

ENVIRONMENTAL RESPONSE LABORATORY NETWORK (ERLN)

A Web-based Seminar
April 10, 2014





Topics

- ERLN
- PHILIS
- Bio Labs

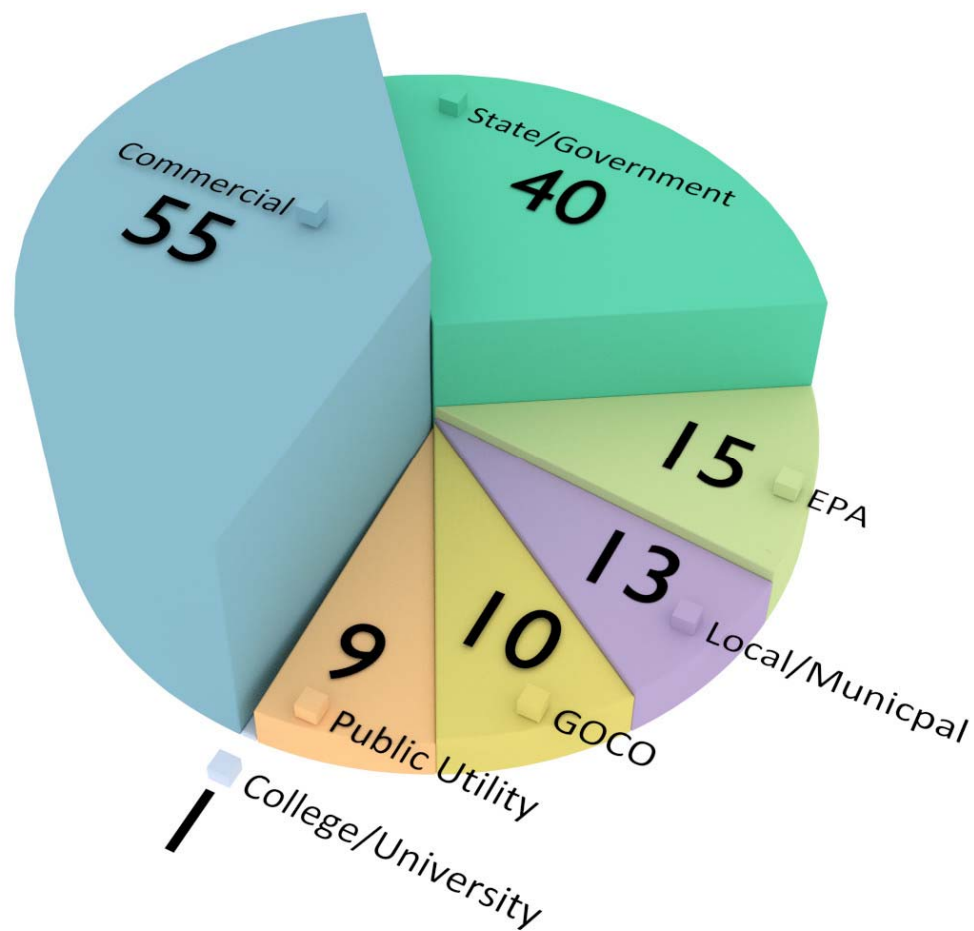
ERLN Background



- Began as a response to World Trade Center disaster
- Compendium of Environmental Laboratories
 - Only a list of commercial, state and public health labs and their basic capabilities
 - **No formal access to the labs for actual work**
 - EPA access to Compendium Web-site through assigned ID and password
 - Very little outreach to Regional lab users



ERLN Current 143 Laboratories

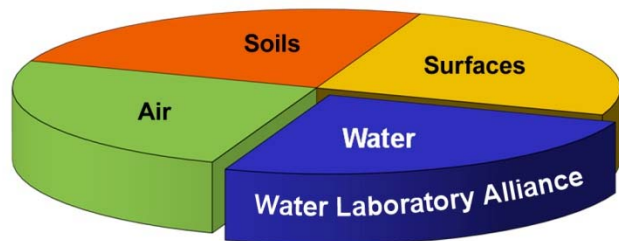


U.S. Environmental Protection Agency



ERLNL

Environmental Response Laboratory Network
(ERLNL)



- An all hazards/all environmental media laboratory network for chemical (including CWA), biological and radiological Agents supporting the needs of the response community
- Allow for day-to-day use supporting incidents of any scale during preparedness, response, remediation.
- Coordinated Partnership with National Homeland Security Research Center (NHSRC) and Office of Resource Conservation and Recovery (ORCR) for methods and method development
- Partnership with Office of Water's Water Laboratory Alliance (WLA) and ORIA Radiological Laboratory program

ERLN National Role Coordination/Surge Capacity During Large Scale Event

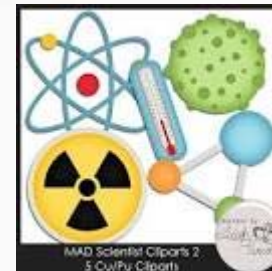


ICLN
Integrated Consortium of Laboratory Networks

- LRN (CDC)
- FERN (FDA)
- **ERLN (EPA)**
- NAHLN (USDA)
- NPDN (USDA)
- DLN (DOD)
- Vet-LIRN (FDA)

	Lab Support to Phase of Response			
	Monitoring/surveillance	Incident Response	Remediation	Forensics
Human Clinical	HHS	HHS	HHS	FBI
Environmental	EPA	EPA	EPA	FBI
Food	USDA/HHS	USDA/HHS	USDA/HHS	FBI
Animal	USDA	USDA	USDA	FBI
Plant	USDA	USDA	USDA	FBI
Drinking Water	EPA	EPA	EPA	FBI

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WHY

- ERLN Labs are all Nationally Accredited
- Labs offer diverse range of capability – membership is always open so capabilities keep expanding
- Large commercial conglomerates are part of ERLN. This provides capacity
- State Labs and Public Health Labs are members. Offers below competitive analysis costs. Aligned with EPA mission and not profit making
- Overall more cost affective than sub-contracting (e.g. through START)
- A mechanism is in place to quickly access labs through Blanket Order Agreements

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HOW

- To be used by all EPA ASRs (Analytical Service Requestors) – OSC, RPM, etc. (Good Idea to coordinate with your EPA Regional Laboratory to ensure compliance with FASTAC initiative).
- Obtain compendium user ID and password (not required, but good idea)
 - WWW.epa.gov/compendium
- Obtain as much information on your site as possible, especially what analytical methods you will be needing and basic DQOs.
- Contact HQ
 - Terry Smith 202-564-2908 (o) 202-503-8981 (cell) smith.terry@epa.gov
 - EOC Hotline 202-564-3850
 - Erica Canzler (CMAT Director) 202-564-2359 (o) 202-431-3146 (cell) canzler.eric@epa.gov

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HOW

- Analytical Service Request will be generated by HQ. May call you to ask for more info on site
- Analytical Service Request will be sent to ERLN member laboratories for request for quote
 - Can sole-source to any laboratory within reason: e.g. known specific capability, proximity to a site, historical work on site, etc.
 - Otherwise will still limit to small group of labs with reasonable proximity to site
- Receive quote from lab and coordinate with ASR on choice of lab
- PR generated via EAS
- Contracting Officer submits work order to lab.
- *** ASR may communicate (is encouraged) with potential laboratory at any time to discuss specific needs and details



Analysis of Chemical Warfare Agents (CWA)

- 5 EPA Regional Labs (all ERLN members) have specialized capability to analyze CWA: Regions 1,3,6,9 and 10
- Labs can be accessed directly and do not go through the quote process
- For informational purposes ASR should discuss Regional lab capability with the closest CWA Regional Lab to their own Region
- During a CWA minor or major incident contact:
 - Terry Smith 202-564-2908 (o) 202-503-8981 (cell) smith.terry@epa.gov
 - Larry Kaelin 732-321-6625 (o) 513-675-4751 (cell) Kaelin.Lawrence@epa.gov
 - EOC Hotline 202-564-3850
 - Erica Canzler (CMAT Director) 202-564-2359 (o) 202-431-3146 (cell) canzler.eric@epa.gov

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Please Use US – Special Cases



Mobile Laboratory Support

- Portable High-Throughput Integrated Laboratory Identification System better known as **PHILIS** (A formal ERLN Member)
- Rapid home-site or deployment for analysis of CWA and Toxic Industrial Chemicals (TICs)
- **More on PHILIS later!**

➤ POCs

- Larry Kaelin 732-321-6625 (o) 513-675-4751 (cell) Kaelin.Lawrence@epa.gov
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Water Laboratory Alliance (WLA)

- ERLN Partner dedicated to water security issues
- Coordination with water utility community
- Coordination with Regions and the Regional Response Plans
- Same process as standard ERLN process: Submit Request to HQ, get quotes, CO submits work order to chosen lab

➤ POCs

- Patricia Tidwell-Shelton, Chief Threats Analysis, Prevention and Preparedness Branch Water Security Division Office of Ground Water and Drinking Water Office of Water 202-564-6319
- Latisha P. Mapp, Team Leader, Water Laboratory Alliance OGWDW/WSD p: 202-564-1390 cell: 202-841-9745

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Please Use US – Special Cases



Office of Radiation and Indoor Air (ORIA)

- Mobile and fixed Radiological Testing Program
- Fixed Radiological lab access (ERLN) via standard ERLN process
- Future WEBINAR
- **POC**
 - John G. Griggs, PhD., Director, National Analytical Radiation Environmental Laboratory (NAREL), Office of Radiation and Indoor Air (ORIA), USEPA

334-270-3401, griggs.john@epa.gov, www.epa.gov/narel/

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Please Use US – Special Partners



- National Homeland Security Research Center (NHSRC): Method development and laboratory support (via Lawrence Livermore National Labs)
 - Gregory Sayles, Acting Director, National Homeland Security Research Center, ORD, Desk 513-569-7607 BB cell 513-305-9984
- Office of Resource Conservation and Recovery (ORCR): Method support and Methods development for EPA's SW 846 Methods.
 - Schatzi Fitz-James, Desk 703-308-8610





Using PHILIS On-site Analytical Laboratories

Lawrence Kaelin & Terry Smith
OSWER/OEM /CBRN CMAT

PHILIS Mobile Laboratory Assets



- PHILIS assets are mobile laboratories operated by OEM/CMAT and “standardized” under the EPA’s Environmental Response Laboratory Network (ERLN)
- Analysis of Chemical Warfare Agents (CWA) and Toxic Industrial Chemicals (TIC) in environmental samples
- They are stationed in Edison, NJ and Castle Rock, CO and can be deployed within 24 to 48 hours to support emergency response and clean-up actions





So What Can PHILIS Do for your Region

- On-site sampling and analysis activities
- Dual Use for CWA and TICs analysis
- Maximize the utilization of EPA response assets
- Reduce time and costs for effective site assessment and clean-up actions
- Laboratory results that meet all 2009 TNI requirements for NELAP accredited parameters
- One & Done concept – no outside analytical confirmation required
- PHILIS labs are mobile and self sufficient

PHILIS Capabilities



- Deployable within 6 hours of notification
- Operational within 6 hours of being on-site
- Operates via internal generators/supplies for 4 days before restocking/refueling required
- TNI NELAP accredited for EPA Methods 8260c/8270d/8082a.
- Pursuing accreditation for TO air methods
- Estimate 100-200 samples/day for CWAs and TICs (24hr operations) for all matrices
 - Air, soil, water and surface wipes
- Analysis of CWAs in environmental samples via EPA's Standard Analytical Methods for environmental restoration Following Homeland Security Events (SAM)
- Detection limits to health-based clearance via EPA's SAM methods

Specific Methods of PHILIS Labs



- Semi-VOCs via method 8270D – NELAP accredited, all matrices
 - Rapid PSE, SPE and “micro-extraction” prep methods
 - Exploring “Twister” rapid prep methods
- VOCs via method 8260C – NELAP accredited, all matrices
 - Purge & Trap - includes BTEX subset method
 - Rapid head space VOC method
- Arochlors via method 8082A – NELAP accredited, all matrices
- TO17 Air toxics – proficient, pursuing NELAP certification
 - Sorption tubes, Tedlar bags, SUMMA canisters
- Carbamates via ASTM D7645-10
- CWA analysis via EPA’s ERLN “SAM” methods – all matrices
 - ERLN’s only mobile CWA analytical asset
- CWA breakdown products via ASTM D7579/E2866
 - Ethanolamines , Nitrogen Mustard breakdown products,
 - Organophosphates compounds, Nerve agent breakdown products

PHILIS Data Packages



- Premium based LIMS, EPA standard
 - Connected via encrypted wireless modem
- Electronic Data Deliverables - Flexibility
 - Daily Prelims via Excel Spreadsheets
 - Tier 1, 2 & 3 EDD
- Scribe compatible
- WebEDR compatible
- Can Generate a “CLP-like” Data Package



<http://www.epa.gov/sam/>

Supports All-Hazards Response for All Environmental Matrices



Soil-gas samples via GeoProbe



Case Study - Support at a Region 1 Site St. Albans Gas & Light-Phase 2, VT



Semi-volatiles mobile labs, set up for the prep & analysis of PAHs in ~ 200 soils and sediments samples

APL02 lab with GC/MS instruments set up for PAHs via method 8270D.



SPA01 Trailer w/automated PSE & SPE via EPA prep methods 3535A and 3545A



Case Study – R1 Cont'd



APL01 – Volatiles Mobile Lab for EPA method 8260C for soil, sediment and water samples via purge & trap.

Modified TO method for benzene and naphthalene in ambient air and soil gas via automated thermal desorption unit



Purge & Trap for soils & waters



Tenax tube analysis - air



R1 Case Study – Summary of Support

- In the course of approximately ~ 4 days, over 250 samples were collected and analyzed on-site for PAHs, benzene or naphthalene contamination in air, soil, sediment and water matrices
- Daily GIS data maps/adjustments
- Expedited RAM was able to be issued by R1 OSC
- Accelerated remediation completed using initial data set – no new site visits/samples required – “1 & Done”
- The on-site abilities provided by PHILIS allowed the OSC to complete all the site soil assessments, excavation, removal and site restoration activities within 90 days of the initial site visit by Region/PHILIS team



R1 Case Study - Costs/Benefits

- Estimations of actual PHILIS analytical cost/sample from the Region 1 site effort were determined to be below most commercial lab costs, which included fuel, mob/demob costs, travel, pre diem, sample analysis, QA review and report writing
- Total Man-hours for this site were covered under the PHILIS contract. Future mobilizations may not – potential cost sharing
- HQ/Region cost sharing options can be explored for future sites.
- PHILIS costs could drop ~ \$50-100/sample (SVOCs) based on “lessons learned” and optimization of man-power & assets**
- The greater time and cost savings were realized for the OSC by having the most effective use of their on-site personnel and assets in an accelerated time frame
- 1 & Done concept – maximum utilization of assets while on site

Case Study – Support to Region 2 Superior Barrel and Drum, NJ



APL01 lab set up for prep and analysis of VOCs by Headspace GC/MS in 950 drum samples

Drum samples contained multiple layers that were analyzed to determine levels of RCRA D-listed contaminants



Case Study –R2 Cont'd



Headspace analysis was used to determine content of VOCs in terms of waste characteristic levels while protecting the GC and the column from the potential of high levels of compounds in the samples that could contaminate the instrument



R2 Case Study – Summary of Support

- On-going project at RPM site – Spring 2014
- Over 900 samples projected, at ~ 100 sample batches / week, over the 6-8 week course of the project.
- VOCs detected in the drum samples include: BTEX, chlorinated organics, acetone, MEK, and styrene at levels from low ppbs to >>100s ppm
- Low level (ppb) contaminants driving cleanup, in a bulk matrix of high level (>100 ppm) organics
- Headspace analysis results provided timely results that were based on the RCRA “D list” limits
- The rapid turnaround of results allows the OSC to effectively segregate/bulk a massive number of drums to accelerate clean up and restoration of the site

Cost Sharing – HQ/Region



- Money is Tight – for everyone!!
- Certain costs for PHILIS on-site operations may be shared by OEM and the EPA region
 - Regular man-hours for PHILIS staff could be covered under existing PHILIS contract, OT picked up by region
 - Some site mob/demob costs, consumables could be covered by region under Superfund site charge number
 - *NOTE: PHILIS does not have to deploy to the field as samples can be shipped to the labs to save money
- Cost sharing can be negotiated
 - “Have I got a deal for you!!”
- Sensitivities to Existing Lab Assets in the Region
 - We want to augment, not compete with existing EPA region and program lab assets and programs
 - Provide regional lab surge capacity

Contacts



Erica Canzler, CMAT Director, Washington, DC
202-564-2359, canzler.eric@epa.gov

Terry Smith, PHILIS Contract PO, Washington, DC
202-564-2908, smith.terry@epa.gov

Larry Kaelin, PHILIS Contract DPO, Edison, NJ
732- 321- 6625, kaelin.lawrence@epa.gov

EPAOSC website: CMAT/PHILIS -look under “Documents” for “Readiness Reports”)

http://www.epaosc.org/site/site_profile.aspx?site_id=6009

Detection of *Bacillus anthracis* Spores: Rapid Viability PCR and EPA Labs

Marissa Mullins

**U.S. Environmental Protection Agency
Washington, DC, USA
April 2014**





Phases of Response to a Biological Incident

RESPONSE AND RECOVERY ACTIVITIES					
(CRISIS MANAGEMENT)		(CONSEQUENCE MANAGEMENT)			
Notification	First Response	Remediation/Cleanup			Restoration (Reoccupancy)
		Characterization	Decontamination	Clearance	
Receive information on biological Incident	Initial threat assessment HAZMAT and emergency actions	Characterization of biological agent	Decontamination strategy	Clearance environmental sampling and analysis	Renovation Reoccupation decision
Identification of suspect release sites	Forensic investigation Public health actions	Characterization of affected site Site containment	Remediation Action Plan Worker health and safety Site preparation	Clearance decision	Long-term environmental and public health monitoring
Notification of appropriate agencies	Screening sampling Determination of agent type, concentration, and viability Risk communication	Continue risk communication Characterization environmental sampling and analysis Initial risk assessment Clearance goals	Source reduction Waste disposal Decontamination of sites or items Decontamination verification		



Biological Detection Methods

Site Characterization Phase - Determine Extent of Contamination

- Sample processing methods (bioagent recovery and extraction of analyte)
- Analytical methods
 - Real-time PCR, immunoassay, GC-MS or LC-MS methods for bioterror agents

Post-Decontamination/Clearance Phase

- Sample processing methods (viable bioagent recovery)
- Analytical methods
 - Culture/Plating followed by real-time PCR or immunoassay
 - **Rapid Viability PCR**



Research and Operational Implementation

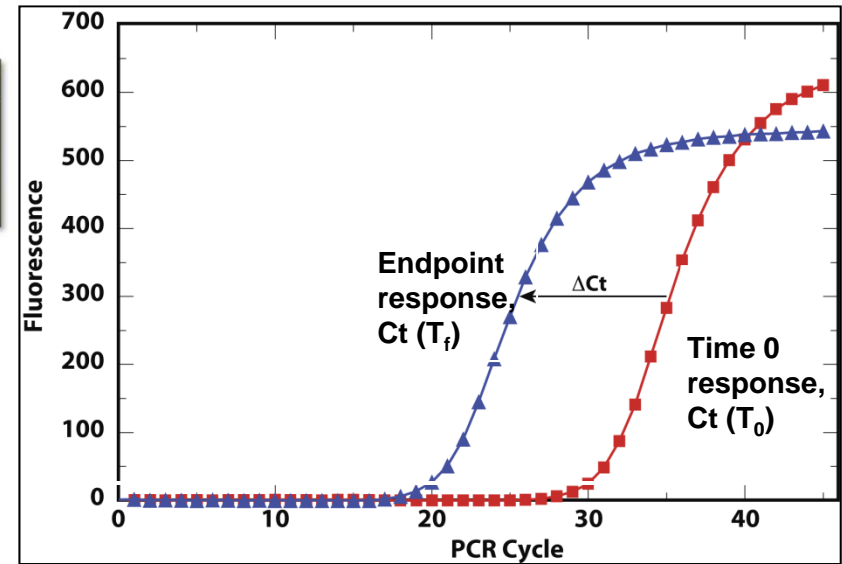
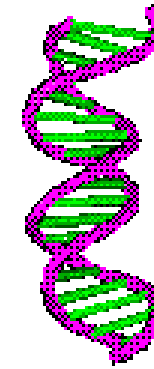
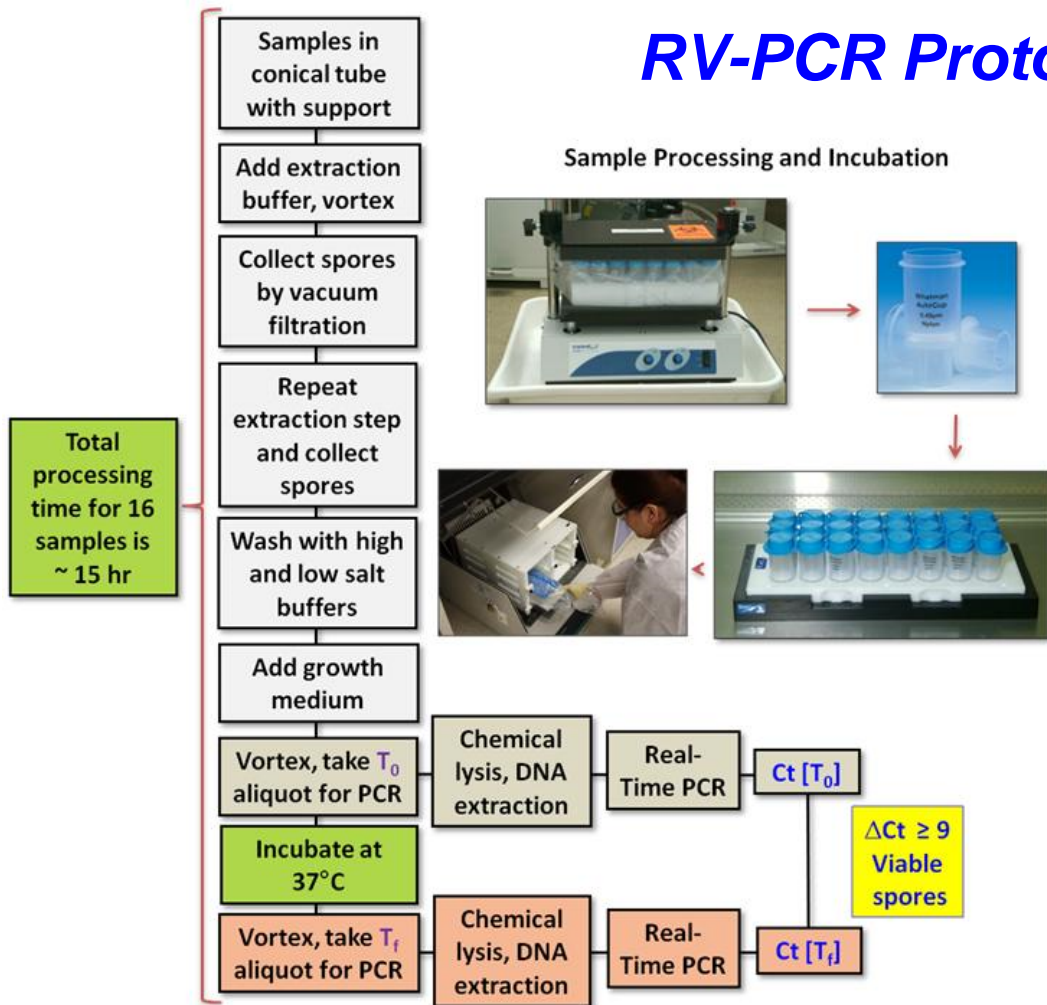
Homeland Security Research Program
National Homeland Security Research Center
Development of Biological Detection Methods



Office of Emergency Management
Operational Implementation

What is RV-PCR?

RV-PCR Protocol



T_0 = Zero Hour Incubation

T_f = Final Incubation-Hours (Endpoint)



Why RV-PCR?

RV-PCR Method

- Rapid, sensitive, and high-throughput sample analyses
 - Increased lab capacity to analyze large numbers of samples during a wide area anthrax event
 - Expedite remediation and recovery decisions
- Significantly less laboratory waste compared to traditional culture method –
A Green Solution!



***Bacillus anthracis* (Ames) colonies are difficult to detect in low levels of environmental backgrounds**



Ames – 23 CFU



Ames + 1 mg Dust



Ames + 10 mg Dust

Dust was added as a slurry and spread with Ames spore suspension
Arizona Test Dust, A3 Medium
(Powder Technologies, Inc.)



1 mg Dust



10 mg Dust



RV-PCR vs. Culture

Culture Method

- 1 sample → 11-12 culture plates + culture tube → presumptive *B. anthracis* colonies → 2-5 PCR analyses/sample
- Confirmed results in ~ 48 – 72 hr

Serial dilution – plating & Enrichment culturing



Filtration and plating



>1000 plates/96 samples
~ 3 incubators
Incubate for 18-24 hours



Sample Dilutions, Plating, and Incubation

+ PCR₃₈

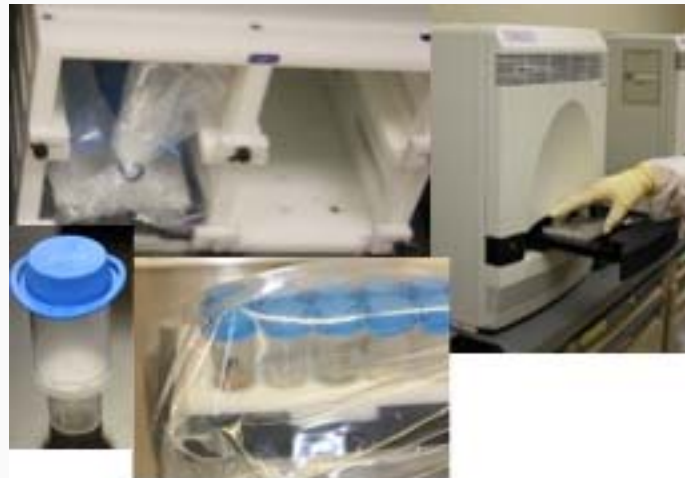


RV-PCR vs. Culturecontinued

RV-PCR Method

- 1 sample → 1 filter cup → 2 PCR analyses
- Confirmed results in ~14-16 hr

*88 samples + 8 controls/incubator
(22 samples/manifold;
4 manifolds/incubator rack)
Incubate for 9 hours*





RV-PCR vs. Culturecontinued

RV-PCR Method	Culture Method
Qualitative Analysis	Semi-Quantitative
Method performs well even in the presence of residual decon agents and spores exposed to decon agents.	Method is not tested/validated in the presence of residual decon agents and spores exposed to decon agents.
Liquid growth medium is more conducive for spore germination and growth (Ref. 2001 Amerithrax).	Plating uses solid growth medium. Some preps of spores may not germinate and form colonies (Ref. 2001 Amerithrax).



Where can I find RV-PCR?

- Lawrence Livermore National Laboratory
- EPA Microbiology Lab at Ft. Meade, MD
- USGS Lab in Columbus, OH (water only/not currently an ERLN lab)
- EPA Lab in Cincinnati, OH (coming)
- EPA NEIC lab in Denver, CO (coming)



Contacts

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