use Test Procedures (4)																

	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interpret/Diagnose Events and Conditions																
Comply With and Use Procedures (1)																
Operate Control Boards (2)																
Communicate and Interact																
Demonstrate Supervisory Ability (3)																
Comply With and Use Tech. Specs. (3)																
Notes: (1) Includes Technical Specification compliance for an RO. (2) Optional for an SRO-U. (3) Only applicable to SROs.																

*Instructions:*

*Circle the applicants' license type and enter one or more event numbers that will allow the examiners to evaluate every applicable competency for every applicant.*

# Simulator Operating Test ES-301 General Guidelines

- Operator details should include: (D.5.f)
  - Opening/closing/throttling valves
  - Starting and stopping equipment
  - Raising and lowering level, flow, pressure

# Simulator Operating Test ES-301 General Guidelines

- Operator details should include: (D.5.f)
  - Acknowledging alarms and verifying automatic actions
  - Making decisions and giving directions
  - Applicable procedures steps with procedure number
  - Critical Tasks Identified.



# Simulator Operating Test ES-301 General Guidelines

- Instrument/Component failure must have verifiable actions. (D.5.f and App D - B.3)
  - Must manipulate controls accurately
  - Acknowledging annunciator or verifying automatic actions is not enough for an evaluation
  - Annunciator responses which requires action or starting equipment that failed to automatically start is usually enough to evaluate.

# Simulator Operating Test ES-301 General Guidelines

- Perform Simulator Scenario Quality checklist IAW ES-301-4. (D.5.g)

# Simulator Operating Test

## Simulator Testing Guidelines

- Select Initial Conditions: (App D B.2)
  - Representative of typical plant status
  - Maintenance or Surveillance activities in progress
  - Should include S/U, Low and full power operations.



# Simulator Operating Test

## Simulator Testing Guidelines

- All, some, or even none of these initial conditions may have a bearing on subsequent scenario events.
- Initial conditions should also be frequently changed to prevent future events from becoming predictable.

# Simulator Operating Test Simulator Testing Guidelines

- Select and Document Events (App D B.3)
  - Sequence events so that component/instrument failures occur prior to the main event
  - A logical sequence adds to credibility
  - EVERY required operator action should be included on form, especially critical tasks.
  - Flag continuous actions steps



# Simulator Operating Test

## Simulator Testing Guidelines

- Determine the Scenario Endpoint. (App D B.4)
  - Identify a particular plant condition or procedural step in which to end the scenario.
  - NRC Examiner running scenario will determine when to freeze scenario.

# Simulator Operating Test

## Simulator Testing Guidelines

- Scenario Validation (App d B.5)
  - Ensures scenario will run as intended
  - Ensures completeness of operator actions
  - Provides assurance that appropriate individuals receive credit for actions taken

# Simulator Operating Test

## Simulator Testing Guidelines

- Scenario Validation (App d B.5)
  - Provides an idea of how long scenario will run
  - Allows opportunity to identify possible alternate paths.
  - Validation Techniques.



# Scenario Attributes

## Qualitative Attributes

- Realism/Credibility (App D C.1.a)
  - Strive for realistic and discriminating examination.
- Event Sequencing (App D C.1.b)
- Simulator Modeling (App D C.1.c)
- Evaluating Competencies (App D C.1.d)
- Level of Difficulty (App D C.1.e)

# Scenario Attributes

## Quantitative Attributes

- Normal Evolutions/Reactivity Manipulation
  - Normal and reactivity changes may be substituted with another malfunction on a one for one basis (App D C.2.a)



# Scenario Attributes

## Quantitative Attributes

- Total Malfunctions 5-8 (App D C.2.b)
- Malfunction after EOP entry 1-2 (App D C.2.c)
- Abnormal Events 2-4 (App D C.2.d)
- Major Transients 1-2 (App D C.2.e)

# Scenario Attributes

## Quantitative Attributes

- EOP's Entered 1-2 (App D C.2.f)
- EOP contingency Procedures 0-2  
(App D C.2.g)
- Simulator Run Time (App D C.2.h)
- EOP Run time (App D C.2.i)

# Scenario Attributes

## Quantitative Attributes

- Critical Tasks 2-3 (App D C.2.j) (App D D.1)
  - Must have safety significance
  - Must have a prompt or cue
  - Measurable performance indicators
  - Performance feedback



# Simulator Grading Criteria

- Use notes and scenario guidelines.
- Ask follow-up questions to establish understanding
- Fill out ES-303-3 for RO or 303-4 SRO

# Simulator Grading Criteria

- If the grade for all competencies is greater than 1.8, the applicants performance is generally satisfactory
- If the grade for Competency 4 “Communications and Crew interactions,” is less than or equal to 1.8 but greater than 1.0 and the individual grades for all other competencies are 2.0 or greater, the applicant’s performance is satisfactory.



# Simulator Grading Criteria

- If the grade for competency 4 is 1.0 or the grade for any other competency is 1.8 or less, the applicant's performance is unsatisfactory.

1. Interpret/Diagnose Events and Conditions Based on Alarms, Signals, and Readings							
Rating Factors	Weighting Factors	RF Scores	RF Grades	Comp. Grade			
(a) Did the applicant RECOGNIZE and VERIFY off-normal trends and status?	N/O = 0	3					
	Nominal = 0.40	2					
	(b) or (c) N/O = 0.57	1					
(b) Did the applicant correctly INTERPRET/DIAGNOSE plant conditions based on control room indications?	N/O = 0	3					
	Nominal = 0.30	2					
	(c) N/O = 0.43	1					
	(a) N/O = 0.50						
(c) Did the applicant ATTEND TO annunciators, alarm signals, and instrument readings in order of importance and severity?	N/O = 0	3					
	Nominal = 0.30	2					
	(b) N/O = 0.43	1					
	(a) N/O = 0.50						
2. Comply with and Use Procedures, References, and Technical Specifications							
Rating Factors	Weighting Factors	RF Scores	RF Grades	Comp. Grade			

indications?	(c) N/O = 0.43	1		
	(a) N/O = 0.50			
(c) Did the applicant ATTEND TO annunciators, alarm signals, and instrument readings in order of importance and severity?	N/O = 0	3		
	Nominal = 0.30	2		
	(b) N/O = 0.43	1		
	(a) N/O = 0.50			
2. Comply with and Use Procedures, References, and Technical Specifications				
Rating Factors	Weighting Factors	RF Scores	RF Grades	Comp. Grade
(a) Did the applicant REFER TO the appropriate procedure or reference in a timely manner?	N/O = 0	3		
	Nominal = 0.30	2		
	(c) N/O = 0.43	1		
	(b) N/O = 0.50			
(b) Did the applicant COMPLY WITH procedures (including precautions and limitations) and references in an accurate and timely manner?	N/O = 0	3		
	Nominal = 0.40	2		
	(a) or (c) N/O = 0.57	1		
(c) Did the applicant RECOGNIZE plant conditions that are addressed in technical specifications?	N/O = 0	3		
	Nominal = 0.30	2		
	(a) N/O = 0.43	1		
	(b) N/O = 0.50			

## 1. Interpret/Diagnose Events and Conditions Based on Alarms, Signals, and Readings

Rating Factors	Weighting Factors	RF Scores	RF Grades	Comp. Grade
(a) Did the applicant <b>RECOGNIZE AND ATTEND TO</b> off-normal trends and status in order of their importance and severity?	N/O = 0	3		
	Nominal = 0.20	2		
	(b) N/O = 0.25	1		
	(c) or (d) N/O = 0.29			
(b) Did the applicant ensure the collection of <b>CORRECT, ACCURATE, and COMPLETE</b> information and reference material on which to base diagnoses?	N/O = 0	3		
	Nominal = 0.20	2		
	(a) N/O = 0.25	1		
	(c) or (d) N/O = 0.28			
(c) Did the applicant's directives and actions demonstrate an <b>UNDERSTANDING</b> of how the <b>PLANT, SYSTEMS, and COMPONENTS OPERATE AND INTERACT</b> (including set points, interlocks, and automatic actions)?	N/O = 0	3		
	Nominal = 0.30	2		
	(a) or (b) N/O = 0.38	1		
	(d) N/O = 0.43			
(d) Did the applicant correctly <b>INTERPRET/DIAGNOSE</b> plant conditions based on control room indications?	N/O = 0	3		
	Nominal = 0.30	2		
	(a) or (b) N/O = 0.37	1		



(c) Did the applicant's directives and actions demonstrate an UNDERSTANDING of how the PLANT, SYSTEMS, and COMPONENTS OPERATE AND INTERACT (including set points, interlocks, and automatic actions)?	N/O	= 0	3		
	Nominal	= 0.30	2		
	(a) or (b) N/O	= 0.38	1		
	(d) N/O	= 0.43			
(d) Did the applicant correctly INTERPRET/DIAGNOSE plant conditions based on control room indications?	N/O	= 0	3		
	Nominal	= 0.30	2		
	(a) or (b) N/O	= 0.37	1		
	(c) N/O	= 0.43			
2. Comply with and Use Procedures and References					
Rating Factors	Weighting Factors		RF Scores	RF Grades	Comp. Grade
(a) Did the applicant REFER to correct procedures, procedural steps, and references when appropriate?	N/O	= 0	3		
	Nominal	= 0.30	2		
	(b) N/O	= 0.43	1		
	(c) N/O	= 0.50			
(b) Did the applicant RECOGNIZE EOP ENTRY CONDITIONS?	N/O	= 0	3		
	Nominal	= 0.30	2		
	(a) N/O	= 0.43	1		
	(c) N/O	= 0.50			
(c) Did the applicant USE PROCEDURES CORRECTLY, including following procedural steps in correct sequence, abiding by procedural cautions and limitations, selecting	N/O	= 0	3		
	Nominal	= 0.40	2		

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## Questions

