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# 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 19<sup>th</sup> 2025
  - Follow-on Data Requirement meeting (V) executed on January 9<sup>th</sup> 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 26<sup>th</sup>
  - Formal facility review (V) executed March 6<sup>th</sup>
  - Preliminary review of results conducted at Xcel on April 2<sup>nd</sup>
  - 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 15<sup>th</sup>)



# 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 22<sup>nd</sup> and 23<sup>rd</sup>
  - 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

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