Anthrax/Ricin Case Histories - Air Sampling(+) for WMD

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OSC Readiness November 2004

Sites to Date

- Anthrax Sites (in order of clearance for reuse)
  - Capitol Hill Anthrax (10/2001 – 4/2002)
  - Brentwood USPS (10/2001 – 9/2003)
  - State Department Annex 32 (10/2001 – 12/2003)
  - Trenton USPS (10/2001 – 3/2004)
  - GSA Building 410 (10/2001 – 6/2004)
  - AMI Building (10/2001 – not cleared yet)
- Ricin
  - Capitol Hill Ricin (Feb – March 2004)

Sampling in the Bio/Toxin-WMD Remediation Process

- Site assessment/environmental sampling
- Isolation of contaminated areas
- Artifact/critical item/”waste” removal
- Bioburden reduction
- Remediation of contaminated areas
- Post-remediation environmental sampling
- Further remediation/sampling (if needed)
- Disposal of decontamination waste (or ongoing throughout)

Environmental sampling importance

Pre-remediation sampling:

- Confirm existence of contamination
- Characterize nature/extent of contamination (e.g., follow mail trail, follow air migration pathway)
- Help select remedial approach
- Potentially aid in determining health risks

Post-remediation sampling:

- Determine effectiveness of remediation
- Arguably the largest contributor to a decision on re-occupancy

Technical Points for WMD Sampling

- Establish purpose of sampling before determining sampling plan
- Try hard to obtain initial FBI sampling data and communicate with them (Region III problems in past)
- If you do not have expertise sampling for the specific agent, don't hesitate to ask for help
- Sampling locations should be guided by the known release locations, agents' characteristics, air migration potential (HVAC system), take home potential and epidemiologic information
  - Random/ biased/ focused sampling approach has become the norm for post-remediation sampling

Technical Points for WMD Sampling (cont.)

- Although somewhat controversial, most argue to go with the greatest surface area for sample collection as opposed to using template, measured areas (i.e. trying hard to find the agent vs sample uniformity for statistical, comparison purposes)

- Incorporate air sampling into the plan if appropriate (anthrax vs ricin incidents)

- Non-technical points (risk perception) or uncertainty may drive sampling approach to a degree

Technical Points for WMD Sampling (cont)

- Use the latest advancements in sampling and analytical information. Some lessons learned during anthrax/ricin responses:
  - Work closely with your laboratory!
  - Do not use dry wipes/swabs for surface sampling
  - Analyze the entire sample not just a per cent aliquot
  - Consider use of a neutralizing agent to protect against sterilant residual
  - Consider positive controls? (i.e. State Annex 32 experience)

WMD Air Sampling to Date

- Air sampling at the Hart Building set the stage for future approaches (at least for anthrax)
- The “experts” said that re-aerosolization of anthrax from desks, floors, etc. would not occur (Weis, Miller, Intrepido, Durno, et. al. proved otherwise)
- After some debate, EPA and NIOSH established the “air sampling w/leaf-blower” approach (anthrax - asbestos similarities). This approach was consistently used at all remaining anthrax remediations.

Air sample instruments used at anthrax sites

	DFU	*High Vol*	*Cascade Samplers/ Agar Plates* (several types)	*Personal* (w/gel or teflon filter)
Capitol Hill	**x …… not at P Street ***	**X….briefly**	**x**	**x**
Brentwood USPS	**x**	**X**	**x**	**x**
State Dept	**x**		**x**	**x**
GSA*			**x**	**x**
Trenton USPS	**x**			**?**
AMI Bldg	**x**	**x**	**x**	**x**

* Building contamination presumed to be from secondary source, not widespread

Pros and Cons at Sites to Date

- **Hart Bldg**– trial and error, time demands, need to write and await plan approval, sample plan writers often did not see the building rooms/not in tune with OPS; time to completion rather impressive
- **Brentwood** – USPS and EPA differed on sample/analysis approach (PCR vs culture, template vs large areas, air sample coverage), unwillingness to share data with ECC; arguably the toughest facility to address
- **State Dept -** very organized with great inter-agency cooperation if arguably “remedialized”, TWGs reached consensus on approach, ECC needed only ½ day to conclude building was clean

Pros and Cons at Sites to Date

- **GSA –** due to contract problems, sampling ceased for 8 months at 1/3 sample completion point. Little info on initial contamination extent but believed minimal, ECC cleared building **and all contents**. TWG played primary role in sample planning.

- **Trenton** - my understanding is that planning and clearance went very smoothly. Apparently Brentwood and Trenton differences due to managerial contrasts.

- **AMI** - only private facility. My understanding is that, once started, planning for and enactment of fumigation and clearance sampling went smoothly.

Pros and Cons at Sites to Date

- **Capitol Hill Ricin -**

  - USCP was much more prepared since the anthrax days, taught us some sampling tricks

  - EPA struggled to get FBI data (interesting story regarding room decon approach)

  - EPA used a “Technical Specialist Team” for sample planning – mixed reviews?

  - developed strong relationship with Army/Navy labs

  - multi-agency “Decon Team” for deconning mail, clothing, personal items; used “live” ricin to prove decon successful

Aggressive air sampling approach

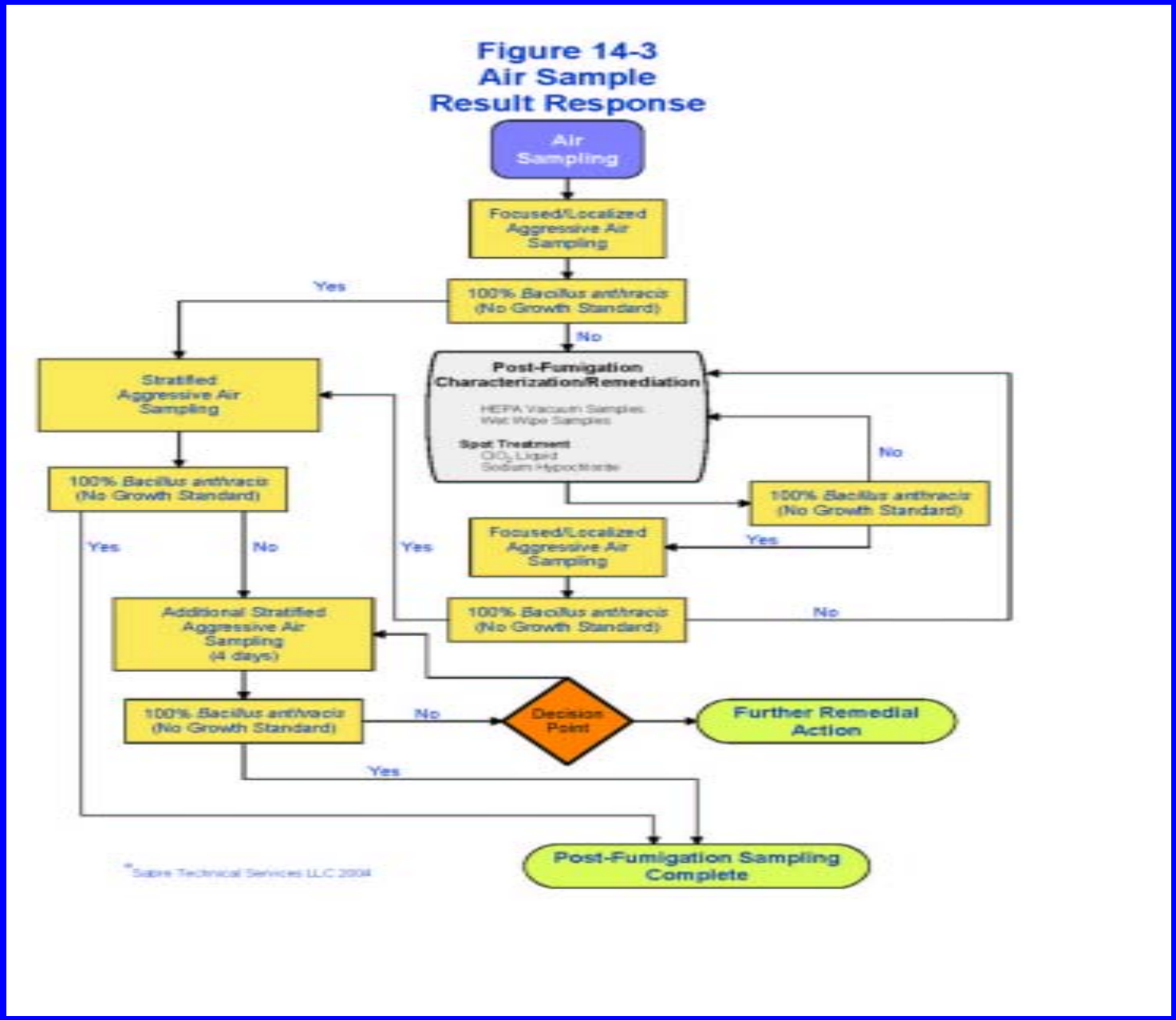
- **Strive to perform only when all surface sample results are negative !**....very risky if you do not

- Involves the use of leaf blowers prior to air sampling and stationary circulation fans during complete air sampling period; air sampling times developed by NIOSH and ATSDR using asbestos air sampling similarities

- Time allotted for air circulation depends on (1) sampling technique used (e.g. DFUs can run for 24 hours, cascade samplers and gel/teflon filter samplers much less so)

- There is a preference for the use of multiple sampling instruments during air sampling due to extraction and sampling efficiency uncertainties

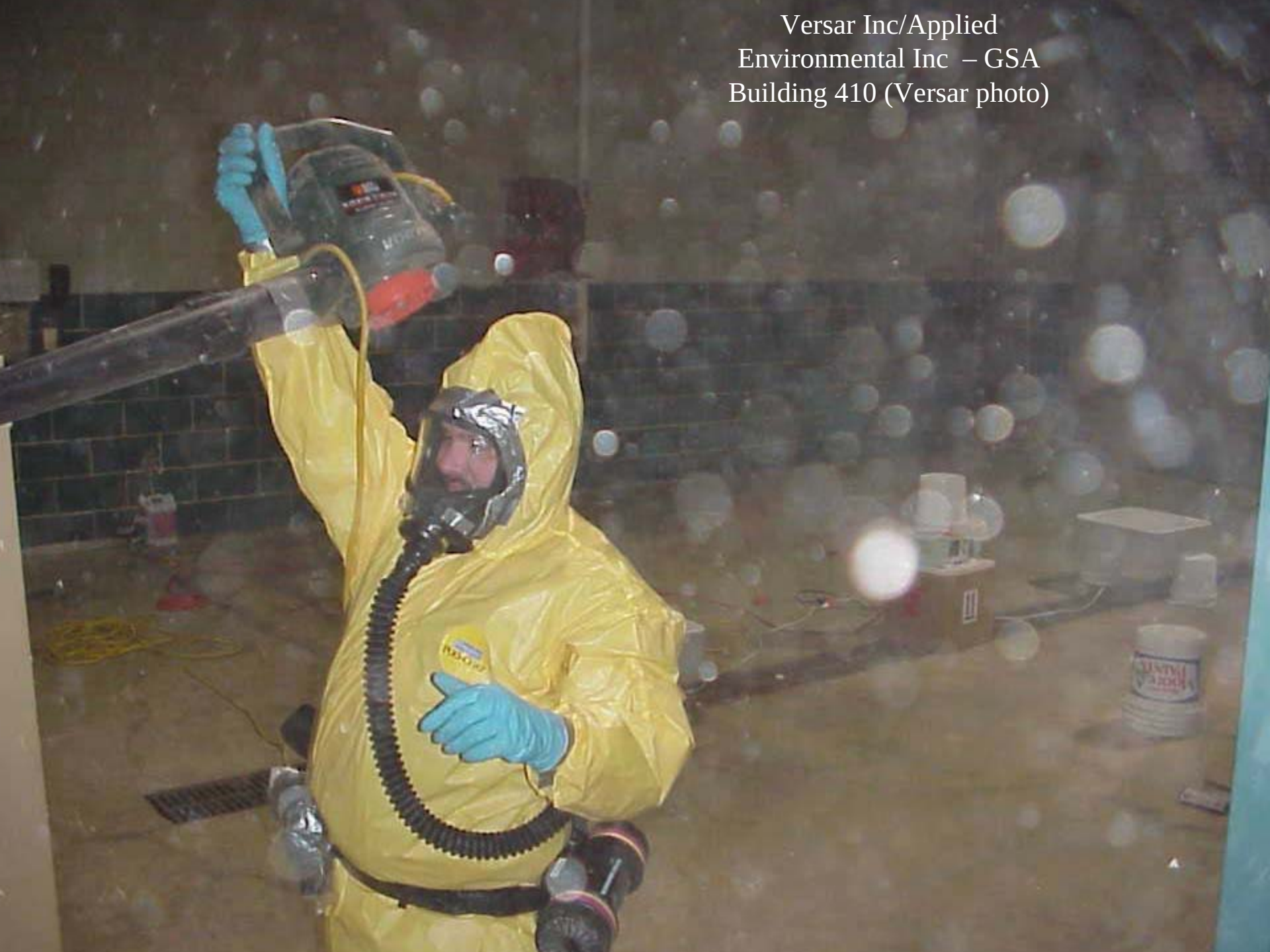
Latest Air Sampling Approach (AMI Building)



Aggressive air sampling approach

- Arguably provides the most convincing method to ensure the agent is no longer a threat

- The number and location of samples will depend on a variety of factors (surface sampling “rules of thumb” are established; air sampling more judgmental). Your sample planning team or TWG will need to work this out.



Versar Inc/Applied Environmental Inc – GSA Building 410 (Versar photo)

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(Versar photo)

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Gathering of Surface Samples *(USPS photo)*

Gathering of Aggressive Air Samples

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(USPS photo)

Is air sampling always necessary?

- **No.** Will depend on the agent's physical characteristics, release mechanism, scientific uncertainties, and other technical considerations

- Non-technical considerations will involve risk perceptions of the affected facility's management and employees. Is it best to go ahead and do air sampling so to allay fears?

- During the Capitol Hill Ricin incident, we learned enough about ricin characteristics from the literature and DOD experts, that we did not see a need for air sampling.

- The decision not to do so was made easier since the USCP had DFUs running in selected hallways as a routine precautionary measure following the anthrax attacks. All DFU results were negative for ricin.

Organizational issues regarding Region III WMD sites to date

- Except for Capitol Hill (due to its prominence/"politics") none of the other sites/facilities could be considered ERs and thus most cleanups were strung out for many months
- Non-ER status allowed time to plan, research, allow for side-by-side comparison sampling tests
- Work at each site had the benefit of lessons learned from the trial and error performed at previous sites
- As time passed, Technical Working Groups (TWG) were formally established at each site to advise on sampling approach and methodology
  - NIOSH was a major contributor on these groups

Organizational issues for Region III WMD sites (continued)

- EPA and the responsible agencies benefited from considerable outside assistance; the number and participation level of supporting agencies increased with time
  - 2001/2002 - NIOSH, CDC NCID, CHPPM, DOD consultants
  - 2002 to present - AFRRI, USAMRIID, Army ECBC, NMRC, OSHA, Academia

Organizational issues for Region III WMD sites (continued)

- Each anthrax site/facility had an Environmental Clearance Committee (ECC) established to make a recommendation on reoccupancy/reuse

- The ECC was multi-agency and multi-disciplinary made up of “volunteers”

- The ECCs received detailed sampling and remediation documentation/reports to make their recommendations (one anomaly) – important should we use ICS/IMTs

- ECC concept seems to be taking hold

Sampling changes over time (2001 to present)

- air sampling instrumentation for anthrax has not changed significantly since 2001 (DFU limitations corrected, Matson Garvins added?)

- for the most part, sampling modifications have been more prevalent for surface sampling based on NIOSH side-by-side comparison studies

- analytical modifications have occurred to ensure greater confidence when making “clearance” determinations (i.e. 100% of sample for analyses (not 10% aliquot), use of neutralizing agent before analyses)

Sampling changes over time (2001 to present)….cont

- at anthrax sites, sampling and analytical approaches continually were tweaked based on lessons learned
- Current research effort is to better identify the sampling and extraction efficiencies of the various sampling approaches to aid in sample plan design – perhaps we can characterize and clear areas with less intensive sampling efforts?
- “Biowatch” ambient air sampling and sample pre-planning efforts are helping to reduce uncertainties and make other OSCs aware

For your site?

- Don’t hesitate to contact experts and ask for onsite assistance– there are a number of individuals at NIOSH, EPA, PHS and DOD who can really assist you. Some of us seem to be making this stuff a career.
- NIOSH Emergency Response Cards are a good start. EPA TADS under development (anthrax TAD most complete, ricin TAD under development)
- Several of us have copies of approved SOPS and sampling plans that can be shared.