15. Performance Testing: Response

Abstract: *Performance testing plays an integral role for determining the effectiveness of a site's overall protection system and evaluating a protective force's ability to perform certain routine duties as they apply to detection, assessment, response, interruption, and neutralization.*

15.1 Introduction

Why Performance Test?

Performance testing is a critical function in the Evaluation Stage of the Design Evaluation Process Outline (DEPO). The goal is to explain how a process can be applied to performance test the response capability and how this process can be translated and applied to evaluate a PPS for a facility that has limited resources.

The most appropriate and useful method of evaluating a protective force's ability to perform certain routine and emergency duties in its operating environment is to observe it performing those or similar duties under controlled, and sometimes simulated, conditions—that is, through performance testing. To develop useful and valid information, the controlled conditions under which performance tests are conducted must be as realistic as possible, and any necessary constraints and artificialities must be designed to have as neutral an effect on player performance as possible.

15.2 Background

What Level of Rigor Do I Need to Apply to Evaluate the Guard and Response Force Functions?

When security culture is cultivated to an acceptable level at the national to the nuclear facility levels and when dedicated resources such as time, equipment, people, and money are applied to the protection of nuclear material, then a nuclear facility will see favorable results in the effectiveness of their PPS.

The United States Department of Energy (DOE) is an organization that applies the necessary resources and has spent many years perfecting performance testing response forces at each facility in the nuclear weapons complex. In addition, the DOE has created a robust process for evaluating the effectiveness of the response force.

Nuclear facilities in the United States are designed and protected as hard targets for adversaries to attack. Many resources are dedicated to the protection of nuclear material in the United States because the consequence of theft or sabotage of nuclear material or facilities is too high to accept. Many foreign countries model the United States in the design and evaluation of a PPS for the protection of nuclear material; however, certain countries are unable to follow the US model because of limited resources in their countries. One of those limitations is the inability to maintain a quality assurance program to ensure adequate proficiency in the response element of the PPS.

A majority of the countries that have nuclear facilities do have an on-site guard force performing guard duties; however, an outside agency is used as a primary

response to an adversary attack or emergency rather than an on-site response force. This concept is not used in the United States where on-site response forces are utilized at each nuclear facility that possesses Category II or greater Special Nuclear Material (SNM). A facility is not required to have an on-site response force; however, the same principles are still required to evaluate the effectiveness of a response force that is either on-site or off-site.

In previous International Training Courses (ITC), many countries were very interested in methods to evaluate the response force. The response and evaluation modules that were presented in ITC did identify what tools can be used to measure the effectiveness of response, but the content was at too high a level for people to truly understand how these tools can be applied to their own facilities.

15.3 Purpose

Why Is Performance Testing Important?

Performance testing is intended to collect data on the capabilities of site protective forces and other security system elements. Performance testing is conducted for many reasons, such as

- Training for personnel
- Identifying system effectiveness or recommending areas for improvements
- Validating security systems, and
- Motivating personnel.

The purpose of this training is to outline the process of how system performance testing is conducted and how all functions of a response force is tested. The scope of performance testing ranges from very simple individual performance tests to more complex collective requirements.

15.4 Concept

What Is Performance Testing?

Performance testing is a test to evaluate the ability of an implemented and operating system element or total system to meet an established requirement. Individual performance tests for response are used to determine whether guard and response procedures are effective; whether personnel understand and follow the procedures; and whether personnel and equipment interact effectively.

Performance test exercises are a means to realistically evaluate the effectiveness of response force programs; provide skills application training for personnel; identify areas requiring system improvements; validate implemented improvements; and motivate personnel to perform duties in the most efficient, effective, and safest manner.

15.5 Planning Performance Tests

How do I Control These Tests?

Begin the planning process by conducting Controller/Evaluator Training. The training is designed to prepare controllers/evaluators to effectively perform their assigned functions and to ensure a system of command and control is in place. Command and control is necessary to ensure that all safety and security requirements are met and to maintain an environment free of the hazards associated with each test.

What Are the Roles/ Responsibilities?

Performance tests and exercises must always be coordinated with appropriate facility personnel. Certain performance testing may require that personnel being tested remain unaware that a test is being conducted. Particular care must be exercised to ensure that these types of tests are well coordinated and all safety factors considered.

The conduct of performance testing depends on the selection and assignment of top-quality controllers and evaluators. Although these individuals may be drawn from non-participating areas of a response organization, care should be taken to ensure that use of these personnel to support the performance test or exercise does not compromise the effectiveness of the response organization.

In many instances, controller/evaluator functions can be combined. However, each role has specific responsibilities that require total concentration to be performed effectively.

- Controllers are primarily responsible for enforcing rules of engagement, safety rules, and other control measures, as well as ensuring the timely and proper accomplishment of specific scenario events.
- An evaluator's function during a test/exercise is to observe and document exercise activities and conditions.

15.6 Sub-system Performance Tests

What Are the Categories of Performance Testing?

There are recognized differences among the various protective forces, physical facilities, and security interests; these differences require a flexible approach to the application of testing and evaluation techniques. A combination of specific types of performance testing is used to evaluate the performance of a security force. There are two categories of performance tests: Sub-system Performance Tests (described in this section) and Whole System Performance Tests (described in Section 15.12). While these categories are common and applicable to most performance testing methodologies, they are not restricted to the types of performance test specific sites may conduct or the manner in which they are conducted.

What Are the Types of Sub-system Performance Tests?

Sub-system Performance Testing focuses on performance testing individual guard and response functions. Types of performance testing for Sub-system Performance Testing may include:

- Time motion studies
- Limited scope performance tests
- Alarm response assessments performance tests
- Shift drills
- Enhanced limited scope performance tests

Performance tests range in complexity from simple demonstrations of a single individual skill to major integrated tests involving an entire protective force shift operating with other elements of a facility's security system. Performance tests should be planned, conducted, and evaluated through the development of a *graded approach.* Each Level becomes more complex to conduct. The following levels are outlined and described below.

- **Level I**
  - Time Motion Studies (TMS)
  - Limited Scope Performance Tests
- **Level II**
  - Shift Drills (To demonstrate Sustainability)
  - Alarm Response Assessments Performance Test (ARAPT)
- **Level III**
  - Enhance Limited Scope Performance Test (small scale FOF)

15.7 Time Motion Studies

What Are Time Motion Studies and How Do They Work?

Response Force Times are considered the foundation in a response element as it is essential for the responders to arrive to a designated response point during a required time. The TMS determines the required response time to arrive at various response locations. When a TMS is conducted, the time begins at the responders' origination point and ends at the dedicated response point derived from the Security Emergency Response Plan. Also included in the overall time is the time it takes for a responder to don all required equipment and firearms, and the time it takes to enter through entry gates, doors, or other type of barriers.

It is recommended to conduct a large number of TMS for each tactical position to quantitatively justify the average response time. A larger sample size justifies the average time it would take a responder to get to the required response point.

Designing/Revising a TMS

Step	Action
1.	Determine the need for a new or revised TMS.
2.	Develop or revise TMS plan according to VAs, procedures, or operational needs.
3.	Route new or revised TMS plan for concurrence and approval as appropriate: • On-site Security Supervisor(s) • Off-site Response Force • Management
4.	Distribute new or revised TMS plan to appropriate personnel as required.
5.	Review TMS plan at least annually to ensure that tests are current and consistent with orders and procedures.

Scheduling and Planning a TMS

Step	Action
1.	Obtain the appropriate TMS Plan.
2.	Identify and mitigate any unsafe conditions that exist in the test/exercise area.
3.	Notify the affected facility representatives before conducting TMS, where applicable.
4.	Notify the appropriate manager or other outside agency personnel for necessary assistance before conducting the TMS, where applicable.
5.	Conduct a safety brief for all controllers/evaluators before conducting a TMS.
6.	When applicable, conduct a thorough question and answer session regarding tactics, response locations, time-lines, equipment, duties and responsibilities.
7.	Ensure that one controller is in the Central Alarm Station (CAS) for TMS involving role-players, simulated weapons, or inert explosives before initiating the TMS.

Halting a TMS

Step	Action	
1.	**IF…**	**Then…**
	A TMS halts for any reason,	a) Notify all participants, controllers/evaluators and the CAS that the LSPT has been halted. b) Resolve the issue. c) Restart or reschedule the LSPT.

When the performance test activity is complete, a debriefing will be conducted immediately by test controllers/evaluators. The purpose of the debriefing is to ensure that all relevant information regarding test activities is revealed and understood. Furthermore, the debriefing provides a forum to discuss the test/exercise as a whole and

- Ensure that the results of evaluations are understood
- Identify issues

- Resolve any disagreements
- Recommend actions that may affect the physical protection strategy

Failing a TMS

Step	Action
1.	Notify the appropriate supervisor and explain the reason for the failure.
2.	Conduct an additional iteration if requested by the supervisor/management.
3.	Document all failures and pertinent information on the TMS test/exercise plan checklist..
4.	Forward failure information to appropriate personnel for trending and analysis.

15.8 Limited Scope Performance Tests

What Are Limited Scope Performance Tests and How Do They Work?

LSPTs determine the level of a security force's skill or capability or verify the effectiveness of specific elements of the security program. LSPTs must be conducted to realistically test any operation or procedure, verify the performance of a policy requirement, or verify possession of a requisite knowledge or skill to perform a specific task that falls within the scope of the security force's responsibility. The tests may involve large numbers of security personnel working together, or they may involve individual or small team. When individuals or small teams are tested, repetitions of the test may be conducted with each individual or team.

Designing/Revising an LSPT

Step	Action
1.	Determine the need for a new or revised LSPT.
2.	Develop or revise LSPT plans according to VAs, procedures, or operational needs.
3.	Route new or revised LSPT plans for concurrence and approval as appropriate: • Shift Captain(s) • Management
4.	Distribute new or revised LSPT plan to appropriate personnel as required.
5.	Review LSPT plans at least annually to ensure that LSPTs are current and consistent with orders and procedures.

Scheduling and Planning an LSPT

Step	Action
1.	Obtain the appropriate LSPT Plan.
2.	Identify and mitigate any unsafe conditions that exist in the test/exercise area.
3.	Notify the affected facility representatives before conducting LSPT, where applicable.

4.	Notify the appropriate manager or other outside agency personnel for necessary assistance before conducting the LSPT, where applicable.
5.	Conduct a safety brief for all controllers/evaluators before conducting an LSPT.
6.	When applicable, conduct a thorough question and answer session regarding tactics, response locations, time-lines, equipment, duties, and responsibilities.
7.	Ensure that one controller is in the Central Alarm Station (CAS) for LSPTS involving role-players, simulated weapons, or inert explosives before initiating the LSPT.
8.	Ensure that all controllers/evaluators have an "LSPT Authorization Card" in case the LSPT begins to escalate beyond a normal response. See Attachment C.

Halting an LSPT

Step	Action	
1.	**IF…**	**Then…**
	An LSPT halts for any reason,	a) Notify all participants, controllers/evaluators and the CAS that the LSPT has been halted. b) Resolve the issue. c) Restart or reschedule the LSPT.

When the performance test activity is complete, a debriefing will be conducted immediately by test controllers/evaluators. The purpose of the debriefing is to ensure that all relevant information regarding test activities is revealed and understood. Furthermore, the debriefing provides a forum to discuss the test/exercise as a whole and

- Ensure that the results of evaluations are understood
- Identify issues
- Resolve any disagreements
- Recommend actions that may affect the physical protection strategy
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Failing an LSPT

Step	Action
1.	Notify the appropriate supervisor and explain the reason for the failure.
2.	Conduct an additional iteration if requested by the supervisor/management.
3.	Document all failures and pertinent information on the LSPT test/exercise plan checklist.
4.	Forward failure information to appropriate personnel for trending and analysis.

15.9 Shift Drills

What Are Shift Drills and How Do They Work?

Shift drills are used as tools to maintain the proficiency of the guard and response force function of the PPS. Shift drills are conducted as on-going training during shifts. Shift drills are a specific type of performance or knowledge-based test designed to be administered primarily by supervisors to members of the guard or response force while on shift. Shift drills are similar to LPSTs with the exception of not being in a test environment. The questions are listed by topical and sub-topical areas of information to provide a broader range of training that *provides for remedial training* when necessary.

A Shift drill tests the individual's knowledge and ability to perform security duties. Some of the job tasks tested include, but are not limited to, the following:

- Operation of equipment and vehicles
- Knowledge of post or patrol operations
- Operation of communication equipment and communication terminology

15.10 Alarm Response Assessment Performance Tests

What are Alarm Response Assessment Performance Tests and How do They Work?

The purpose of these tests is to evaluate response force readiness and response to alarm conditions. ARAPTs are conducted with no prior notice, to evaluate a response to a specific location under alarm protection (i.e., a building, room, or other area that has a site-specific security interest) when an alarm is annunciated. It is very important to coordinate the ARAPTs with facility representatives who are trustworthy (Trusted Agents) to ensure that safety requirements are fulfilled, the security exercise is not compromised, and operational disruption is minimized.

ARAPT scenarios shall be based on simulated adversary actions.

How do You Develop an ARAPT?

Step	Developing An Alarm Response Assessment Plan
1.	Coordinate the following regarding the planned ARAPT with the Facility Manager / Facility Security Representative: • Safety issues • Operational issues • Security issues
2.	Develop a rough draft ARAPT plan, including the following topics: • ARAPT objective(s) • Scenario description • Pass/fail evaluation criteria, issues, and findings • Specific element of the PF being tested

	• Facility or facilities involved • PF response according to the appropriate procedures • Test boundaries • Number of iterations • Test controls • Resource requirements • Training requirements • Operational affects • Compensatory measures that may be required • Coordination and approval processes
3.	Develop evaluation forms.
4.	Review and update the safety briefing as necessary.
5.	Distribute the ARAPT plan to the appropriate departments for review and concurrence. At a minimum, the following departments or persons should review the plan: • Safety Representative • Management as applicable
6.	Incorporate, as necessary, comments from the review process and complete the plan.
7.	Route the final ARAPT plan to management for approval.

Conducting an ARAPT

Step	Personnel	Action
1.	Senior Controller or designee	Notify controllers and other representatives of the date, time, and location of the controller briefing.
2.	Senior Controller or designee	Provide controller/evaluator forms to controllers/evaluators that includes the following: • Alarm response Evaluation Sheet (see attachment XX) • Maps (if necessary) • ARAPT Briefing
3.	Senior Controller or designee	Conduct the ARAPT controller briefing to include the following topics: • Safety requirements • Scenario • Objectives • Assignment of controller/evaluator duties
		Hand out controller/evaluator forms,

		as applicable.
		Issue Equipment as needed.
		Conduct ARAPT by performing the following activities: • Stage controllers/evaluators • Notify the controller in the central Alarm Station (CAS) to initiate a radio check with all controllers/evaluators to ensure definitive exercise control • Advise the CAS exercise controller to initiate the ARAPT
4.	CAS Controller	Advise personnel in the CAS to initiate the ARAPT by handing the CAS operator the "CAS Message Card" (see attachment XX, CAS Message Card).
5.	CAS Operator	Initiate the ARAPT by reading the "CAS Message Card" provided by the CAS controller.
6.	Response Force	Respond to simulations as indicated in the applicable response plans.
7.	Controllers/Evaluators	Evaluate the response.

15.11 Enhanced Limited Scope Performance Tests

What Are Enhanced Limited Scope Performance Tests and How Do They Work?

ELSPTs are used to test the effectiveness of the overall system of the PPS. Three functions (detection, delay, and response) of the PPS system are measured against a fictitious yet credible adversary attack. ELSPTs are used as a substitute for force on force exercises due to the substantial amount of resources (time, people, equipment, and money) that are required to conduct an FOF. Certain foreign countries may not have the resources to conduct an FOF and/or may be overwhelmed of the type of planning that is involved with this activity. ELSPTs are diluted so the activity is easier plan, organize, manage, and implement; and still achieve similar results as an FOF exercise.

An adversary team is still used in the exercise; however, it is used in a manner that only needs to stimulate the response element to respond to their necessary response positions. Responders/Controller calls are used in place of MILES gear (weapon systems, alarm harnesses, and equipment) to achieve Probability of Hit or Probability of Kill of the adversaries. For example, the responder will articulate to the assigned controller the actions taken to engage the adversary, relaying information such as identifying adversaries, distance, and number of rounds the responder is shooting.

Controller training is provided to all controllers so they understand how to make certain controller calls when information is being articulated to them or when a critical event or engagement takes place during the adversary timeline.

The controller training also identifies and mitigates certain safety hazards, exercise artificialities, and adversary attack plan limitations. Certain terminal objectives are designed for evaluation these tests, such as

- Command & Control: The responders Command and Control structure and response Supervisors facilitate and provide clear direction and control over those responding to the threat, and they ensure the protection of assets.
- Communications:
  - Responders' communications are commensurate to the tactical environment.
  - Responders' communicators make the appropriate notifications within the facility.
  - Responders are able to utilize backup systems effectively and verify that systems function as designed without significant degradation of the radio system effectiveness or impact on effective communications.
- Individual/Team tactics: Responders use effective individual and team defensive tactics, appropriate to the situation.
- Response: Responders implement SERP and correctly adjust to the tactical situation as directed.
  - Equipment, Weapons, Vehicles: Responders are trained in their use and are able to deploy them tactically.
  - Ability to Implement SERP: Evaluate how well the responders deployed and implemented their tactics relative SERP requirements.

15.12 Whole System Performance Tests

What is Whole System Performance Testing?

Whole System Performance Testing focuses on methods to evaluate the overall performance measures for the response function. Testing the sections of the whole system ensures individual components work together. Two performance measurement criteria are evaluated:

What are Interruption and Neutralization?

Interruption – The successful arrival of the response force at an appropriate location to stop the adversary.
Neutralization – The response force kills, captures, or causes the adversary to flee before the adversary is able to complete the task.

What is a Table-Top?

Tabletop (or sand table or military map) analysis involves using a map or site schematic with either icons or miniature figures~~?~~ to represent combat elements. This method has been used in warfare at least since Roman Legion times, and probably earlier. Commanders can place the icons in various positions on the map and debate the outcome of possible engagements. A crucial element for tabletop analysis is the method used to determine the outcome of engagements. Expert judgment, data tables, or a set of rules with simple numerical calculations are the most common methods.

What are Computer Simulations?

Computerized engagement simulations are a third category. The Joint Conflict and Tactical Simulation (JCATS) will be used as an example in this discussion. JCATS is a multi-user computer simulation developed for analysis of large-scale force-on-force engagements. JCATS was adapted from a U.S. Army application by one of the U.S. Department of Energy (DOE) national laboratories for use in doctrinal planning. JCATS evolved from the original military map and tabletop exercises, but is more sophisticated. JCATS requires a minimum of two highly trained users and significant setup time. The simulation also requires at least three networked computers, one each for threat and response, and one for administrative control.

The simulation contains large databases for weapons, equipment, and individual combatant performance, including operations on varied terrain and day/night conditions. JCATS also requires at least two real-time war-gamers to operate the system and simulate the engagement, and one specialist to design the battlefield and activate the appropriate numerical combatants. The results have been shown to be "operator- and player-dependent"; i.e., a skilled computer game player can sometimes defeat more able military tacticians and thus skew the results.

What is a Force on Force?

Simulated physical engagements are also known as force-on-force (FOF) exercises. FOF exercises are not actually evaluation methodologies but should be considered training exercises or validation exercises. At a real facility, FOF requires four groups: mock adversaries, mock responders, referees, and the on-duty response force personnel. These exercises are expensive in terms of both personnel and planning, are usually run only a few times at a facility, and can also produce skewed results. Statistically, there are usually not enough engagements to produce a probability of system win with a high confidence level.