

Matthew Talbot RhinoCorps mtalbot@rhinocorps.com

April 30, 2025

Modeling & Simulation Applications for Physical Security





RhinoCorps Support

- RhinoCorps is supporting two LWRS projects in FY25
 - Both projects are focused on the development of combat/physical security models using Simajin/Vanguard to further LWRS goals
- Monticello: Developing Simajin/Vanguard models of existing facility, defense, and attack scenario suite
 - Basis for pilot study of the performance-based security assessment method (SNL)
 - Support a study on the use of MASS-DEF tools on BWR to reduce security costs (INL)
- Crane Clean Energy Center
 - Support Physical Security Assessment and Analysis to provide the commercial client with a technical assessment for a set of candidate security alternatives



What is the Simajin/Vanguard Suite

- Simajin/Vanguard is a software tool suite used by government and commercial organizations to evaluate and quantify the system effectiveness of their security system
 - Used at all DOE/NNSA/EM sites where vulnerability assessments are required (PL 1-4)
 - Used at domestic (US) and international nuclear power plants
- Objectively measure overall security effectiveness and manage risk
 - Security costs are a large portion (10%-15%) of the operating budget for commercial reactors
- Simulations are much more cost-efficient than exercises and can be used to optimize defenses and evaluate changes







Modeling and Simulation Can Provide...

- Statistical data on:
 - Win/Loss percentages
 - Identification of vulnerable pathways
 - Breach points/times in attack plans
 - Layer data (first infiltrations times, deaths, escapes)
- Graphical data on:
 - Playback to watch the simulation execute, start, stop, rewind, etc.
 - Death Plots from multiple simulations
 - Shot Plots for individual simulations

- Model aspects/situations not easily captured in live events
- Investigate impact on:
 - Threat Changes
 - Size and capability
 - Insider support
 - Targets
 - New Technologies
 - ROWS
 - UAS/UAV impact
 - Physical/Cyber Threats
 - New defense procedures



Programmatics of Monticello Support

- RhinoCorps was placed on contract via Sandia National Laboratories in early December of 2024; it used an existing T&M contract with RhinoCorps
 - Kick-off Meeting (V) was executed on December 19th 2025
 - Follow-on Data Requirement meeting (V) executed on January 9th 2026
 - Obtained a SCRIBE 3D model which supported some model development (mostly external), but the internal facility model was reconstructed from client drawings.
 - Conducted an impromptu facility review at NEI-SWG on February 26th
 - Formal facility review (V) executed March 6th
 - Preliminary review of results conducted at Xcel on April 2nd
 - Process of identifying a final review date at Xcel in Junr
 - Expected completion of models and runs for record ~30 days after final review
 - On budget: 74% expended (as of April 15th)



Monticello Models

- RhinoCorps is working with INL to define the support required for the INL MASS-DEF aspect of the project.
 - Expect some small model/attack plan changes to evaluate the impact on security





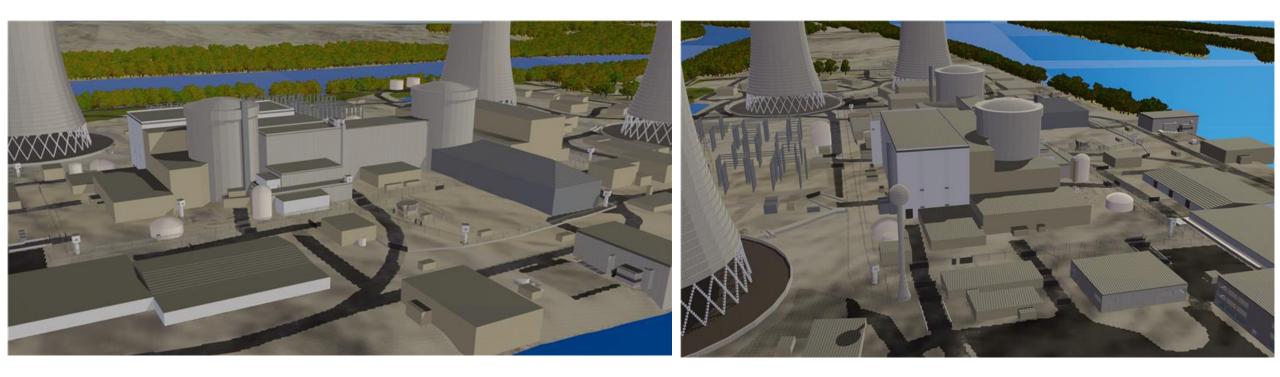
Programmatics of CCEC Support

- Support Physical Security Assessment and Analysis to provide the commercial client with a technical assessment for planned security changes
- Cost-sharing effort between Constellation and DOE-NE/LWRS
- Supported kick-off meeting at the facility on April 22nd and 23rd
 - Reviewed current model; discussed data requirements, and toured facility
 - The requested data is being gathered and is expected to be transmitted to RhinoCorps with the next few days
- Will schedule a follow-on facility review once new data is received and reviewed
- Expected completion closer to August or September, depending on number of alternatives and iterations
 - RhinoCorps can support an engagement where MODSIM data is presented to regulators



CCEC Models

• Initially planned for primarily external only; however, after site visit it is clear effort will require internal modeling as well





Summary

- Expected completion of the Monticello models in late spring or early June
 - Dependent on scheduling a final review with Xcel on attack plans and defense.
 - Follow-on effort to support modifications for MASS-DEF should be completed prior to September
 - On budget and on schedule
- CCEC analysis started; the modeling and analysis team shifting from Monti to CCEC
 - Conducted a kick-off meeting and site visit
 - External model build-out ahead of schedule; analysis will require some internal modeling
 - Expect external defense and baseline attacks to be reviewable in ~30-45 days
 - The internal portion of the analysis will follow on as it is developed
 - Focused on completing the assessment and providing Constellation with an assessment of alternatives by the end of FY25, if not prior



Sustaining National Nuclear Assets

lwrs.inl.gov