An Approach to Performance-Based, Risk-Informed Evaluations of a Site's Physical Protection Strategy – the Vulnerability Assessment Process

One of the most important aspects of any security program is the ability to analyze a facility's protective strategy to make cost-effective adjustments. It is critical for any type of facility with high-consequence assets to be able to take a multidisciplinary approach to self-identify and correct weaknesses.

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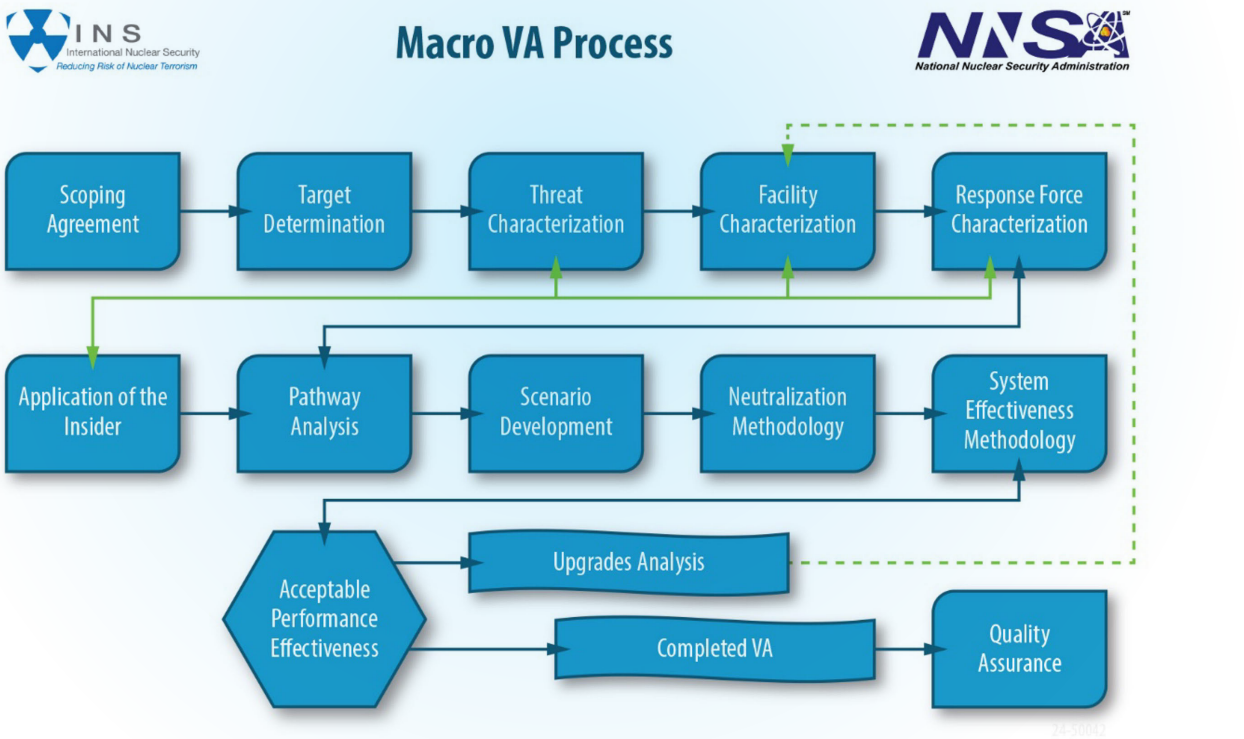
Physical Security Pathway

The U.S. Department of Energy (DOE) and National Nuclear Security Administration (NNSA) have implemented a vulnerability assessment (VA) process that has standardized the security assessments of DOE/NNSA facilities across many of its sites. This process entails a systematic evaluation of threat risks and protection capabilities using a quantitative approach. A flow diagram of the DOE/NNSA VA process is shown in Figure 3.

At a high level, the VA process requires site operators and security teams to develop and document facility targets, threats, adversary and response force characteristics, insider threat mitigation programs and potential attack pathways. Using a common set of threats and boundary assumptions, it is used to develop realistic, peer-reviewed scenarios based on aspects of a site's design basis threat and evaluate these scenarios using modeling and simulation tools. This provides an overall physical security system performance effectiveness (PE) metric to assess the security readiness of the facility. One of these developed scenarios is then selected by the regulator to run as a force-on-force exercise to validate the assessment findings. The results are used for continuous improvement of security processes, technology implementation, and culture. This overall process is documented as a VA report, which is used as a single point of evaluation for both the peer-review team and the regulator.

Figure 3. DOE/NNSA VA process flow.



Currently, the domestic nuclear power fleet already conducts several of the steps included in a standard VA. However, a systematic process along with a PE number to evaluate the security program is not currently being used. One reason for this is because quantitative criteria for commercial activities have not been developed.

The LWRS Program has been conducting research in this area and is currently evaluating how the DOE/NNSA VA process could be adapted for commercial nuclear power plant sites. The LWRS Program has considered current practices for both the nuclear power industry and DOE/NNSA sites to evaluate where there is overlap and where differences exist for security program evaluation. Additionally, this research effort has conducted two technical exchanges with the nuclear power industry to describe the DOE/NNSA VA process and gather feedback from nuclear utilities regarding how they currently conduct evaluations. These exchanges supported the development of a crosswalk identifying similarities and differences.

A prospective vulnerability analysis process has been developed from this research. It is a similar process to the DOE/NNSA VA, but, with adjustments to meet the specific needs of the nuclear power industry. The current plan for this research is to conduct VAs with collaborating nuclear power plant sites using an internally agreed upon PE number. These pilots inform the research and individual participants with lessons-learned and serve as a tool method refinement. These enhancements are intended to augment current insights and approaches to physical security self-assessments. The benefits for developing and implementing a VA process include:

- A potentially standardized VA process using a proven methodology
- The ability to quantify aspects of security assessments and establish formal metrics that are performance-based
- VA consistency improvement across assessments and sites
- Adversary characteristic and scenario realism improvement
- Enabling increased protective strategy information-sharing, lessons-learned and peer reviews
- The potential to reduce costs by increased efficiency and the elimination of redundant requirements.

Ultimately, this VA process will enable site personnel to assess protection strategies in its security program. Furthermore, a formal analysis program will support protective strategy decisions by using a performance-based, risk-informed process that is based on site-specific conditions. Understanding the site's risks would allow decision-makers to make investments to benefit the specific protection strategy being implemented and evaluate upgrades.

Welcome Commie Byrum, the New Physical Security Pathway Lead

Mr. Commie Byrum is the new Physical Security Pathway Lead for the LWRS Program. He works at Sandia National Laboratories (SNL) in the Global Security Analysis and Simulation department. During more than two decades of dedicated service within the U.S. Department of Energy National Nuclear Security administration, he has distinguished himself as a leader in security management.

Commie R. Byrum

Byrum has a broad range of expertise spanning various security disciplines including performance testing, vulnerability analysis, physical protection strategies, secure transportation of sensitive materials, insider threat countermeasures and protective force operations.

He holds Master of Arts (M.A.) and Bachelor of Science (B.S.) degrees in Organizational Management from Tusculum University and a Master of Arts (M.S.) degree in Security Management from Bellevue University.

Since joining SNL in 2022, Byrum has been instrumental in leading multidisciplinary teams to deliver critical systems analysis for physical protection and sabotage mitigation, supporting our nuclear/radiological security training and analysis programs. As the Physical Security Pathway Lead he will continue his commitment to enhancing our security initiatives and protecting our nation's critical assets and infrastructure.