Overview of the Physical Security Pathway

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Overview of Physical Security Pathway

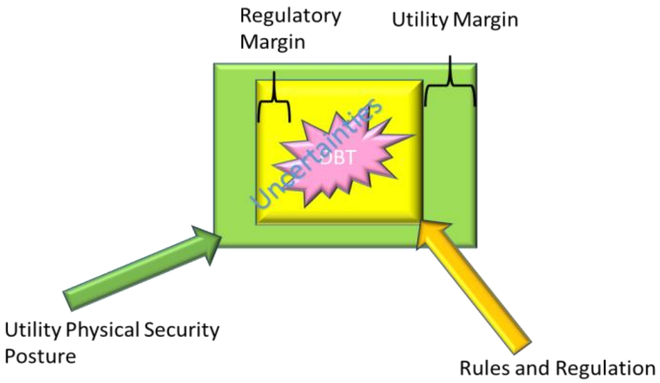
Physical Security research aims to create tools, technologies, and risk-informed physical security decisions and activities with the following objectives:

- Develop mitigation strategies and enhance the technical basis necessary for stakeholders to reevaluate physical security postures while meeting regulatory requirements.
- Analyze the existing physical security regime, current best practices, and compare/contrast insights with alternative methods which leverage advanced modeling and simulation, modern technologies, and novel techniques that address design basis threat and regulatory requirements

Short-term goal is to enable industry to operate nearer the staffing requirements of 10 CFR 73.55

Main research thrust areas:

- Advanced Security Technologies
- Risk-Informed Physical Security
- Advanced Security Sensors & Delay



Physical Security Risk-Related Research

Research Thrust Area
Advanced Security Sensors – Deliberate Motion Analytics
Advanced Security Sensors – Water Intakes
Risk Informed Security – Performance Based Data Collection Methodology
Risk Informed Security – Dynamic Risk Framework
Advanced Security Delay – Risk-Informed Adversary Timelines
Advanced Security Delay – Risk-Informed Approach for Unattended Openings
Risk Informed Security – Security Economics & Risk-Informed Management for Enterprise Security

FY-22 Activities

- Stakeholder Engagement Meetings
  - Path Analysis Workshop
  - Explosive Engineering Workshop
- Advanced Security Technologies
  - Remote Operated Weapons System (ROWS)
- Risk-Informed Physical Security
  - Dynamic Risk-Informed Framework
  - Performance Based Data Collection Methodology
- Advanced Security Sensors & Delay
  - Deliberate Motion Analytics (DMA)
  - Water Intakes
  - Unattended Openings (UAOs)
  - Vital Area Doors

Recent Accomplishments

- Completed first FY-22 stakeholder engagement meeting in February
- Conducted preliminary Sentry-II ROWS modeling with collaborating utilities
- Completed unattended opening testing
- Completed discussion series for developing a risk-informed security methodology with pilot utility and PWROG
- Ongoing human factors data collection during DOE marksman training evolutions
- Completed Interim Access Delay Security System Desk Reference (SSDR)
- Conducted first pilot study of DMA with collaborating utility

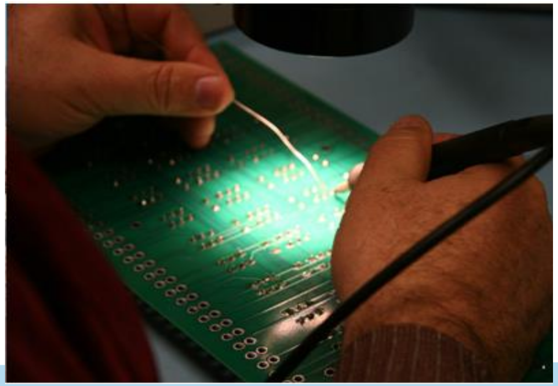
Industry Engagement & Roles

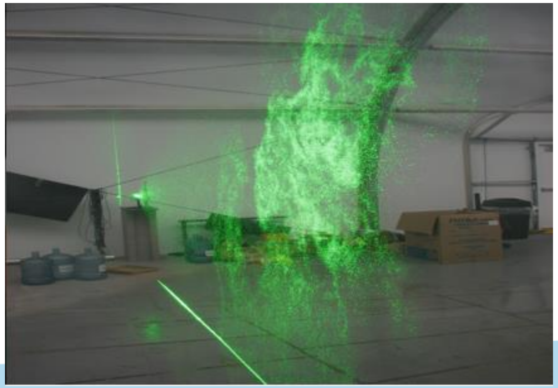
- ROWS – Xcel Energy, Entergy, Constellation, and NRC
- Unattended openings – NEI, Xcel Energy, Southern Nuclear Co. Stars Alliance, Dominion Energy, Entergy, NextEra, Exelon, and NRC
- Deliberate Motion Analytics – American Electric Power and Entergy
- Dynamic Risk-Informed Framework – Southern Nuclear, Arizona Public Service, PWROG, and RhinoCorps

- SBIR – ARES Security Corp.
- NEUP – Ohio State University

Impactful Out-Year Outcomes (within 3-years)

- Provide a risk-informed technical basis for unattended openings (2D & 3D)
- Access to updated performance based data sets and references from DOE Office of Security
  - Interim Access Delay SSRD, and other SSDRs
- Fleet-wide application of risk-informed access delay timelines for adversary and response force
- Support deployment of ROWS to at least one candidate site
- Pilot an integrated approach to dynamic force-on-force & reactor system response modeling
- Pilot the integration of human factors data and modeling for adversary and protective force
- Support deployment of advanced security sensor and delay technologies
  - Sensor fusion
  - Deliberate Motion Analytics
  - Jam-proof wireless
  - Vital area doors



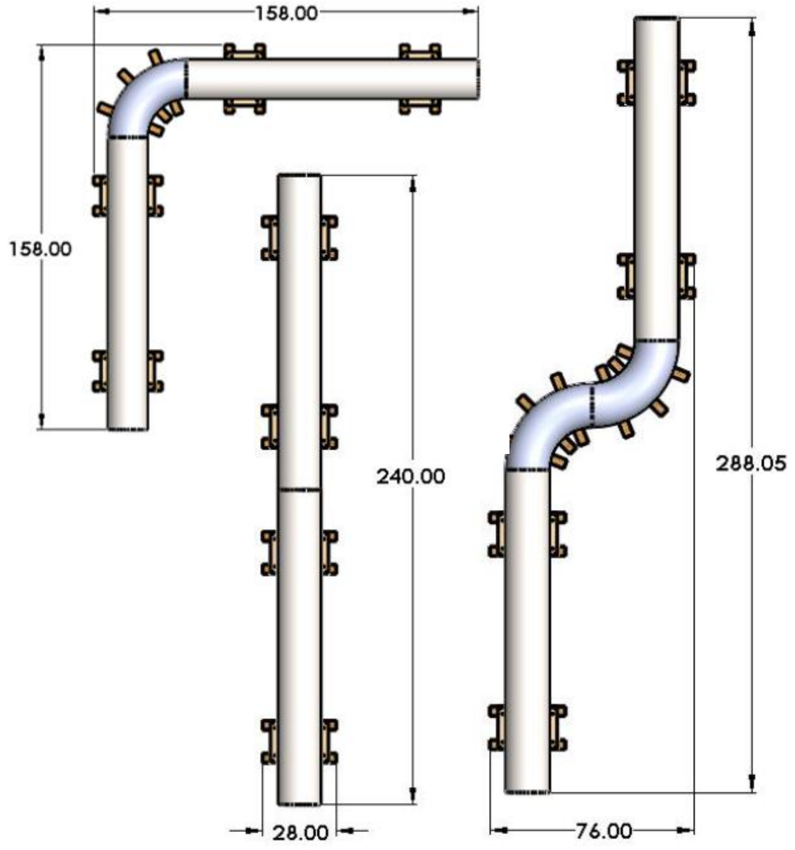


Risk Related Example - Unattended Openings

Impact: Provide the technical basis to determine optimized protective strategies related to person-passible openings that intersect security boundaries during normal and maintenance operations. Reductions in patrols, monitoring, and compensatory measures could be reconsidered but will be site specific on a case-by-case basis.

FY-22 efforts

- Conduct a risk-informed evaluation for 2D and 3D unattended openings based on past US Government policy
- Identify human factors associated with 2D and 3D openings
- Evaluate 2D UAO testing with 4-inch circle & rectangles and 36-inch circle
- Evaluate 3D UAO testing with 20-foot piping sections and pipe bends
- Evaluate success of passing through the opening (go/no-go), rate times, and limited data on exertion



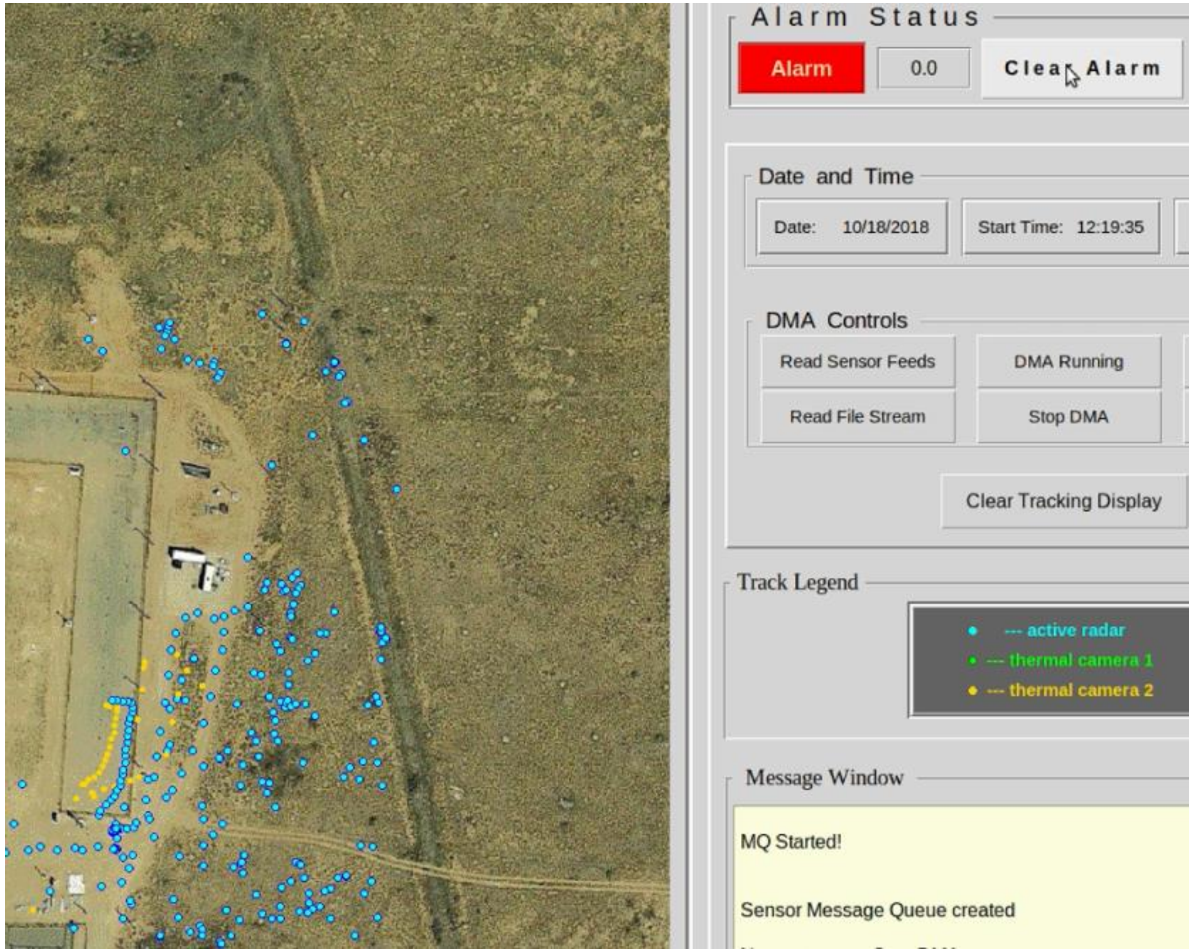
Example of 3D UAO Testing Configurations

Risk Related Example - Deliberate Motion Analytics

Impact: Security sensor fusion linked with DMA can take input from multiple sensors of different types, analyze the data, and determine if an adversary is making an approach toward a facility. Sites using current commercial sensor technologies typically experience elevated nuisance alarm rates (NAR) not caused by an intruder. Maintaining a low NAR while being able to detect intruders has the potential to decrease the cost of security.

FY-22 efforts

- Using DMA and sensor fusion, collect at least four weeks of continuous performance data at two nuclear power plant sites
- Consider engineered terrain (perimeter intrusion detection system) and un-engineered terrain (owner controlled area).
- Create an NPP-specific demonstration package containing sensor fusion



Active Radar (blue) and Thermal Camera (yellow) fused through DMA

Risk Related Example - Dynamic Risk-Informed Framework

Impact: A risk-informed physical security method integrating dynamic risk methods, physics-based modeling and simulation, operator actions, and FLEX equipment (as an example of safety equipment). This linked security-safety framework will extend the adversarial timeline for response force success. The tools will enable commercial utilities to incorporate increased realism in their force-on-force models, take credit for operator actions and FLEX equipment, and move toward greater use of quantitative measures of performance in security posture.

FY-22 Tasks:

- Develop guidance in collaboration with stakeholders to support the use of the dynamic risk tools.
- Integrate force-on-force simulation software platforms with thermal-hydraulic codes.
- Document Physical Security human reliability needs.
- Develop dynamic modeling tools to incorporate force-on-force and operator actions into static and dynamic risk assessment models; credit additional operator actions and FLEX within a site's protective strategy.

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