



# BioWatch Indoor Reachback Center (BIRC)

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## Mission of the BIRC:

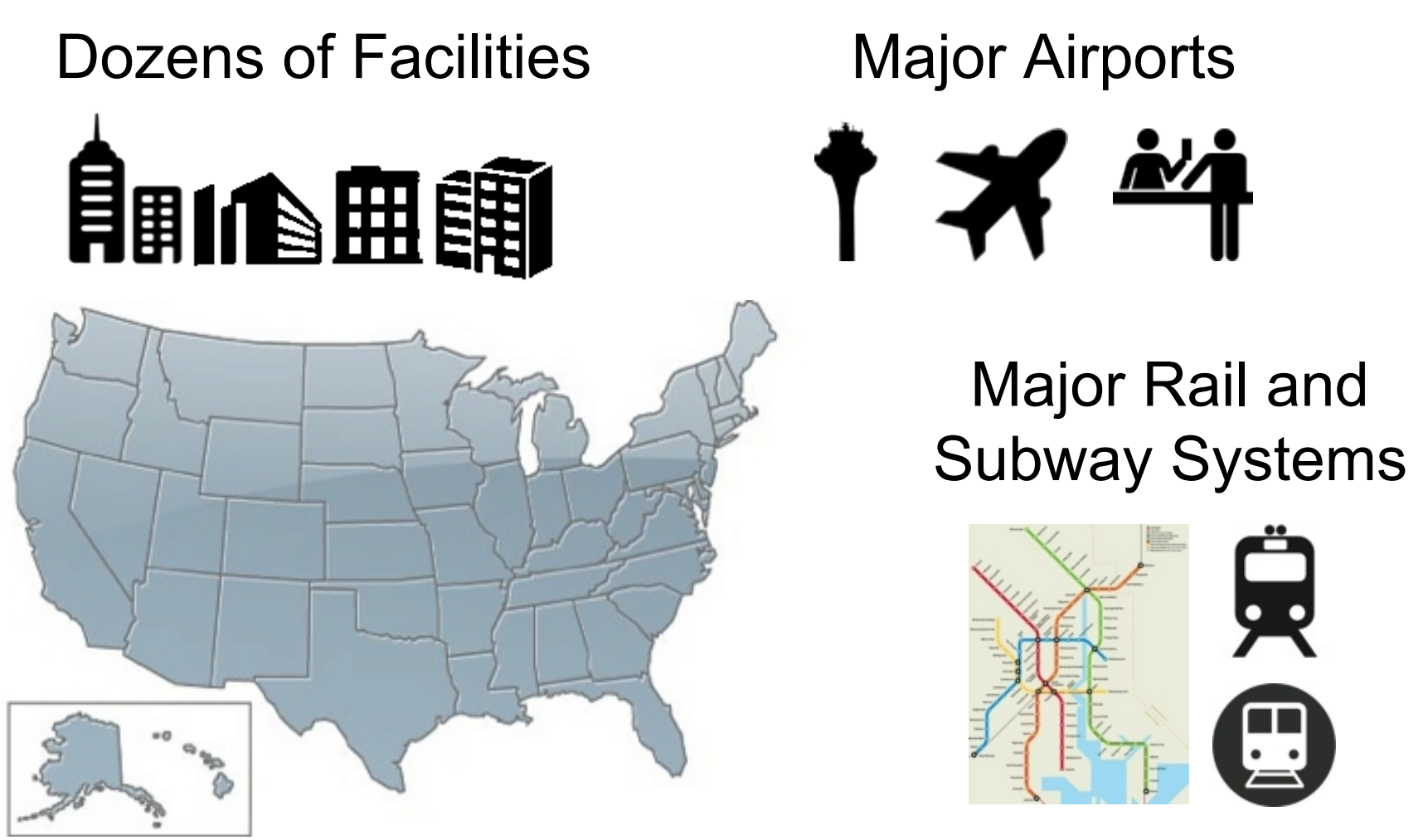
- Established by DHS to provide scientific modeling support to decision makers responding to a BAR or similar incident at an indoor facility or subway
- Provides information to decision-makers that can be used to address the following questions:
  - Where did the release come from?
  - How large was the release?
  - Where should initial sampling efforts be focused?
  - How much material may have been released to the outside?
  - Does the event represent a threat to public health?
- The BIRC can respond to either a BioWatch Actionable Result or to an overt release in a BIRC-supported facility



## BIRC Support Responsibilities:

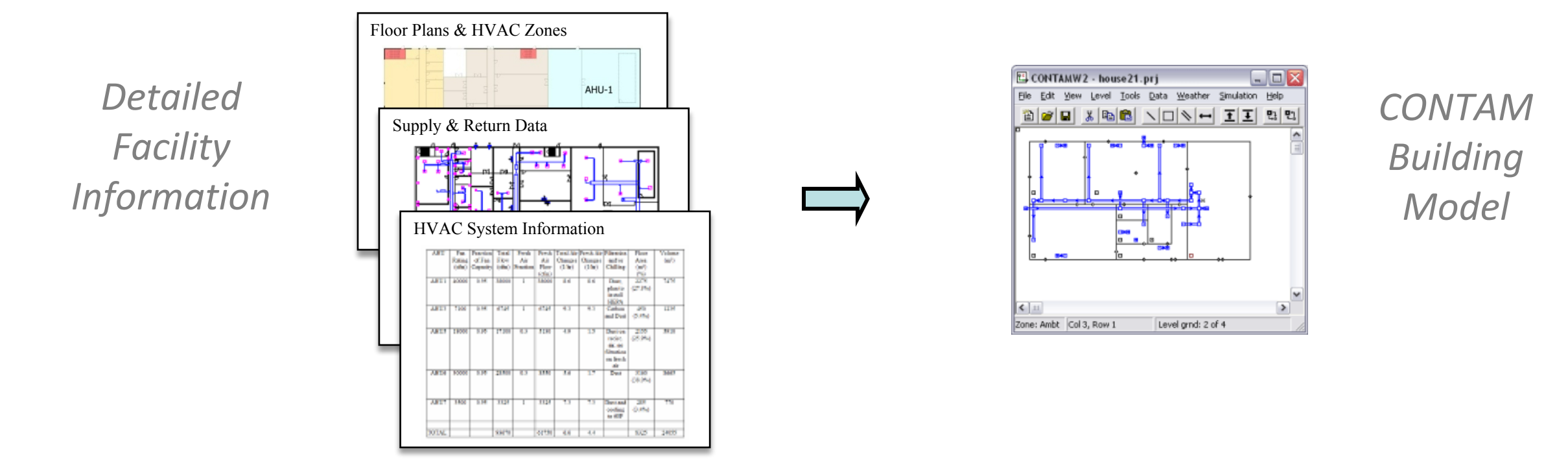
- Facility Modeling
- Collector/Detector Siting
- Incident Support and Situational Analysis
- Exercise Support for CONOPS Development and Testing
- Modeling, Simulation, and Analysis Supporting Directed Studies

BIRC supports deployments across the US:

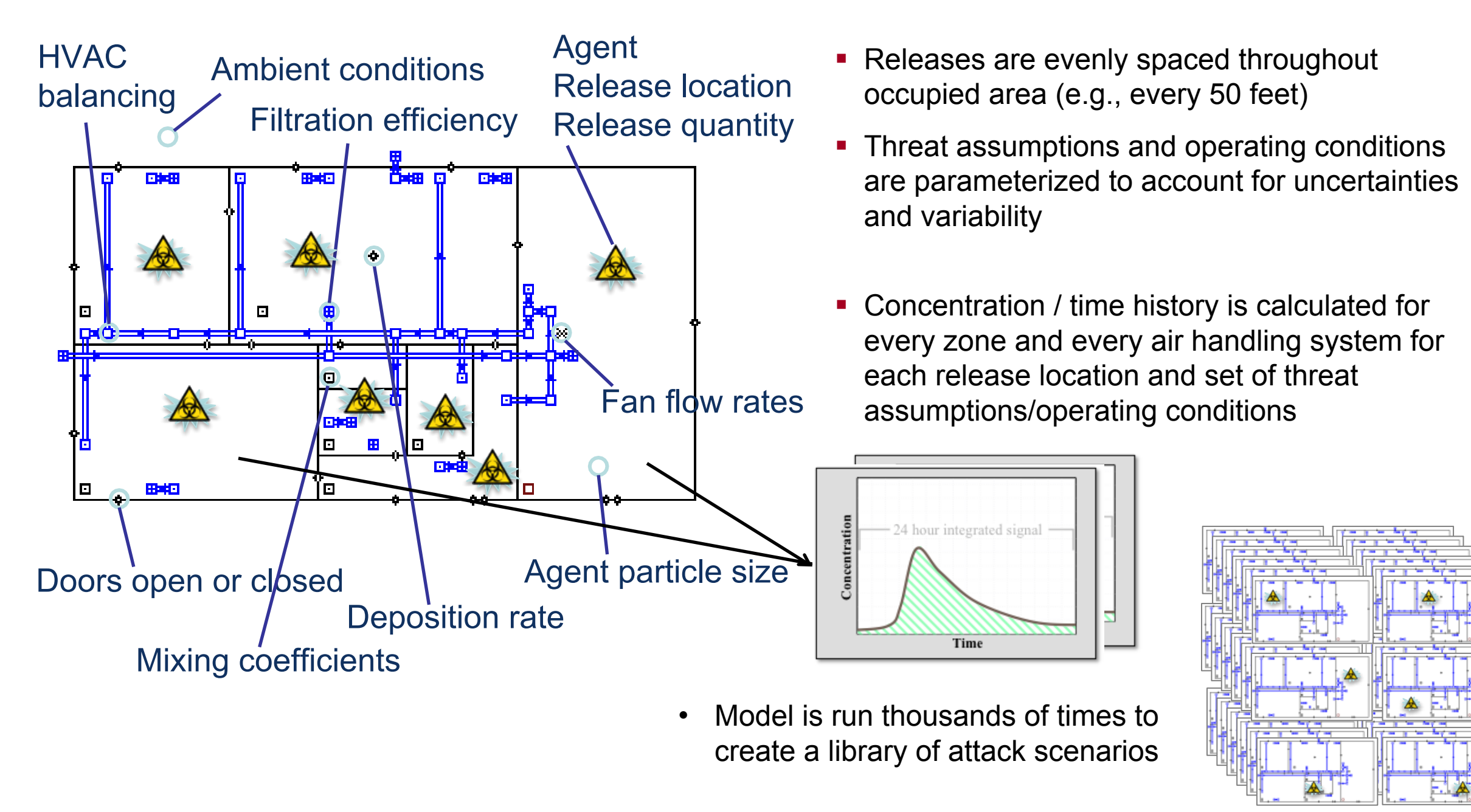


## Deployment: Optimized Indoor Detector Siting

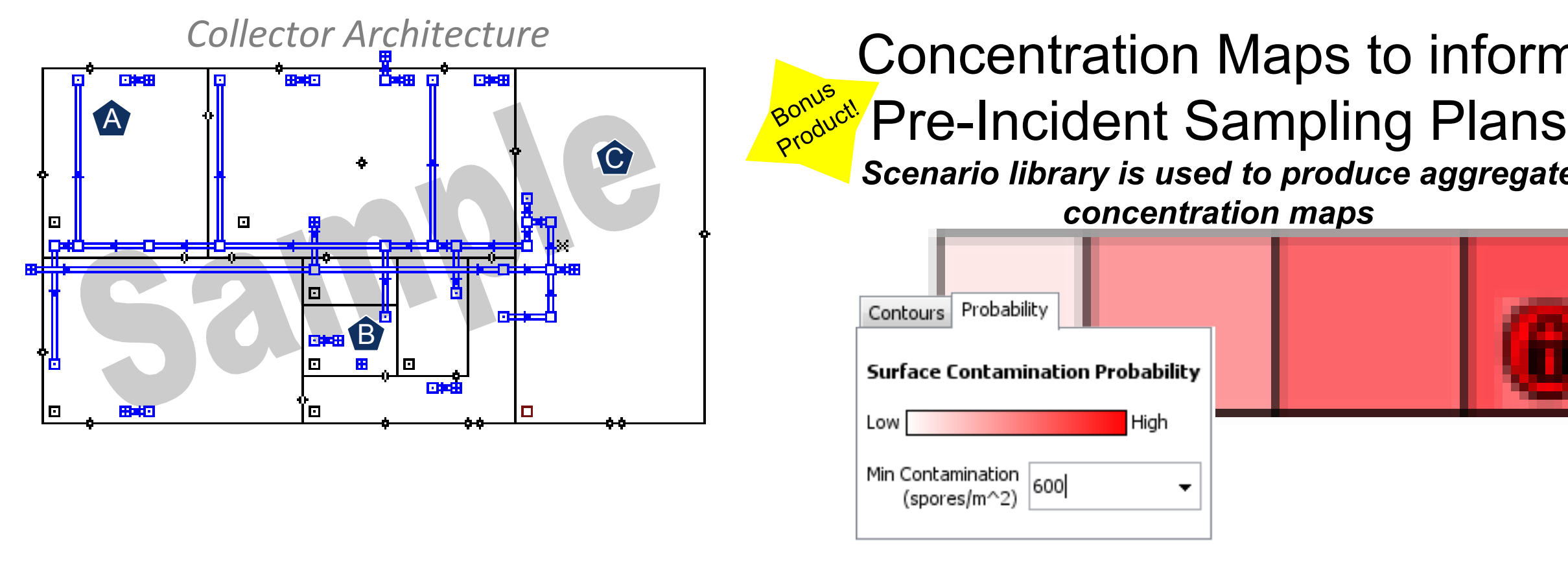
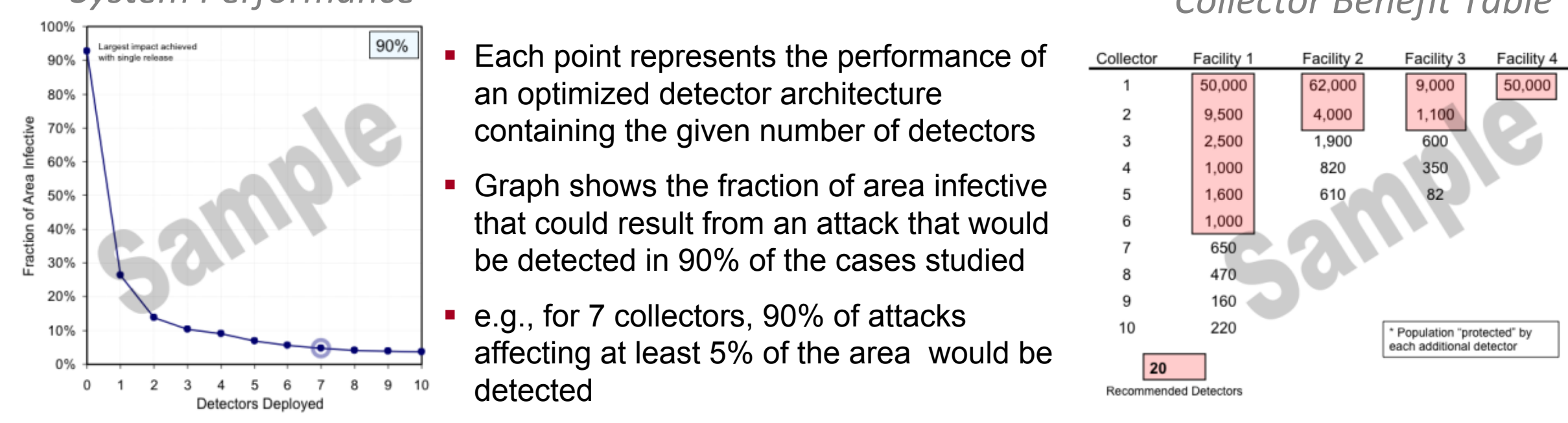
**Facility Model Development**  
Based on Facility Information, a CONTAM airflow/contaminant transport model is developed



**Scenario Library Generation**  
Monte Carlo techniques are used to generate a library of potential building flow states; library is analyzed using Bayesian techniques



**Detector Siting**  
Scenario library is analyzed using Bayesian techniques to determine optimal detector configurations



## Response: Incident Reconstruction

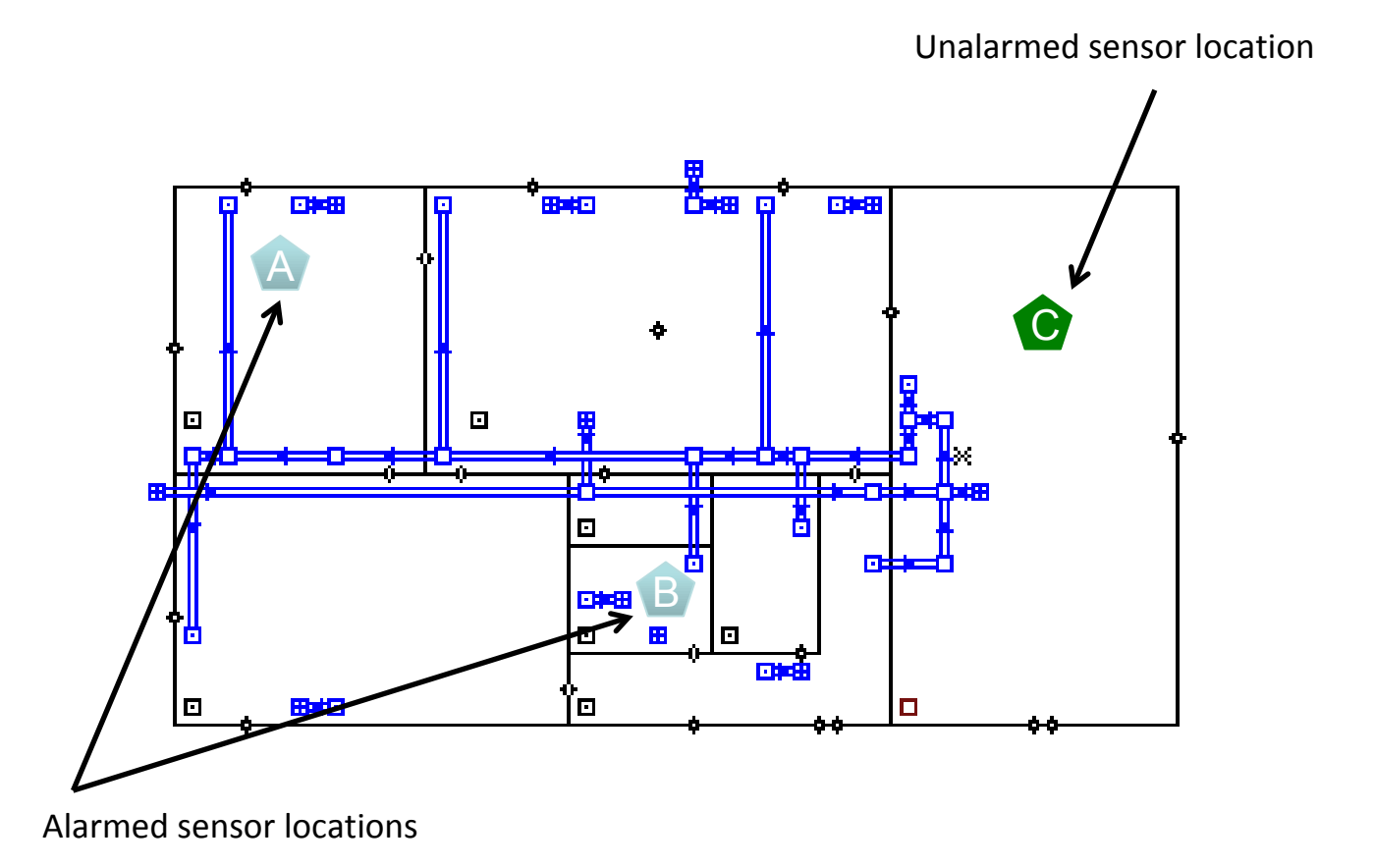
**Response Report:**

- Delivered within 2 hours
- Requires very little data

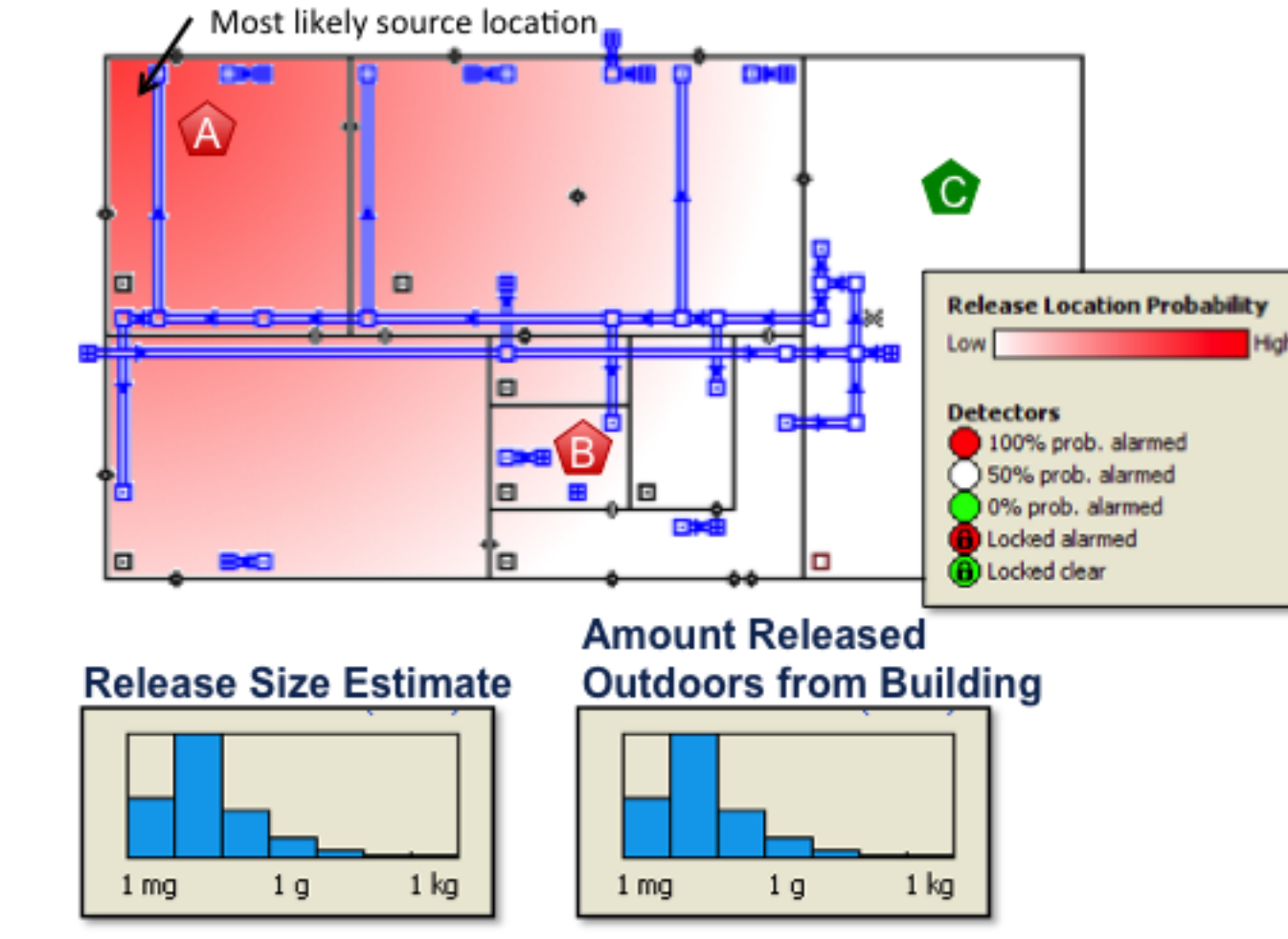
**Information products:**

- Release location probability maps
- Estimate of release size
- Estimate of amount released to the outside
- Surface contamination probability maps
- Exposure probability maps

**Initial Picture for Decision Makers**



## Release Location Probability Map



**Informs Public Safety/Law Enforcement Strategies:**

- Find Source: Target initial investigation at most likely locations of release
- Define Crime Scene: Bound potential crime scene and egress zones to include most likely locations

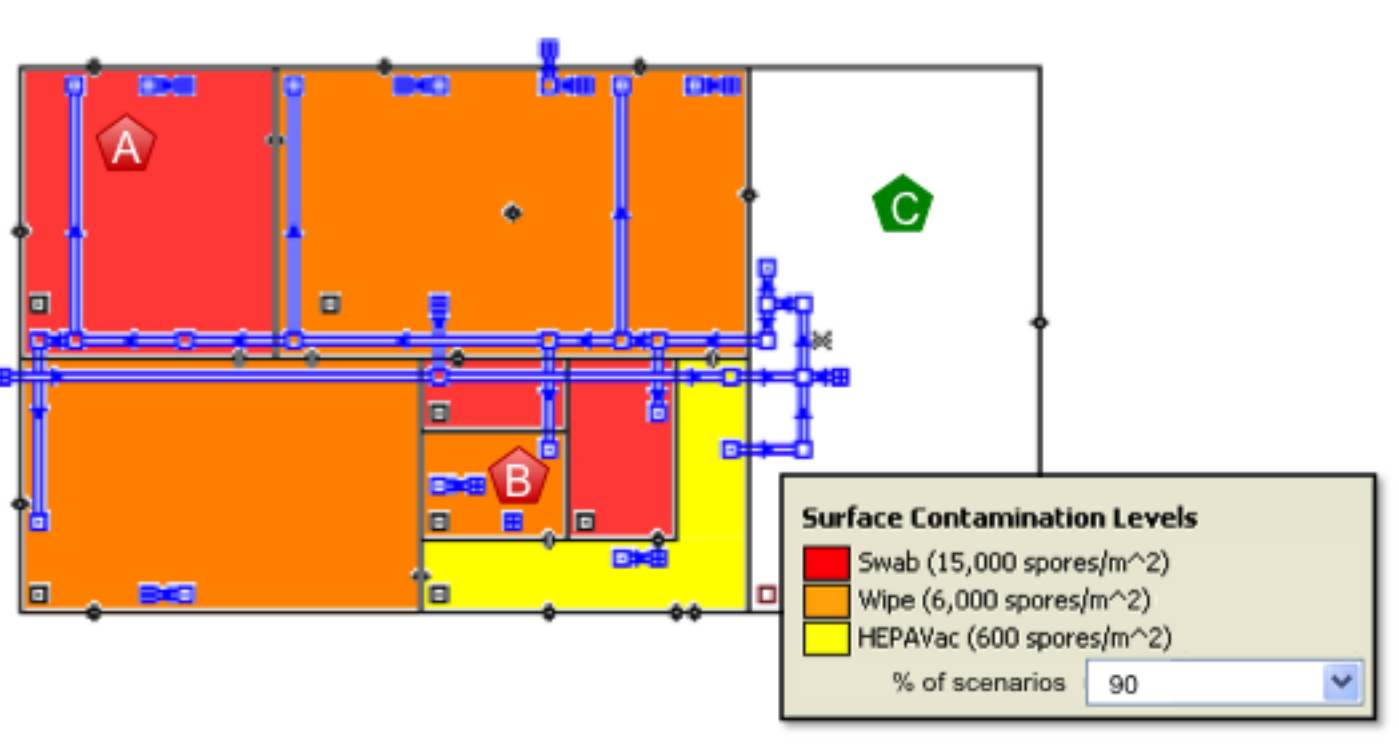
**Informs Public Health Strategy:**

- Identify High Risk Individuals: Individuals in areas with high probability of release location might be at significant risk for exposure, and could be targeted for treatment

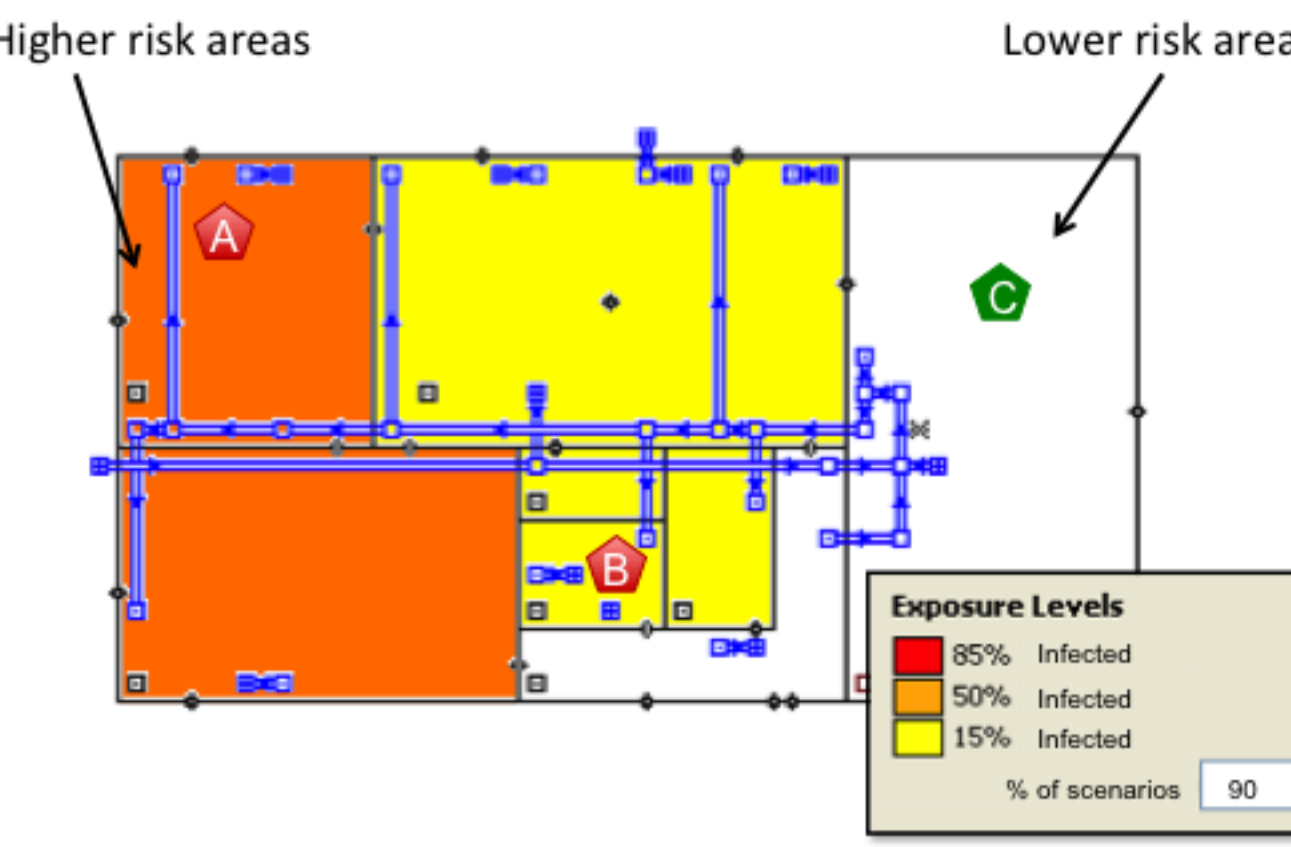
## Informs Occupational Safety & Sampling Team Strategies:

- Characterize extent of surface contamination:** Use map to select sample locations to distinguish hot, warm and cold zones.
- For example, sampling teams could start at ends of contamination maps and begin working toward higher probability areas every X feet
- Verify and quantify surface contamination:** Sample in areas with highest surface contamination probabilities if you need to verify release and test for viability. In addition, surface concentrations can be quantified by using approved methods
- Safety:** Suggest appropriate levels of PPE for responders

## Surface Contamination Estimate



## Population Exposure Estimate



**Informs Public Health Strategies:**

- Epidemiological Questionnaire:** Could generate considerations for epidemiological questionnaire
  - For example, Were you on the "red line" between the hours of...; where do you work?
  - This information could be used to validate use of other surveillance data (i.e., case findings and sampling data) to prioritize populations.
- Prioritize High Risk Populations:** Could prioritize interventions to facility/subway workers, businesses, commuters, and vendors in high risk areas
- Risk Communication:** Could tailor risk communication to stress prophylaxis compliance to those most likely exposed

Modeling data in isolation should not be used to drive public health decisions, but rather should be regarded as one piece of information that can be used to form hypothesis that can be tested as other information becomes available.

## Exercise/Workshop Support



**Exercise/Workshop Support:**

- Generate ground-truth scenarios for response plan and guidance development
  - Work with Argonne and Los Alamos to create multi-domain (indoor/outdoor/subway) scenarios
- Provide live reachback support
- Analyze sampling strategy effectiveness

**Exercise/Workshop Participation:**

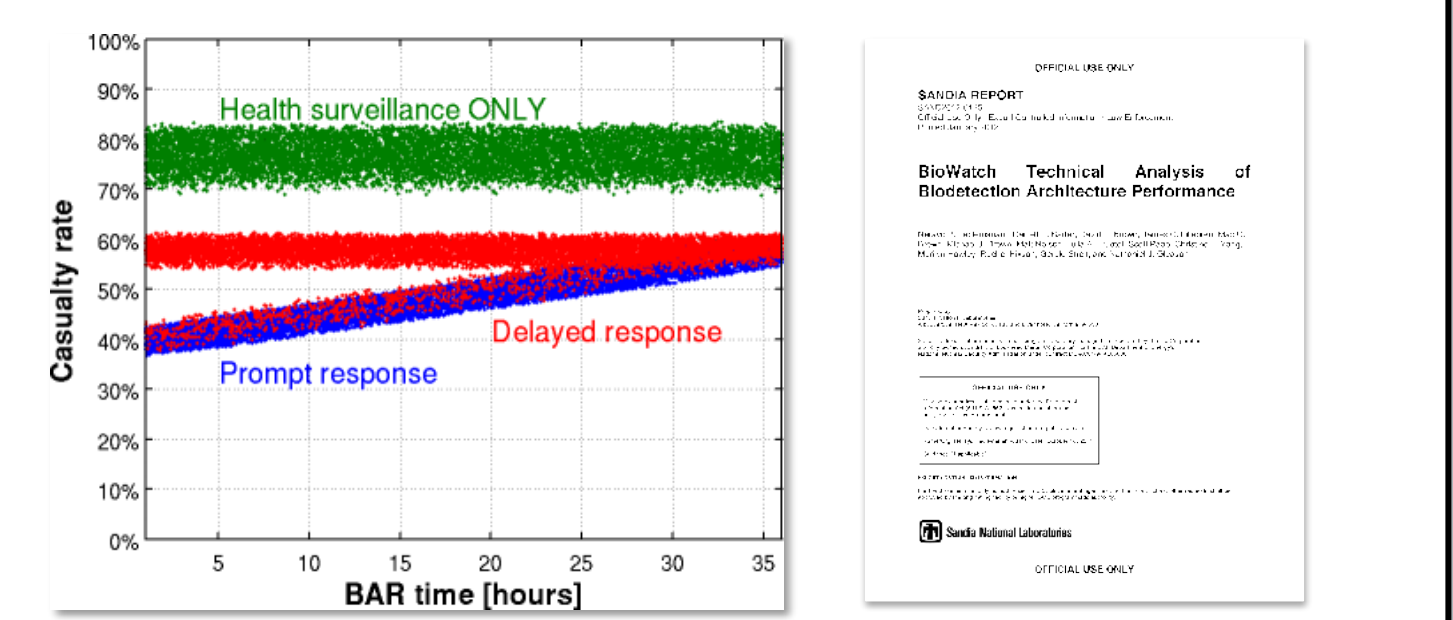
- 2011 National Capital Region
- 2011 Houston
- 2011 New York City
- 2010 New York City Dept. Health & Mental Hygiene Exercise
- 2007 Houston Sampling Exercise

## Analysis Projects

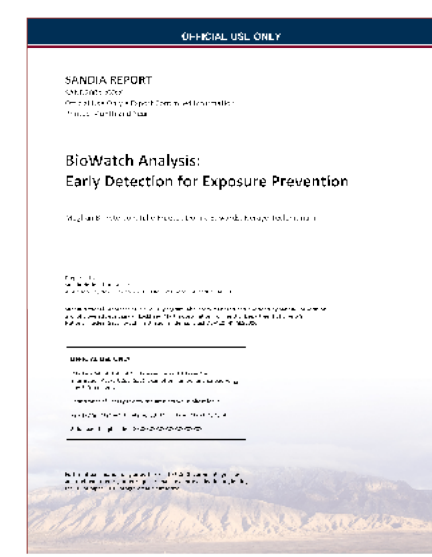
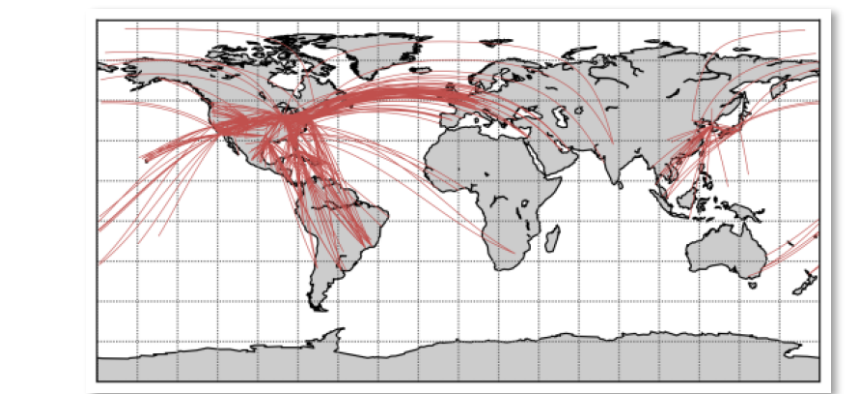
The capabilities developed to support operational BioWatch also enable deeper dives into performance tradeoffs, which provide programmatic and operational insights. And conversely, the conduct of the analyses enriches our understanding of the parameters that factor into system performance, understanding that we can provide to decision makers in the event of a BAR.

## Biodetection Architecture Performance

- Technical systems analysis to aid in the deployment of future biodetector technologies
- Analysis performed for representative indoor, outdoor, and subway deployments with various
  - System sensitivities
  - Detection times
  - Number of deployed detectors



## Early Detection for Exposure Prevention



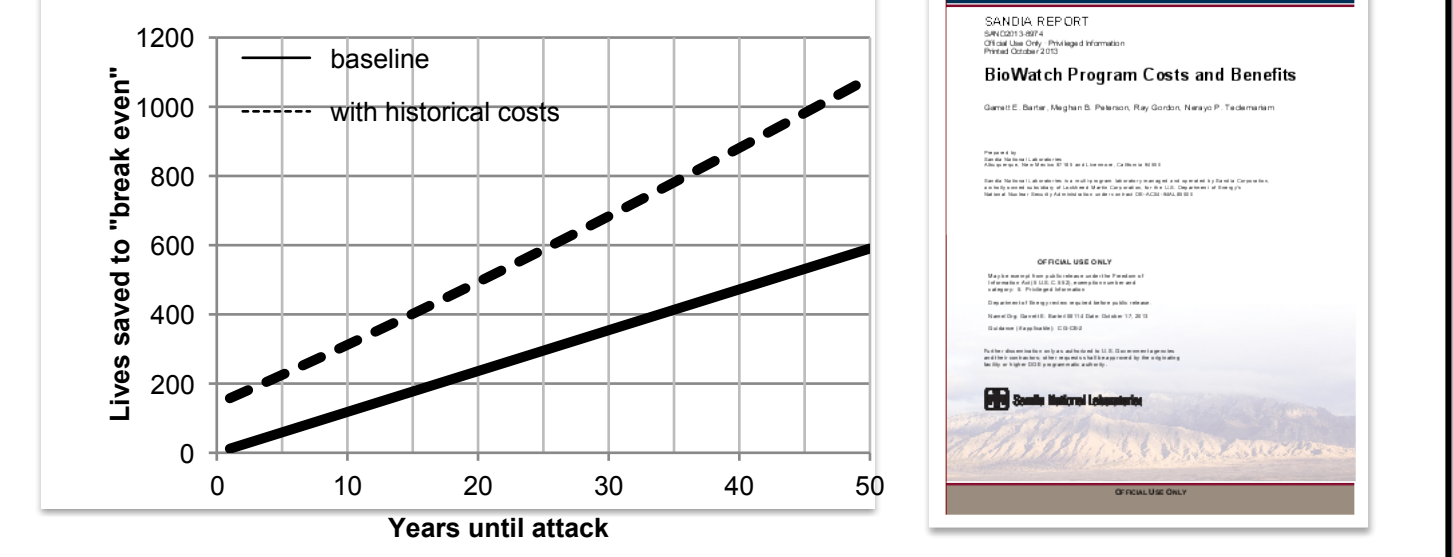
Quantified the additional benefits of early environmental detection that may arise from restricting access to contaminated areas

- Reduced potential for continued population exposure to the agent
- Reduced size of population that may require post-exposure prophylaxis
- Reduced spread of agent by contaminated rolling stock or people through tracking

## BioWatch Program Cost/Benefit Analysis

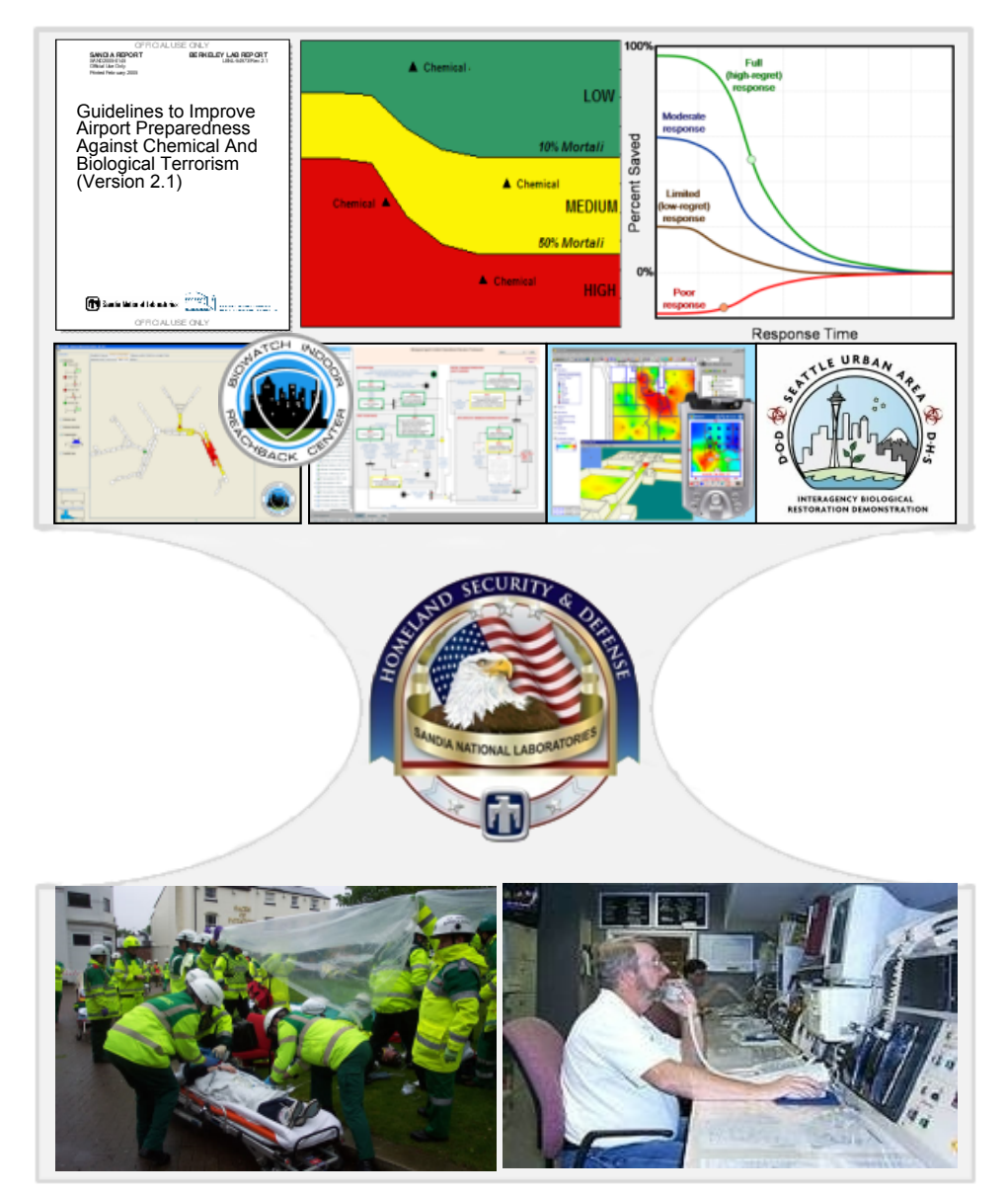
Evaluated benefits of the BioWatch Program over traditional health surveillance in terms of

- Lives saved
- Cost avoidance
- Enhanced national security responsiveness against program costs.



## Sandia employs an End-to-End approach to biodefense

- Threat assessment**
  - What is the problem / threat?
- Attack prevention / hardening**
  - What measures can be implemented to reduce the likelihood or impact of an attack
- Countermeasures evaluation**
  - How can we effectively respond to an attack?
- System requirements**
  - What support / information is needed to implement effective actions?
- System architecture design and deployment**
  - How do we best deploy available assets?
- Signal interpretation / decision support**
  - How do we use available information to make the best operational decisions during an event?
- Restoration and recovery**
  - How do we get back to normal operations after an attack?



Integrating cutting-edge technology and real-world response operations through sustainable solutions, training, and exercises

