



IBCTR

INTERNATIONAL BIOLOGICAL
and CHEMICAL THREAT REDUCTION

SAND2016-5707PE

SANDIA NATIONAL LABORATORIES

INTERNATIONAL BIOLOGICAL AND CHEMICAL THREAT REDUCTION PROGRAM

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IBCTR's global experience



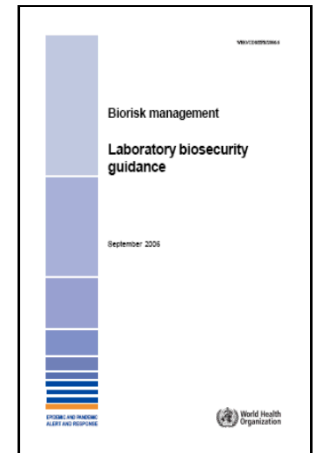
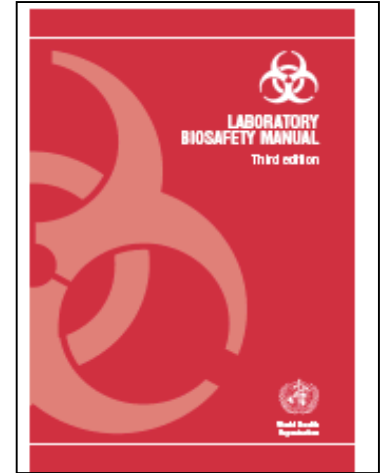
DEFINITIONS

Laboratory biosafety: containment principles, technologies, and practices implemented to prevent **unintentional** exposure to pathogens and toxins, or their unintentional release¹

Laboratory biosecurity: protection, control and accountability for valuable biological materials within laboratories, in order to prevent their unauthorized access, loss, theft, misuse, diversion or **intentional** release²

¹Laboratory Biosafety Manual, Third edition (World Health Organization, 2004)

² Biorisk management - Laboratory biosecurity guidance (World Health Organization, 2006)



BIORISK MANAGEMENT

Risk associated with biological materials

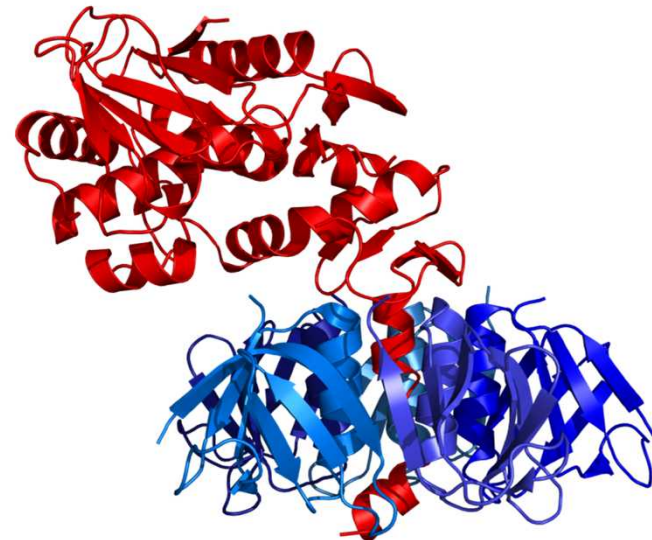
Biorisk = Biosafety + Biosecurity Risks

Pathogens



<http://orangesdms.wikispaces.com/bacteria+-+bg>

Toxins



https://commons.wikimedia.org/wiki/File:Shiga_toxin_type_2_%28Stx2%29_from_Escherichia_coli_O157-H7_PDB_1r4p.png

HUMAN CAPACITY DEVELOPMENT

For biorisk management to be effective, institutes need to have the appropriate knowledge and skills in biosafety and biosecurity.

- Includes a culture shift at the institutional level



TRAINING IN BIORISK MANAGEMENT

- Weeklong training events on topics related to biorisk management
 - Laboratory Biosecurity
 - Biorisk Mitigation Strategies
 - Biorisk Characterization and Evaluation
 - Engineering Controls and Laboratory Equipment
 - Waste Disposal
 - Shipping of infectious substances
- 20-30 staff from one or several institutes within a specific country
 - Kenya
 - Uganda
 - Ukraine
 - Algeria
 - Morocco



TRAINING IN BIORISK MANAGEMENT, CONT.

- Utilize research-based learning techniques
 - Developed a library of training materials called the Global Biorisk Management Curriculum (GBRMC)
- Train-the-trainer
 - Mentoring of local trainers



INTEGRATION OF BIORISK MANAGEMENT TOPICS INTO UNIVERSITY CURRICULA

- Work with a group of university professors and deans within a given country
 - Several engagements over multiple years
 - Planning and coordination
 - Increasing university expertise in biorisk management
 - A big hurdle is course approvals (can take many years)
- Represents one of our best ways to change the overall culture and awareness surrounding biorisk management in the biosciences
- Inherently sustainable (once in the curriculum, it will stay there)



SAFE AND SECURE LABORATORY AND FACILITY DESIGN

Design Drivers

- Risk based design vs. pre-defined solutions
- Sustainability
- Adaptability
- Consistency in design and operations (e.g. SOPs)

Laboratory Best Practices for Intrinsic Safety and Security

- Safety and Security
- Separation of public and lab spaces
- Samples, waste, and people flow



EQUIPMENT & CASEWORK:

- 1 Fixed Bench
750mm deep x 2500mm wide x 915mm high
(single drawer with door) below
- 2 450mm x 450mm Sink
- 3 Mobile Bench
750mm deep x 1500mm wide
Height adjustable from 750mm to 915mm
- 4 Mobile Bench
750mm deep x 750mm wide
Height adjustable from 750mm to 915mm
- 5 Mobile Storage Cabinets
450mm wide x 600mm deep x 800mm high
One 4 drawer unit, one drawer/door unit per
1500 mm wide mobile bench
One drawer/door unit per 750 wide mobile bench
- 6 Adjustable Shelves
3 shelves 400mm deep x 750mm wide
- 7 Refrigerator - approx 750mm x 750mm
- 8 Freezer - approx 750mm x 750mm
- 9 Equipment as required
- 10 Biosafety Cabinet 1800mm
Ducted / Thimble Connected / Recirculating
- 12 Drying Rack 600mm wide x 750mm high

SERVICES:

- SINK(s) - CW / HW / DI Water / Eyewash
- EQUIPMENT - CO2 / LN2
- FUME HOODS - CW / CA / Vac / Other _____
- AT BENCH - CA / Vac / CO2 / Other _____
- EXHAUST AIR - HEPA Filtered / 100% Exhaust /
Recirculating
- SUPPLY AIR - Natural Ventilation / Mechanical
Ventilation / HEPA Filtered
- EFFLUENT - Direct discharge / Neutralization / Effluent
Decomposition System (Batch / Flow
Through)

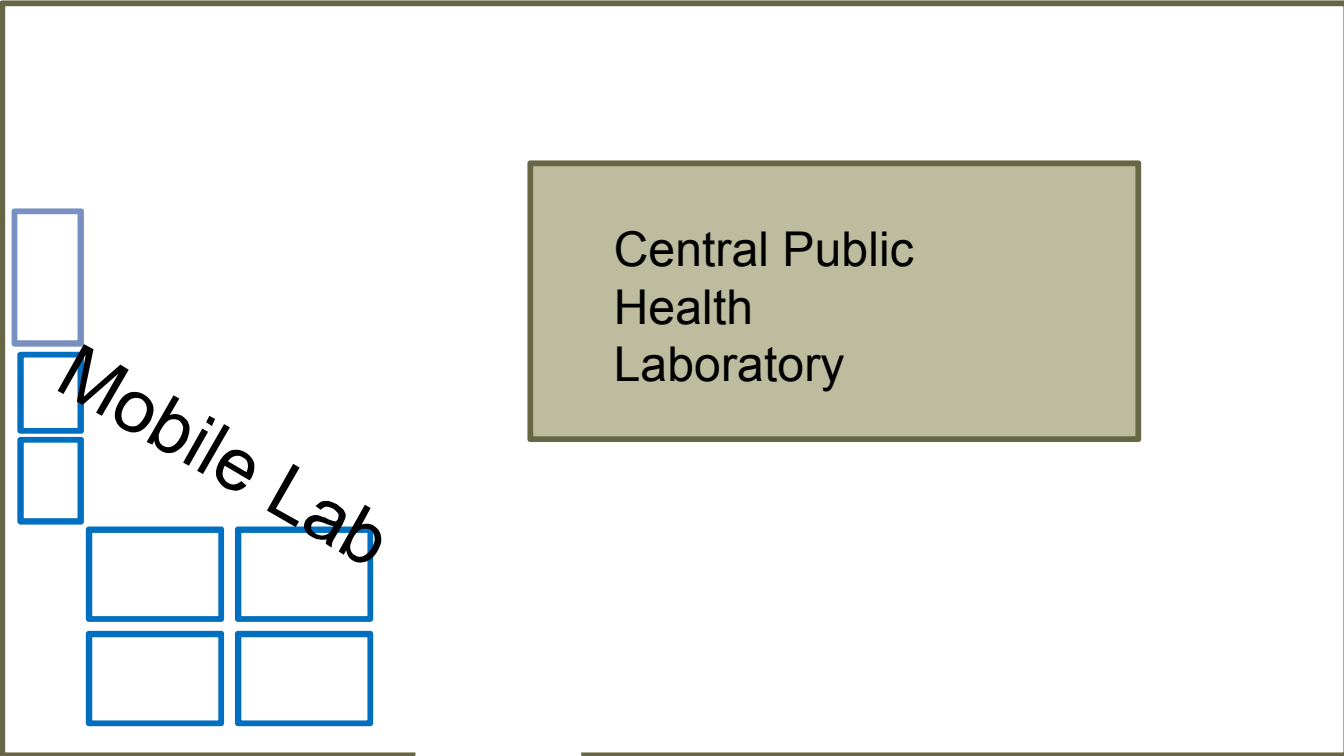


LAB COORDINATOR FOR EBOLA DIAGNOSTIC LAB IN SIERRA LEONE

- Liaise between lab, sponsor, and stakeholders in country
- Compile, analyze, and report results daily to local Ministry of Health, local physicians, and sponsor
- Responsible for eventual transition of capability to host governments
- Receive samples
- Give tours



MOBILE LAB IS LOCATED AT CENTRAL PUBLIC HEALTH LABORATORY



MOBILE LAB

Engineer
office

Storage

Incinerator/
generators

Office

PPE

PCR

PCR
prep

Isolation &
extraction

Decon



MOBILE LAB

Engineer
office

Storage

Incinerator/
generators

Office

PPE

PCR

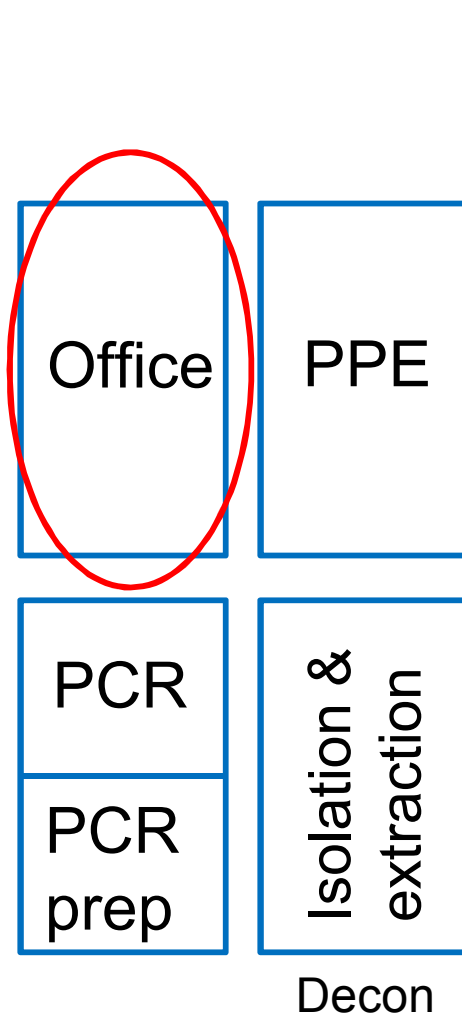
PCR
prep

Isolation &
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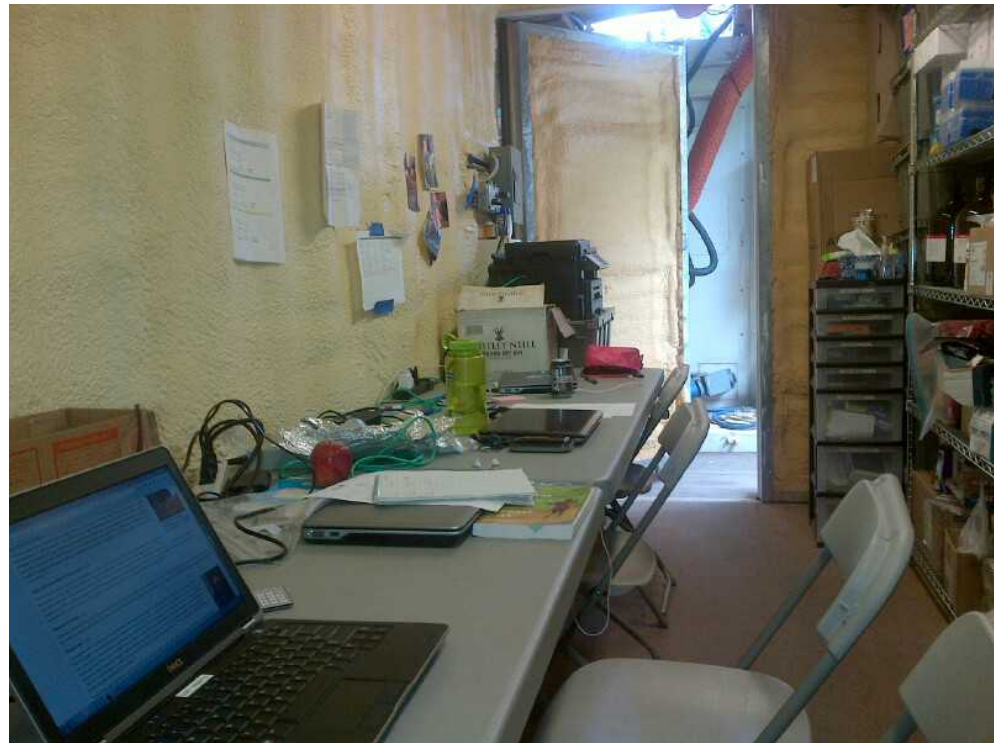
MOBILE LAB



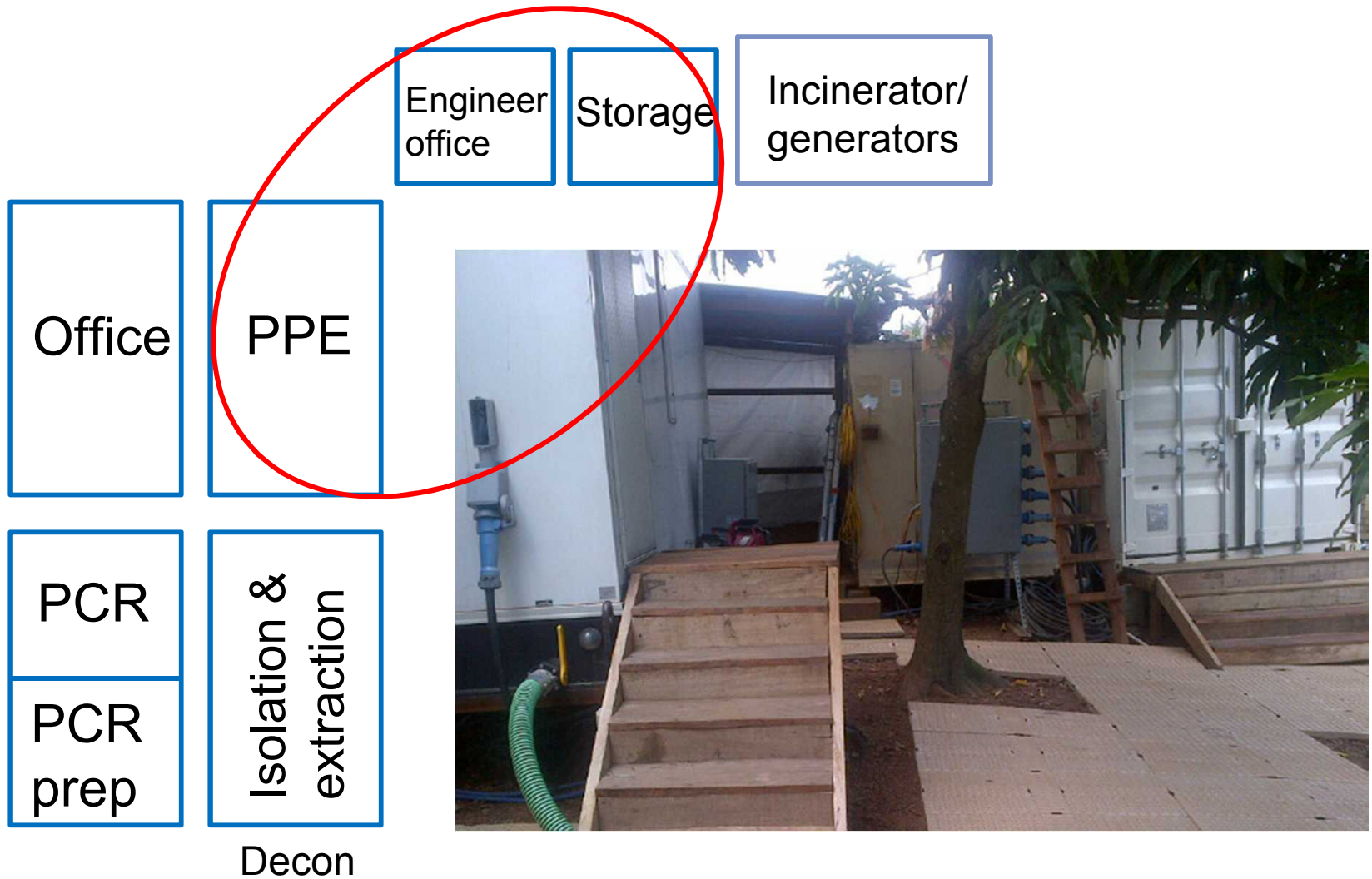
Engineer
office

Storage

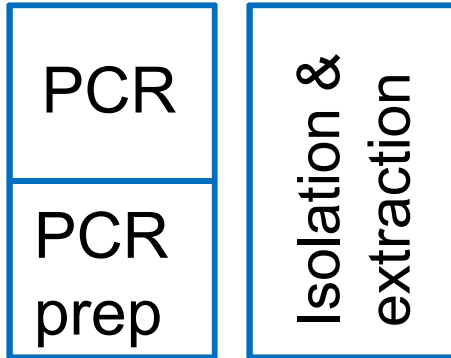
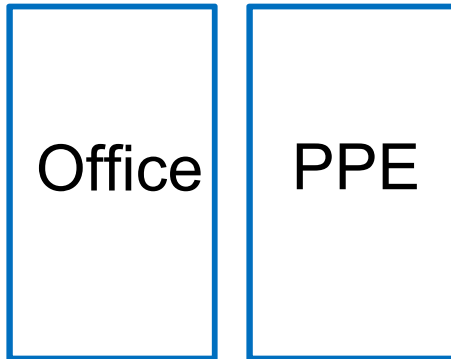
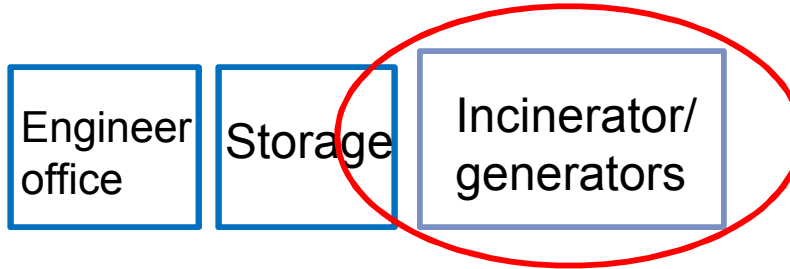
Incinerator/
generators



MOBILE LAB



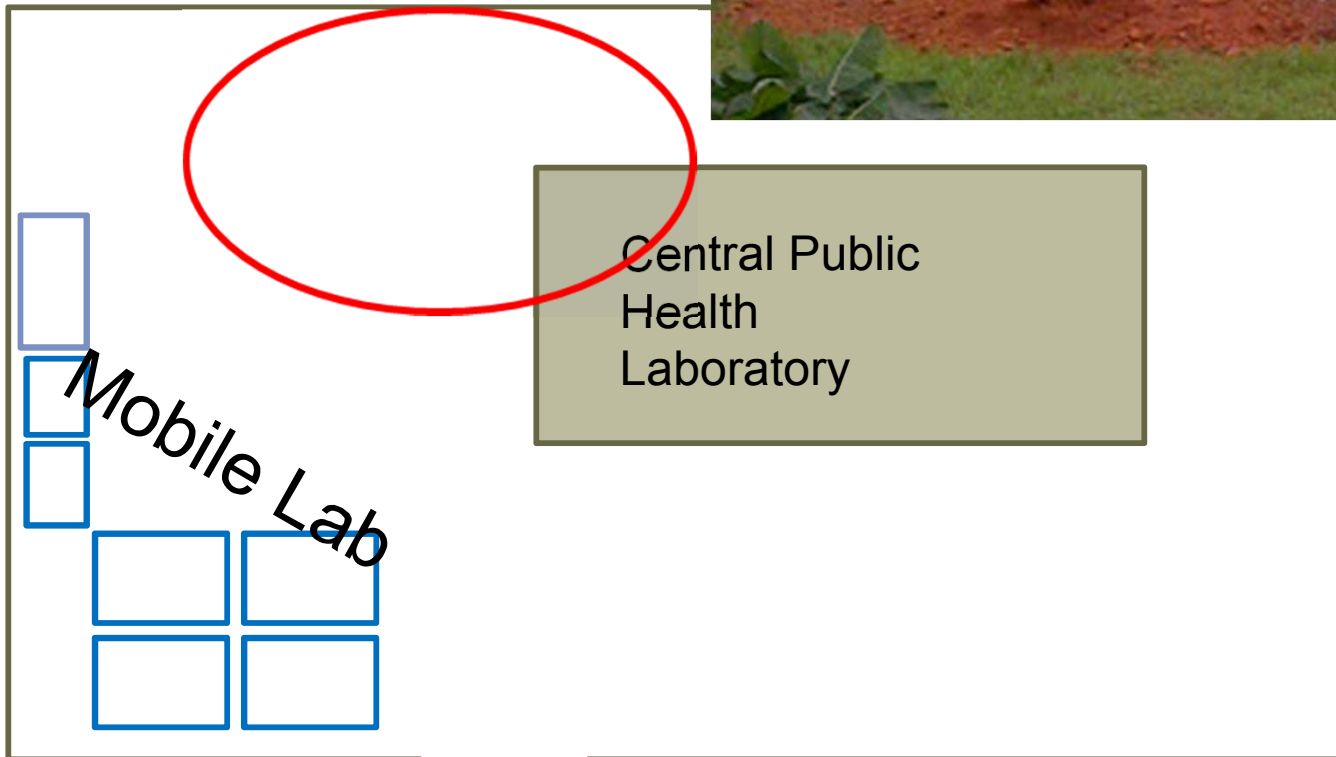
MOBILE LAB



Decon



SEPTIC SYSTEM BEING BUILT BEHIND THE LAB





IBCTR IS INVOLVED WITH MANY OTHER ACTIVITIES

- Conducting biosafety and biosecurity risk assessments
- Biosafety and biosecurity risk assessment methodology
- Implementing laboratory biorisk management systems at already existing facilities
- Chemical security
- Veterinary capacity building
- Conducting exercises and workshops in emergency preparedness and response (for law enforcement, public health)
- Prioritization of biological threats worldwide or within a country using robust, transparent, and reproducible methodology
- Assisting countries in the development of national biosafety associations
- Developing biorisk management policies and guidelines