

R. F. Farnsworth

**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

WASHINGTON, D.C. 20555-0001



October 4, 2005

MEMORANDUM TO: Roy P. Zimmerman, Director
Office of Nuclear Security and Incident Response

FROM: Bruce A. Boger, Director *BABoger*
Division of Inspection Program Management
Office of Nuclear Reactor Regulation

SUBJECT: PANEL'S REVIEW OF THE DIFFERING PROFESSIONAL OPINION
INVOLVING FORCE-ON-FORCE EVALUATION CRITERIA

In response to your memo dated January 24, 2005, the ad hoc review panel (the "Panel") has reviewed the subject Differing Professional Opinion (DPO). A statement of the submitter's concern, background information, and the Panel's review process, conclusions and recommendations are provided below. This document supercedes my memorandum to you dated June 23, 2005. It has been revised to provide clarification in consideration of the comments provided by the submitter on June 29, 2005, and your comments dated August 16, 2005.

Background

In a memorandum dated January 24, 2005, you appointed me as Chairman of the ad hoc review panel for the DPO involving Force-on-Force (FOF) evaluation criteria. Jack Davis and Dennis Vernon, both from NSIR/DNS, were also designated by you as Panel members. Rani Franovich of NRR/DIPM assisted the Panel.

Statement of Concern

The Panel reviewed the written concerns submitted in the DPO (Attachment 1) and met with the submitter on January 27, 2005. Following introductions, a discussion of the NRC's DPO program, and a description of the process, the Panel asked the submitter to summarize his concerns. The Panel met with the submitter again on February 9, 2005, to obtain clarification on certain details of his concerns.

The Panel provided a concise summary of the concern to the submitter for his review and comment on February 21, 2005. The summary was discussed with the submitter on several occasions and revised based upon his comments. A final summary was approved by the submitter on April 11, 2005, and is as follows:

In short, the submitter contends that a win/lose paradigm is employed by the NRC in evaluating Force-on-Force (FOF) exercises at power reactor facilities. The submitter also contends that the win/lose approach is insufficient in that:

- (1) it does not adequately address relevant insights into licensee performance during the conduct of FOF exercises (i.e., is not performance-based);
- (2) results derived from these win/lose criteria are not reliable and do not provide defensible results and actions taken, or not taken, by the NRC and respective licensees due to these results may be detrimental to the public health and safety.

(3) there are numerous artificialities, many of which are complex and significant, associated with these exercises and these artificialities routinely affect the outcome of exercises. Most of the consequences resulting from these artificialities are known and can be adequately factored into the evaluation process. However, there are consequences created by some artificialities that evaluators are either unaware of or do not fully understand and these consequences can be the determining factor in which side wins or loses an exercise

(4) the affect of drill artificialities on the final outcome (success or failure to protect the target set) of the FOF exercises is amplified in the win/lose paradigm.

Regardless of the criteria used artificialities will always affect the outcome of these types of exercises. The number and type of artificialities, and the subsequent consequences relating to the bottom-line, remain the same regardless of the evaluation criteria used. However, a performance based criteria that evaluates the capabilities of protective force attributes such as command and control, communications, tactics (individual and team), equipment, protection strategy, etc. along with other supporting protective systems is not reliant on the bottom-line results to obtain necessary and beneficial data. Using performance based criteria evaluators are able to determine the effectiveness of these individual attributes regardless of who wins or loses the exercise. Evaluating these essential attributes provide evaluators with information pertaining to the protective force/systems' effectiveness which in turn provides a basis for determining whether the licensee has the necessary capabilities to adequately protect essential equipment.

(5) it precludes adequate evaluations of "wins" to identify performance deficiencies and areas for improvement;

(6) it provides no incentive to licensees to function in an open, legitimate manner and may provide motivation to manipulate their performance in an effort to "win."

Submitter's Proposal

A final summary of the submitter's proposal was approved by the submitter on April 11, 2005, and is as follows:

The submitter proposed that the NRC adopt a different evaluation approach similar to one employed by the U.S. Department of Energy (DOE). The proposed methodology, as the Panel understands it, is as follows:

Revise the FOF evaluation criteria. Employ performance-based criteria that focus on security force attributes (e.g., command and control, tactics, communications, etc.). An appropriate number of NRC evaluators with appropriate training should be used to assess protective force performance. Achievement of target set(s) provides insights into protective force performance, but the focus of performance assessment should be on the security force attributes and supporting protective systems. The focus of assessment should not be on win/lose. Win/lose is important to the assessment but the focus should be on why the licensee won or lost with emphasis on performance-based criteria.

In summary, the submitter contends that when using the Win/Lose criteria a licensee with a less than adequate protective system/force can "win" exercises while an licensee with adequate protective measures can "lose" due the existence of artificialities. This is especially significant when evaluators are either unaware of the introduction of one or more artificialities or the potential consequences of these artificialities. Moreover, the perceptions and actions taken based on these indefensible results can be counterproductive to the security posture at the evaluated facility and detrimental to credibility of the NSIR Force-on-Force program.

Review Process

The objective of the Panel was to conduct a thorough review of the submitter's concerns and proposal and make a recommendation to you regarding the disposition of the issues presented therein. To accomplish this, the Panel sought to (1) verify that the submitter's understanding of the NRC's FOF evaluation criteria was correct; (2) to gain insights into NRC policy governing FOF exercises (e.g., how the evaluation program was developed, how it has evolved over time, and the future direction of the program); (3) determine the extent to which the submitter's concern had been expressed to and discussed with his management; and (4) evaluate the merits of the concern and proposal. The Panel did not attempt to assess the effectiveness of the three FOF exercises that had been conducted under the November 2004 FOF evaluation program at the time report preparations commenced.

To this end, the Panel reviewed a number of NRC and DOE documents. The Panel also interviewed a number of NSIR/DNS staff and management, as well as representatives of DOE responsible for the DOE FOF program. A detailed presentation of the Panel's observations and conclusions based upon the information it reviewed is contained in the Panel's report (Attachment 2). A list of references is provided in Appendix 1 of that report.

As noted in the report, in the Panel's view, the submitter's concerns were not well-communicated up the NSIR management chain prior to the submittal of the DPO. The submitter's two immediate supervisors were aware of the concerns and opportunities existed for further discussion; however, a thorough vetting of the submitter's concerns by NSIR management did not take place to ensure that they were fully considered and dispositioned. There was no documentation that could be used to review the management decision-making process on the concerns that were expressed by the submitter. The Panel relied on numerous interviews to develop its understanding of how management addressed the issues and how the security staff implemented the new FOF program. Furthermore, the rapidly evolving nature of the FOF program over the previous two years and the absence of a clearly articulated future vision for the program revealed inconsistencies between information provided in a written format and program descriptions provided by staff and management. The Panel developed conclusions and recommendations specifically related to the submitter's concerns, which are offered for consideration as potential program enhancements.

Panel's Conclusions

The Panel recognizes that the FOF exercise is just one element that is considered when the effectiveness of a licensee's physical security program is evaluated. However, FOF exercises are the only means by which the NRC can observe and evaluate a protective force's implementation of its defensive strategy. These exercises provide valuable insights into a

protective force's ability to thwart adversaries that can not be obtained by reviewing a licensee's security plan or conducting the Security Baseline Inspection Program. Although NRC documentation does not refer to win/lose, the Panel agrees that the appearance of a win/lose paradigm exists due to the emphasis placed on target set protection in the significance determination process (SDP) along with the staff's understanding that protective force performance deficiencies exhibited during FOF exercises can only be developed as findings if they are linked to the loss of a target set. The NRC staff has been discouraged from bringing to the licensee's attention performance deficiencies exhibited when a target set has been protected due to a concern that this would be viewed as consulting with the licensee.

The submitter expressed in some detail his concerns regarding the influences of FOF exercise artificialities and the potential consequences on the outcome of an exercise. The Panel acknowledges that the influences of artificialities are well-known to the FOF program staff and that considerable efforts have been undertaken to reduce this influence. However, even when these artificialities are minimized, they can not be eliminated and they have the potential to invalidate or render indeterminate FOF exercise results. The submitter also asserts that in some cases artificialities exist that are unknown to the evaluators and may impact the protection of target sets. For these reasons, the Panel finds merit in the submitter's concerns with the potential impact of artificialities on FOF exercise outcomes.

The submitter contends that the FOF evaluation criteria should be revised to provide a focus on protective force attributes such as command and control, tactics, and communications. His proposal would retain consideration of drill outcomes in terms of protecting target sets; however, it would add to NRC evaluations a broader assessment of the protective force's ability to exhibit the performance attributes necessary to successfully execute a defensive strategy. There is some evidence that the staff currently applies an informal and team-specific approach to assessing performance attributes. However, the Panel feels that a structured assessment of performance attributes would enhance the NRC's ability to understand and articulate why a protective force was successful in its defense of target sets as well as enhance the NRC's ability to determine whether licensee corrective actions are appropriate in those instances where target sets were not well-protected. Such an assessment would also provide a template to consistently evaluate the adequacy of the licensee's critique of a FOF exercise. In the Panel's view, a structured assessment with established criteria would also provide the basis for discussions with licensees on performance deficiencies, regardless of target set outcomes and without the appearance of consulting. The Panel agrees with the submitter's concept.

The submitter proposed that the NRC adopt an evaluation approach similar to the one employed by DOE. The Panel found the DOE FOF program, with its 25 years of experience, to merit consideration for benchmarking. The Panel did not fully investigate the merits of migrating to an approach similar to one employed by DOE; however, it felt a systematic comparison of DOE and NRC FOF programs could be beneficial. Although the regulatory relationship that exists between the NRC and its licensees is much different than the relationship between DOE and its contractors, the Panel determined that insights and lessons learned can be gleaned from this program to improve the existing NRC program. The resulting process would involve consideration of formalizing protective force performance evaluations across a number of performance attributes and the consideration of methods to further reduce the impact of artificialities on drill outcomes. Specifically, a revision to the FOF program that retains aspects of the current program, augmented with features of the submitter's proposal or alternative changes that minimize the impact of artificialities on the evaluation criteria applied to

the protective force, could optimize the NRC's FOF performance assessment capabilities within budgetary constraints. It could also provide a vehicle, consistent with Reactor Oversight Process (ROP) principles, to identify and provide feedback to licensees on performance deficiencies.

The submitter also asserts that the proper evaluation of protective force attributes would require specific training for NRC evaluators. He also asserts that the number of evaluators would have to be appropriate to adequately monitor a representative sample of attributes to compensate for artificialities. The Panel acknowledges the staff's efforts to recruit security experts and to develop a training and qualification process for NRC inspectors. However, it appears to the Panel that more structured and specialized training and periodic retraining and refreshing of perishable skills is likely to be needed for inspectors with varying levels of security experience to consistently perform the revised FOF program noted in the preceding paragraph. The Panel notes that an assessment of the revised program, including the sample size of performance attributes, would have to be conducted to determine the appropriate number of evaluators.

The Panel concludes that certain aspects proposed by the submitter have merit and, if applied, would allow the NRC to more reliably assess the capability of a protective force to execute an effective defensive strategy. The Panel believes that a revised FOF program that retains the goal of protecting target sets and applies the performance assessment tools and techniques proposed by the submitter is viable, comports with the principles of the ROP, and would be more effective in both assessing and improving performance.

Panel's Recommendations

With respect to the submitter's concerns, the Panel recommends revision of the FOF program with consideration of the following:

1. Benchmark with other federal agencies (U.S. Department of Defense, DOE) to gather insights, techniques and strategies for evaluating protective force performance during FOF exercises.
2. Develop protective force performance attributes and evaluation criteria that should be used by FOF evaluators.
3. Incorporate protective force performance attributes and evaluation criteria into inspection procedures, assessment tools (including those for the SDP and licensee feedback), and guidance documents. Document assessments in inspection reports.
4. Develop a structured process to provide licensees FOF exercise feedback on protective force performance against the attributes and evaluation criteria identified.
5. Perform a job-task analysis for NRC FOF evaluators. Develop a more structured and specialized training and certification program (including refresher training) for all FOF evaluators.
6. Employ a Communication Plan to reach out to internal and external stakeholders to develop a consistent understanding of the revised program.

Mr. Roy P. Zimmerman

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October 4, 2005

The Panel would like to acknowledge the professionalism, dedication, and tenacity of the submitter in pursuing his concerns. By raising them to this level, he has ensured that they will receive a full vetting. In this way, he has contributed significantly to the NRC's role of ensuring public health, safety and security. The Panel recommends that the submitter be considered for specific performance recognition in honor of his contribution.

Attachment: As stated

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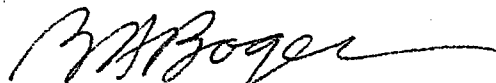
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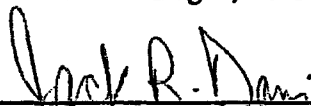
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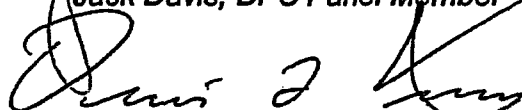
October 4, 2005



Bruce Boger, DPO Panel Chair



Jack Davis, DPO Panel Member



Dennis Vernon, DPO Panel Member

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Disclaimer: Information contained in portions of this report reflects the DPO ad hoc review panel's understanding of the Department of Energy's (DOE) force-on-force program.

Report Details

I. Introduction

An ad hoc review panel was established by memorandum dated January 24, 2005, to review a differing professional opinion (DPO) involving Force-on-Force (FOF) evaluation criteria. Bruce Boger served as the Chairman of the ad hoc review panel (hereafter the "Panel"). Jack Davis and Dennis Vernon, both from NSIR/DNS, served as panel members, and Rani Franovich of NRR/DIPM assisted the Panel.

The Panel reviewed the written concerns submitted in the DPO and summarized them as follows:

In short, the submitter contends that a win/lose paradigm is employed by the NRC in evaluating Force-on-Force (FOF) exercises at power reactor facilities. The submitter also contends that the win/lose approach is insufficient in that:

- (1) it does not adequately address relevant insights into licensee performance during the conduct of FOF exercises (i.e., is not performance-based);
- (2) results derived from these win/lose criteria are not reliable and do not provide defensible results and actions taken, or not taken, by the NRC and respective licensees due to these results may be detrimental to the public health and safety.
- (3) there are numerous artificialities, many of which are complex and significant, associated with these exercises and these artificialities routinely affect the outcome of exercises. Most of the consequences resulting from these artificialities are known and can be adequately factored into the evaluation process. However, there are consequences created by some artificialities that evaluators are either unaware of or do not fully understand and these consequences can be the determining factor in which side wins or loses an exercise.
- (4) the affect of drill artificialities on the final outcome (success or failure to protect the target set) of the FOF exercises is amplified in the win/lose paradigm.

Regardless of the criteria used artificialities will always affect the outcome of these types of exercises. The number and type of artificialities, and the subsequent consequences relating to the bottom-line, remain the same regardless of the evaluation criteria used. However, a performance based criteria that evaluates the capabilities of protective force attributes such as command and control, communications, tactics (individual and team), equipment, protection strategy, etc. along with other supporting protective systems is not

reliant on the bottom-line results to obtain necessary and beneficial data. Using performance based criteria evaluators are able to determine the effectiveness of these individual attributes regardless of who wins or loses the exercise. Evaluating these essential attributes provide evaluators with information pertaining to the protective force/systems' effectiveness which in turn provides a basis for determining whether the licensee has the necessary capabilities to adequately protect essential equipment.

- (5) it precludes adequate evaluations of "wins" to identify performance deficiencies and areas for improvement;
- (6) it provides no incentive to licensees to function in an open, legitimate manner and may provide motivation to manipulate their performance in an effort to "win."

In the formal DPO, the submitter proposed a remedy for his concerns. The proposal is summarized as follows:

The submitter proposed that the NRC adopt a different evaluation approach similar to one employed by the U.S. Department of Energy (DOE). The proposed methodology, as the Panel understands it, is as follows:

Revise the FOF evaluation criteria. Employ performance-based criteria that focus on security force attributes (e.g., command and control, tactics, communications, etc.). An appropriate number of NRC evaluators with appropriate training should be used to assess protective force performance. Achievement of target set(s) provides insights into protective force performance, but the focus of performance assessment should be on the security force attributes and supporting protective systems. The focus of assessment should not be on win/lose. Win/lose is important to the assessment but the focus should be on why the licensee won or lost with emphasis on performance-based criteria.

In summary, the submitter contends that when using the Win/Lose criteria a licensee with a less than adequate protective system/force can "win" exercises while an licensee with adequate protective measures can "lose" due the existence of artificialities. This is especially significant when evaluators are either unaware of the introduction of one or more artificialities or the potential consequences of these artificialities. Moreover, the perceptions and actions taken based on these indefensible results can be counterproductive to the security posture at the evaluated facility and detrimental to credibility of the NSIR FOF program.

The Panel's summary of the concerns and proposal expressed in the formal DPO was approved by the submitter on April 11, 2005.

The objective of the Panel was to conduct a thorough review of the submitter's concerns and proposal and make a recommendation to you regarding the disposition of the issues presented therein. To accomplish this, the Panel sought to (1) verify that the submitter's understanding of

the NRC's FOF evaluation criteria was correct; (2) to gain insights into NRC policy governing FOF exercises (e.g., how the evaluation program was developed, how it has evolved over time, and the future direction of the program); (3) determine the extent to which the submitter's concern had been expressed to and discussed with his management; and (4) evaluate the merits of the concern and proposal. The Panel did not attempt to assess the effectiveness of the three FOF exercises that had been conducted under the November 2004 FOF evaluation program at the time report preparations commenced. To this end, the Panel reviewed a number of NRC and DOE documents. The Panel also interviewed a number of NSIR/DNS staff and management, as well as representatives of DOE responsible for the DOE FOF program. This report documents the Panel's observations and conclusions based upon the information it reviewed.

II. Evolution of the Current Process

It is important to understand the context within which the NRC FOF Program has evolved over the last four decades to fully evaluate the submitter's concerns. Of particular importance to this understanding is the security foundation and critical program aspects employed within the NRC's FOF program which ensures high assurance of a licensee's ability to thwart the DBT.

In 1967, the Atomic Energy Commission (AEC), interpreted its "common defense and security" legislative authority as mainly requiring basic protection against industrial sabotage at licensed commercial nuclear power plants (NPP). The AEC concluded that protection of the U.S. against hostile enemy acts was the responsibility of the nation's defense establishment and of the various agencies having internal security functions. However, there were numerous public challenges to this limited interpretation, most notably during the Turkey Point NPP licensing hearings of 1967, that prompted the AEC to commission a study to investigate the appropriate scope of nuclear power plant industrial sabotage protection. It was determined that industrial sabotage should be viewed in terms of socioeconomically-motivated actions (such as acts resulting from civil demonstrations) and should not be defined as damage that could result from sabotage by subversive organizations or trained foreign agents. Such decisions were codified and promulgated in 10 CFR 50.13, "Enemies of the United States," which specifically precludes the requirement for NRC licensees to protect against sabotage from an enemy of the United States, whether a foreign government or other person.

Since 1967, there has been considerable change in AEC, and subsequently NRC, policy and licensing practice regarding security requirements for commercial nuclear power reactors primarily due to the change in the incidence and type of malevolent acts in society. Considerations of design threat levels as applied to reactor physical protection were included in the 1973 ANSI Standard N18.17, "Industrial Security for Nuclear Power Plants," and endorsed by Regulatory Guide 1.17 that same year. In early 1974, the security plans at all operating reactors were reviewed in accordance with the guidance of Regulatory Guide 1.17.

After the creation of the NRC in 1975, Congress directed the NRC to develop contingency plans for dealing with threats, thefts, and sabotage at NRC licensed facilities. By 1977, the NRC was directing its licensees to examine facility operations to determine vulnerabilities related to radiological sabotage. However, the NRC became concerned that implementation was inconsistent among licensees and in early 1982, the Regulatory Effectiveness Reviews (RER) Program was established. The intent of the RER program was to examine the effectiveness of

the security requirements while evaluating the licensees' ability to implement the requirements in a manner that would ensure protection against the Design Basis Threat (DBT). Unfortunately, no implementing guidance existed at the time and this contributed to inconsistent application and findings from the NRC reviews. After the completion of several RER inspections the NRC employed external security experts to provide more uniform input to the review process that was consistent with the known threat environment and with known and expected adversary characteristics of the time.

As a result of the number of inconsistencies in licensee security programs that were identified through the RER program, the NRC determined that it was appropriate to test licensee defensive strategies under simulated adversary attacks. In the late 1980's, the NRC established the Operational Safeguards Response Evaluation (OSRE) Program. To ensure more consistency in program application than was achieved with the RER program, the NRC developed target sets with thresholds based upon a Part 100 release. The NRC also established an explosives testing program to validate barrier time credits as used in the OSRE program. The OSRE program was sized for an 8-year frequency of NRC observed plant FOF testing and completed its first cycle in 2000. Although the Panel was informed by credible sources that staff positions on the appropriate sizing and frequency of the OSRE program had been documented, the Panel was unable to locate any such files. Complicating the search was the fact that no centralized filing system exists for safeguards documents and several of the key staff that were reported as developing these documents have since retired from the NRC. Thus, the Panel was unable to review the basis for the frequency of OSRE visits, the number of exercises completed or needed per visit, or the minimum number of NRC evaluators and licensee controllers to ensure an outcome with high assurance under the attributes of the OSRE program.

In response to the terrorist events of September 11, 2001, the Commission temporarily suspended FOF evaluations. When the Commission approved staff plans to resume FOF exercises, it directed the staff to do so in an orderly phased approach. Phase 1 analyzed the impact of expanded adversary characteristics reflected in the new threat level via expanded tabletop drills. Phase 2 factored the lessons learned in Phase 1 into guidance governing pilot expanded FOF exercises. Phase 2 was designed to primarily evaluate the impact of the expanded adversary characteristics and compensatory measures. Phase 2 was expected to be the final phase of the analysis of the FOF process before commencing a new, routine FOF exercise program. However, experience from Phase 2 convinced the NRC that further development was warranted to achieve more effective, efficient, and realistic FOF exercises. It was also important to incorporate the post-9/11 changes to the design basis threat (DBT) into the routine FOF program. Thus, the NRC added a third Phase to complete transitional FOF exercises before a final routine program could be commenced.

The third Phase (Transitional Phase) continued to evaluate the purpose and scope of the future FOF program and the use of Multiple Integrated Laser Engagement System (MILES) equipment. It also explored the potential utility of software programs (e.g., Joint Conflict and Tactical Simulation [JCATS]) in preparing for and supplementing FOF exercises and piloted a significance determination methodology that considers mitigative actions and Part 100 criteria in assessing the potential consequences of adversary attacks. Phase 3 was completed in October 2004 with the results and lessons learned from this phase documented in SECY-04-0174.

In each of these phases, a consistent objective stated was that the review would include an evaluation of the process and scope of FOF exercises. A review by the Panel of each of the SECY papers transmitting the staff findings and lessons learned found that this objective was primarily focused on process/scope issues that were tactical/operational in nature. The Panel was not able to determine if the pilot process addressed the underlying programmatic aspects, which are central to the submitter's concern. For instance, it was not clear from the Panel's review that an investigation or testing was completed for the effectiveness of the FOF methodology employed and the strengths/weaknesses of the win/lose (performance-based) paradigm, the appropriateness of the frequency of FOF exercises per site, the significance of the number of scenarios exercised per visit, the consideration or need for the incorporation of performance-based attribute testing, or a determination of the minimum number of NRC evaluators and licensee controllers necessary under a win/lose paradigm to ensure valid outcomes.

Although these aspects which are critical to the submitter's DPO do not appear to have been investigated during the phased resumption of FOF exercises, the Panel recognizes that a considerable amount of effort went into developing and greatly expanding the current FOF program from the earlier OSRE and RER programs. The evolved program includes more players, more weaponry, increased insider activities, more complex tactical approaches and defensive strategies, longer duration exercises, and the use of state-of-the-art exercise equipment. The increase in the level of complexity has directly increased the realism and greatly reduced the artificialities associated with FOF exercises. In the Panel's view, it would seem that this increase would have a direct impact on the minimum number of evaluators and controllers necessary to ensure any artificialities or equipment malfunctions are identified and fully accounted to ensure validity and high confidence of exercise results. Without appropriate investigation, an informed opinion on the appropriate number of FOF evaluators is not possible.

Finally, the Panel notes that despite the numerous components of the FOF program and necessary related components (e.g., the PPSDP) that were still in draft at the time, the staff did not identify any significant program issues to prevent transition into a full (routine) FOF evaluation program. The routine program commenced in November 2004.

III. The Current Approach

The Panel reviewed documents and conducted interviews of DNS staff and management to gain a better understanding of the NRC's current FOF Program. Specifically, the Panel explored the submitter's assertion that the current FOF Program employs a win/lose paradigm and that such an approach is insufficient due to the perceived inherent weaknesses of this method. The Panel's understanding is that the win/lose concept is based on whether a protective force protects a target set (a win) or the adversary achieves destruction of a target set (a loss), and not on the effectiveness of the performance attributes with the protection capabilities provided by the protective force.

A. The NRC's Use of a Win/Lose Paradigm

Since the use of the term "Win/Lose" by the submitter in describing the NRC's current FOF program can have a different meaning to different people, the Panel interviewed NSIR/DNS staff and management to glean their understanding of the current FOF evaluation approach and

criteria used by the NRC. NSIR/DNS staff and management confirmed (without exception) that the NRC's FOF Program and evaluation paradigm revolves around the bottom line outcomes (protection of target sets) of the exercises. Similarly, Manual Chapter 0609, Appendix E, "Physical Protection Significance Determination Process for Power Reactors," focuses on target set loss or protection and radiological release in determining a finding's significance. Likewise, throughout NRC Inspection Procedure (IP) 71130.03, "Contingency Response - Force-on-Force Testing," the emphasis is clearly on the loss or successful protection of a target set. Specifically, Section 05.34, "Screening of Findings through SDP," focuses on target set losses and the impacts of radiological release as the sole factors considered in significance determination. The premise of the approach is that significant performance issues will manifest themselves in target set losses. Thus, the Panel concluded that the NRC's FOF Program does apply win/lose criteria that places considerable importance on the bottom-line results of target set loss or protection in determining a licensee's overall ability to thwart the DBT.

B. Sufficiency of the Win/Lose Approach

Through interviews with NSIR/DNS management responsible for oversight of the NRC FOF program and interviews with NSIR/DNS Team Leaders and staff charged with executing the program, the Panel determined that these individuals agree that artificiality is inherent in FOF exercises, but that it is not at a level to negate the effectiveness of a FOF drill. The Panel was informed that a properly conducted drill is the most effective tool for assessing site performance. The interviewees believe that potential artificialities can be controlled and their impact effectively assessed and dispositioned. The Panel was informed that such assessments occur during the post-exercise critique and as part of the assessment of whether the exercise outcome is a valid representation of the licensee's ability to defend the target sets. It is also the position of those interviewed that performance attributes (e.g., response tactics, command and control, communications, detection, etc.) of the licensee's response force are, in fact, evaluated by the NRC during FOF exercises. After assessment of any impacts on the performance aspects of the drill (i.e., whether such a deficiency had a significant impact on target set loss or protection), findings from these evaluations are directed through the regional FOF participant and resolved through the baseline security inspection program. Although the Panel was unable to locate implementing documentation that specifically requires or guides NRC evaluators in consistently assessing these components, the Panel was provided copies of unofficial checklists that are used by some of the FOF Team Leaders to ensure these areas are reviewed. However, the Panel feels that a structured assessment tool to evaluate performance attributes would enhance the NRC's ability to understand and consistently articulate why a protective force was or was not successful in its defense of target sets.

The submitter disagrees with the premise that significant performance issues will manifest themselves in target set losses. The submitter contends that artificialities, both known and, perhaps more importantly, those not recognized, may mask significant performance issues regardless of target set protection. The submitter also disagrees that evaluation of performance attributes can be successfully achieved under the existing NRC FOF program. The submitter contends that this method is compromised by the limited number of NRC evaluators available to observe every exercise participant throughout the conduct of an exercise to ensure a valid determination of each participant's impact on the exercise result. Although licensee controllers have a mitigating effect on unknown artificialities, the submitter contends that even the most skilled controller having vast FOF exercise experience and knowledge cannot be totally aware of everything occurring around him/her during the entire exercise. The

submitter also remarks that some licensee controllers may not be fully forthcoming in raising mistakes made by themselves or others during the conduct of the exercise. Therefore, one or more activities could occur without being observed or reported by a controller, and therefore not considered, which could significantly impact the outcome of the exercise. The limited number of NRC evaluators employed in these exercises makes it very difficult to consistently identify performance attribute deficiencies having a direct impact on the final outcome of an exercise.

During interviews, DNS staff and management confirmed their reliance on expert judgement to assess protective force performance and identify findings. The Panel determined that, in practice, findings were specifically tied to lost target sets. In one interview, the Panel was told that any compliance issue identified during a FOF exercise would not be characterized and developed as a finding unless one or more target sets were destroyed. A senior DNS manager confirmed that this was the practice. As such, it became apparent to the Panel that performance deficiencies might not be developed as FOF inspection findings, documented in inspection reports, communicated to licensees for corrective action, and revisited during future inspections to ensure they were adequately corrected, unless target sets were lost. In the Panel's view, this also was not in conformance with the ROP.

SECY-05-0082 states that an objective of the new security oversight process is to provide valid indications of licensee performance. In reviewing the Commission Paper, it appeared to the Panel that FOF exercise outcomes (target set defense or loss) are a dominant input to the Security Cornerstone Action Matrix. The Panel concluded that the current FOF program (as defined in program guidance documents) is potentially susceptible to unreliable or incomplete conclusions regarding licensee (protective force) performance because it focuses on bottom line outcomes. It appears that the premise of the current FOF program is that significant performance issues will result in target set losses. The Panel considered this premise to have a weakness, because performance issues may not necessarily translate into drill outcomes if they are neutralized or masked by artificialities. As such, the NRC's ability to maintain an appropriate level of oversight might be vulnerable to invalid assessments of protective force performance during FOF exercises. Specifically, a protective force that protects target sets fortuitously rather than through a strong defensive strategy and robust skills and abilities might not receive the appropriate level of NRC oversight to effect improvement. Likewise, a protective force with a strong defensive strategy and robust skills and abilities might lose a target set because of the impact of artificialities on drill outcomes and could receive a heightened level of assessment that is unwarranted and inefficient.

The Panel feels that a structured assessment tool to evaluate performance attributes would enhance the NRC's ability to identify protective force performance deficiencies in an objective manner, regardless of target set defense or loss.

C. Summary of Panel's Assessment of the Current FOF Approach

The Panel investigated whether any planned changes or improvements were being considered beyond the phased resumption that may have a bearing on the submitter's concerns. The Panel was informed by NSIR/DNS management that some of the submitter's concerns were being considered for future improvements to the FOF program. During the phased resumption of the FOF program, NRC and industry implemented a number of enhancements to reduce artificialities and to make the exercises more realistic including the use of MILES gear and improving CAF training, qualifications and preparation by including enhanced access to insider

knowledge. However, aside from various changes made during the phased resumption NSIR/DNS management could not produce any documentation specifically addressing the issues as raised by the submitter.

V. The DOE Approach

The Submitter believes that the impact of drill artificialities on the final outcome (success or failure to protect the target set) of the FOF exercises is amplified in the win/lose paradigm. The Submitter proposed that the NRC adopt an approach similar to one employed by the U.S. Department of Energy (DOE). To become more knowledgeable about the DOE's FOF Program, the Panel met with the DOE Office of Independent Oversight and Performance Assurance (OA). This enabled the Panel to gain insights into DOE's inspection methodology and, moreover, their FOF evaluation rating system.

A. Evolution of the DOE Rating System

It is the Panel's understanding that in the early 1980's, DOE employed the win/lose paradigm as the driving factor for assigning a rating (Satisfactory, Marginal and Unsatisfactory) to describe the adequacy of the protection afforded to DOE special nuclear material (SNM) processing facilities. The program elements that were evaluated included physical security systems and, protective forces. Although there were lower tier areas (e.g. training; performance of routine duties) under the subject area of protective force, the outcome of the FOF received the greatest visibility and served as the driving force for the rating assigned. As a result, a "win" on the FOF was deemed necessary to obtain a passing inspection grade. When a site did not "win," the DOE operations office manager (similar to a Regional Administrator) would appear before a Congressional oversight subcommittee to explain why the site "failed" and what corrective actions were planned to ensure there would not be a recurrence.

DOE officials indicated that FOF exercises were not reliable indicators of the entire site's safeguards and security posture when a win was not achieved. The low reliability of accurate exercise outcomes was attributed to the sometimes unpredictable drill artificialities. Moreover, DOE field officials indicated that the effectiveness of the various protective elements or measures that were, in fact, a part of the site's protective strategy were not duly considered and/or evaluated in a Win/Lose paradigm. An adversarial relationship developed between the DOE Headquarters (that was conducting the inspections) and the DOE field offices because the site contractors were under pressure to "win the FOF at any cost" in order to avoid a Congressional oversight hearing. As a result, additional artificialities (e.g., gaming the exercise) further interfered with the FOF evaluation process. Field office managers petitioned for a more balanced and accurate approach to characterizing the site's security posture, and the DOE's "win/lose" construct evolved to its current methodology.

B. DOE's Current Security Assessment Approach and Scope

The "Office of Independent Oversight and Performance Assurance, Appraisal Process Protocols" dated January 2002, describes the current approach as a series of security topical and sub-topical reviews that are rated individually and then combined to arrive at an overall security rating for a facility. Typical topical areas include: Protection Program Management; Physical Security Systems; Material Control and Accountability; Protective Force; Personnel

Security; Classified Matter Protection and Control; Unclassified Cyber Security Program; and, Classified Cyber Security Program. If there are weaknesses, deficiencies, or standards that are not fully met, they are considered individually and collectively and balanced against any strengths or mitigating factors to determine the overall impact on the program's effectiveness. Based upon the analysis, a rating is assigned as: Effective Performance (Green); Needs Improvement (Yellow) or Significant Weakness (Red). Each topical area is subjected to checks and balances and quality reviews to ensure it represents an accurate assessment of a facilities security posture.

C. Purpose and Relationship of FOF Exercises to DOE's Security Assessment Process

Within the DOE, there are multiple organizational levels that conduct FOF exercises for different purposes. The site protective force contractors conduct exercises for individual and team tactical training; for in-service tactical response training; and to validate accuracy for adversary interdiction times based upon computerized vulnerability assessment data. Additionally, DOE requires their contractors (as a portion of their self-assessment program) to conduct four (4) equally-distributed FOF exercises each year. The technical basis for four (4) FOF's is to ensure that each protective force shift is tested. As a matter of routine, the local DOE field office conducts FOF exercises during routine inspections to verify the contractor's response capability. The DOE line management organization may also conduct a FOF for quality assurance purposes to ensure that response capability integrity is adequate. Lastly, the Office of Independent Oversight and Performance Assurance (OA) conducts FOF exercises as a part of their inspection data collection activities.

The outcome of a FOF is not a sub-topical area that is rated but, conversely, the results of FOF testing may be used as data points for the aforementioned sub-topical areas under the Protective Force topic. For example, if DOE evaluators determine that the protective force was not adequately trained in individual or team tactical movements (taking advantage of cover and concealment, radio discipline, and/or firearms proficiency, etc.), these types of deficiencies could provide indications of performance under the sub-topical areas of "Training" or "Management." These deficiencies also could impact the performance rating in the topic area of "Protection Program Management" if training was not, in fact, provided as a result of budget, policy and/or staffing shortfalls, which might indicate that management did not appropriately prioritize the security needs to ensure that the primary security mission could be accomplished. Additionally, deficiencies identified in the FOF may also indicate less than adequate performance for one or more sub-topical areas under Protection Program Management topic. This would be considered in the overall assessment of the Protective Force's performance. The DOE also uses FOF exercises to assess the effectiveness of the site's performance testing and to evaluate the suitability of site security plans.

D. Comparison of DOE's FOF Program to NRC's FOF Program

Although the DOE no longer applies the win/lose criteria to its FOF exercises, it has many similarities to NRC's implementation of FOF exercises. For instance, DOE evaluates performance attributes (e.g., individual and team tactics; command, control, and communications; etc.) in the context of a simulated attack by a design basis threat adversary, and effectively uses technology such as Multiple Integrated Laser Engagement System (MILES) to minimize artificialities. The NRC considers performance attributes as part of the conduct of simulated attacks by a design basis threat adversary and uses MILES as well. The

two primary differences between the programs are that: 1) DOE minimizes the variability of expert judgement on outcomes by employing a large number of evaluators using a systematic and standardized approach to performance attribute assessment, and 2) FOF results are considered within the context of performance attributes and do not receive a separate rating.

DOE determined that to adequately evaluate the security performance attributes during a FOF exercise, it needed to deploy 17 to 20 DOE inspectors for a typical FOF exercise. Assignments may be either to a particular protective force armed responder (fixed or roving patrol posts) or to monitor activities in a particular sector or zone. After the completion of each exercise, each DOE evaluator prepares a detailed worksheet that documents their evaluation of the contractor's performance in such areas as planning; communications; command and control; individual tactical skills; team tactical skills; application of deadly force; and response plan execution. DOE then compiles the results and performs a trending analysis from previous FOF exercise results. An important aspect of developing a valid assessment is to ensure that the evaluators are comprehensively trained, certified appropriately and periodically retrained, particularly on skills considered perishable.

E. Evaluator Training

Both DOE and NRC consider evaluator training and retraining to be a very important aspect of ensuring reliable results in FOF exercises. DOE has a National Training Center (NTC) located in Albuquerque, New Mexico, that is used to develop and conduct all safeguards and security related training including its FOF evaluators. Although the Panel did not conduct an in-depth review of the evaluator curriculum, the Panel was informed that the program has prescribed requirements, including prerequisite coursework, and requires associated certification.

Likewise, the Panel did not conduct an in-depth review of the NRC evaluator training program, but was informed that FOF evaluators attend two external training courses at the Federal Law Enforcement Training Center (FLETC) and the DOE Office of Secure Transportation (OST). The training received deals with firearms familiarity and capabilities. The Panel was further informed that the NRC evaluator certification program was still under development. Evaluators certified under the program are considered to be interimly qualified until such time as a complete program is developed and proficiency can be demonstrated.

F. Conclusions on the Comparison of DOE and NRC's Approach to FOF Exercises

The Panel recognizes that the regulatory relationship that exists between the NRC and its licensees is much different than the relationship between DOE and its contractors. In addition, differences exist in the facilities and their protective strategies. However, the Panel believes that the NRC can apply lessons learned by DOE (both positive and negative) and finds merit with some of the evaluation tools developed by DOE. Efforts to benchmark with DOE or Department of Defense (DOD) entities could enable the NRC to augment its current evaluation criteria and thereby have a more complete understanding of a protective force's strengths and weaknesses such that the performance issues can be more specifically addressed. The NRC should also ensure that an appropriate number of trained evaluators are available, as balanced through a cost/benefit analysis, to ensure valid and repeatable outcomes.

VI. Timing of DPO Submittal

As noted in MD 10.159, "In the free and open discussion of agency issues, professional differences of opinion are common. Employees normally try, and are encouraged, to resolve their concerns through discussions with their co-workers and supervisors." The MD also states that "In some cases, informal discussions fail to completely cover the matter in question ..." and if "all attempts to resolve the technical, legal, policy issues informally have failed," an employee may submit a formal DPO.

In the instance at hand, the submitter began employment with the NRC in 2003 with over 27 years of experience in the security field. In particular, he was very familiar with the FOF process used at DOE, since he served as a team leader for FOF exercises while at DOE. He was hired to perform a similar role at the NRC. The submitter was aware that DOE had modified their FOF program to reduce the emphasis on win/lose and to enhance the emphasis on protective force performance attributes. As explained below, he informally sought to introduce this approach to the NRC FOF program.

The submitter advised the Panel that he emailed a paper delineating his concerns to several co-workers and his first and second level supervisors in May 2004. He was unable to provide the Panel with a copy of that email, but indicated that it was similar in substance to the information provided in his DPO. His first-level supervisor recalled the email. The submitter indicated that, subsequent to that time, he spoke openly about raising his concerns through the DPO process. In addition, he met with his first level supervisor and discussed his concerns. This supervisor related to the Panel that he felt the approach proposed by the submitter would inappropriately place the NRC in a consultant role with the licensee. The concerns were next discussed between the submitter and his first and second level supervisor in the July 2004 time frame. The second level supervisor indicated to the Panel that he saw some merit in the submitter's suggested approach, but he also felt that the approach tended to look like a consultant's role rather than a regulator. It does not appear to the Panel that the issues the submitter raised were elevated to higher management at that point in time. This may have been because the second level supervisor felt he had remanded the issues back to the first level supervisor for resolution. However, the first level supervisor seemed to feel that it was the submitter's prerogative to submit a DPO if further recourse was desired. The submitter recalls being asked about his intentions to submit a DPO by his first and second level supervisors after their meeting, but no follow up discussions to further pursue his issues took place.

In the Panel's view, the submitter's concerns were not well-communicated up the NSIR management chain prior to the submittal of the DPO. The submitter's two immediate supervisors were aware of the concerns and opportunities existed for further discussion; however, a thorough vetting of the submitter's concerns by NSIR management did not take place to ensure that they were fully considered and dispositioned. The Panel recognized that the timing of the concerns raised by the submitter was challenging because the organization was focused on the implementation schedule for the revised FOF exercise program (November 2004). Many activities were taking place during the spring and summer of 2004 to update procedures and provide training to security inspection staff. Nevertheless, opportunities existed to more fully address the submitter's concerns.

VII. Panel's Conclusions

The Panel recognizes that the FOF exercise is just one element that is considered when the effectiveness of a licensee's physical security program is evaluated. However, FOF exercises are the only means by which the NRC can observe and evaluate a protective force's implementation of its defensive strategy. These exercises provide valuable insights into a protective force's ability to thwart adversaries that can not be obtained by reviewing a licensee's security plan or conducting the Security Baseline Inspection Program. Although NRC documentation does not refer to win/lose, the Panel agrees that the appearance of a win/lose paradigm exists due to the emphasis placed on target set protection in the significance determination process (SDP) along with the staff's understanding that protective force performance deficiencies exhibited during FOF exercises can only be developed as findings if they are linked to the loss of a target set. The NRC staff has been discouraged from bringing to the licensee's attention performance deficiencies exhibited when a target set has been protected due to a concern that this would be viewed as consulting with the licensee.

The submitter expressed in some detail his concerns regarding the influences of FOF exercise artificialities and the potential consequences on the outcome of an exercise. The Panel acknowledges that the influences of artificialities are well-known to the FOF program staff and that considerable efforts have been undertaken to reduce this influence. However, even when these artificialities are minimized, they can not be eliminated and they have the potential to invalidate or render indeterminate FOF exercise results. The submitter also asserts that in some cases artificialities exist that are unknown to the evaluators and may impact the protection of target sets. For these reasons, the Panel finds merit in the submitter's concerns with the potential impact of artificialities on FOF exercise outcomes.

The submitter contends that the FOF evaluation criteria should be revised to provide a focus on protective force attributes such as command and control, tactics, and communications. His proposal would retain consideration of drill outcomes in terms of protecting target sets; however, it would add to NRC evaluations a broader assessment of the protective force's ability to exhibit the performance attributes necessary to successfully execute a defensive strategy. There is some evidence that the staff currently applies an informal and team-specific approach to assessing performance attributes. However, the Panel feels that a structured assessment of performance attributes would enhance the NRC's ability to understand and articulate why a protective force was successful in its defense of target sets as well as enhance the NRC's ability to determine whether licensee corrective actions are appropriate in those instances where target sets were not well-protected. Such an assessment would also provide a template to consistently evaluate the adequacy of the licensee's critique of a FOF exercise. In the Panel's view, a structured assessment with established criteria would also provide the basis for discussions with licensees on performance deficiencies, regardless of target set outcomes and without the appearance of consulting. The Panel agrees with the submitter's concept.

The submitter proposed that the NRC adopt an evaluation approach similar to the one employed by the Department of Energy (DOE). The Panel found the DOE FOF program, with its 25 years of experience, to merit consideration for benchmarking. The Panel did not fully investigate the merits of migrating to an approach similar to one employed by DOE; however, it felt a systematic comparison of DOE and NRC FOF programs could be beneficial. Although the regulatory relationship that exists between the NRC and its licensees is much different than

the relationship between DOE and its contractors, the Panel determined that insights and lessons learned can be gleaned from this program to improve the existing NRC program. The resulting process would involve consideration of formalizing protective force performance evaluations across a number of performance attributes and the consideration of methods to further reduce the impact of artificialities on drill outcomes. Specifically, a revision to the FOF program that retains aspects of the current Program, augmented with features of the submitter's proposal or alternative changes that minimize the impact of artificialities on the evaluation criteria applied to the protective force, could optimize the NRC's FOF performance assessment capabilities within budgetary constraints. It could also provide a vehicle, consistent with Reactor Oversight Process (ROP) principles, to identify and provide feedback to licensees on performance deficiencies.

The submitter also asserts that the proper evaluation of protective force attributes would require specific training for NRC evaluators. He also asserts that the number of evaluators would have to be appropriate to adequately monitor a representative sample of attributes to compensate for artificialities. The Panel acknowledges the staff's efforts to recruit security experts and to develop a training and qualification process for NRC inspectors. However, it appears to the Panel that more structured and specialized training and periodic retraining and refreshing of perishable skills is likely to be needed for inspectors with varying levels of security experience to consistently perform the revised FOF program noted in the preceding paragraph. The Panel notes that an assessment of the revised program, including the sample size of performance attributes, would have to be conducted to determine the appropriate number of evaluators.

The Panel concludes that certain aspects proposed by the submitter have merit and, if applied, would allow the NRC to more reliably assess the capability of a protective force to execute an effective defensive strategy. The Panel believes that a revised FOF program approach that retains the goal of protecting target sets and applies the performance assessment tools and techniques proposed by the submitter is viable, comports with the principles of the ROP, and would be more effective in both assessing and improving performance.

VIII. Recommendations

With respect to the submitter's concerns, the Panel recommends revision of the FOF program with consideration of the following:

1. Benchmark with other federal agencies (DOD, DOE) to gather insights, techniques and strategies for evaluating protective force performance during FOF exercises.
2. Develop protective force performance attributes and evaluation criteria that should be used by FOF evaluators.
3. Incorporate protective force performance attributes and evaluation criteria into inspection procedures, assessment tools (including those for the SDP and licensee feedback), and guidance documents. Document assessments in inspection reports.

4. Develop a structured process to provide licensees FOF exercise feedback on protective force performance against the attributes and evaluation criteria identified.
5. Perform a job-task analysis for NRC FOF evaluators. Evaluate the appropriate number of FOF evaluators and develop a more structured and specialized training and certification program (including refresher training) for all FOF evaluators.
6. Employ a Communication Plan to reach out to internal and external stakeholders to develop a consistent understanding of the revised program.

IX. Closing Comments

The Panel would like to acknowledge the professionalism, dedication, and tenacity of the submitter in pursuing his concerns. By raising them to this level, he has ensured that they will receive a full vetting. In this way, he has contributed significantly to the NRC's role of ensuring public health, safety and security. The Panel recommends that the submitter be considered for specific performance recognition in honor of his contribution.

Appendix

List of Documents Reviewed

NRC Inspection Procedure 71130.03, Contingency Response – Force-on-Force Testing, November 10, 2004.

NRC Inspection Procedure 71130.05, Protective Strategy Evaluation, dated February 19, 2004.

NRC Inspection Manual Chapter 0609, Appendix E, Physical Protection Significance Determination Process (SDP) for Power Reactors (interim and draft).

NRC Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," dated December 21, 2004.

NUREG/CR-5081, Tactical Exercise Planning Handbook (Battelle).

"Context and Protocols for Performance Testing of Protective Forces," (DOE, Office of Environment, Safety and Health), February 1999.

"Security Performance Evaluation Section Force-on-Force Program Review," slides from Presentation by Ronald Albert, Section Chief, DNS/SPES, September 6, 2004.

SECY-04-0020, "Treatment of Physical Protection Under the Reactor Oversight Process," dated February 5, 2004.

SECY-04-0083, "Final Report on the Pilot Expanded Force-on-Force Exercise Program with Lessons Learned and Recommendations for Future Activities," dated May 14, 2004.

SECY 04-0198, "Redeveloping the Assessment Process for the Physical Protection Cornerstone of the Reactor oversight process," dated October 22, 2004.

SECY-05-0082, "Revised Assessment Process for the Security Cornerstone of the Reactor Oversight Process," dated May 12, 2005.

Telfair, W.D., D.A. Moul, J.W. Klingelhofer, W.R. Leonard, A Tactical Exercise Planning Handbook, @ NUREG/CR-5172, U.S. Nuclear Regulatory Commission (prepared as BMI-2166, by Battelle Columbus Division), Washington, DC, April 1989.

"Context and Protocols for Performance Testing of Protective Forces," dated February 1999, published by the DOE Office of Oversight, Environment, Safety and Health.

"Health and Safety Plan for Safeguards and Security Evaluations Inspection Force-on-Force Exercises Using Engagement Simulation System (ESS)/Multiple Integrated Laser Engagement Systems (MILES) Activities at U.S. Department of Energy Sites," dated September 2, 2004.