The Blueprint for Success in Chemical Terrorism Laboratory Preparedness

Prepared by

The Environmental Health Committee

of the

Association of Public Health Laboratories

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The Blueprint for Success in Chemical Terrorism Laboratory Preparedness

- Building on the ‘Traditional’ Environmental Public Health Laboratory
- To the Present
  - Preparedness for possible Chemical Terrorism
  - Developing and enhancing relationships
  - Improving communication, coordination, and cooperation
- To the Future
  - Identify and fill gaps in System

Environmental Health

- *Segment of public health that is concerned with assessing, understanding, and controlling the impacts of people on their environment and the impacts of the environment on them* (Moeller, 1997)

- Moeller, D.A. *Environmental Health*, rev. ed., pp. 1. Cambridge, MA: Harvard University Press

Biomonitoring

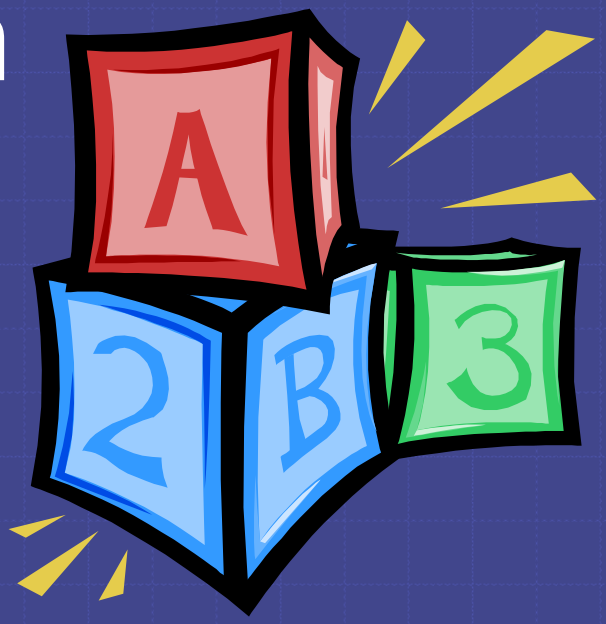
Biomonitoring is the assessment of human exposure to chemicals by measuring the chemicals or their metabolites in human specimens such as blood or urine.

State BT/CT Programs

- Where are we now?
- Are we prepared?
- What needs to be done?

Building Blocks

- The Three “C’s”
  - Communication
  - Coordination
  - Cooperation



Criteria for CT Preparedness

- **Communication**
  - Are internal and external communication procedures and equipment adequate?
  - Is the laboratory a member of the LRN?
- **Coordination**
  - Are sample collection containers and procedures in place with appropriate agencies such as Emergency Rooms, HazMat Teams and Civil Support Teams?
- **Cooperation**
  - Have relationships been established between the various state agencies to ensure prompt response to an event?

Criteria for CT Preparedness

- Plan
  - Does the state have a laboratory response plan for chemical terrorism?
- Facilities
  - Are the laboratory facilities adequate for performing the duties described in the plan?
- Staff
  - Does the laboratory have adequate staff with the appropriate training to perform the services described in the plan?

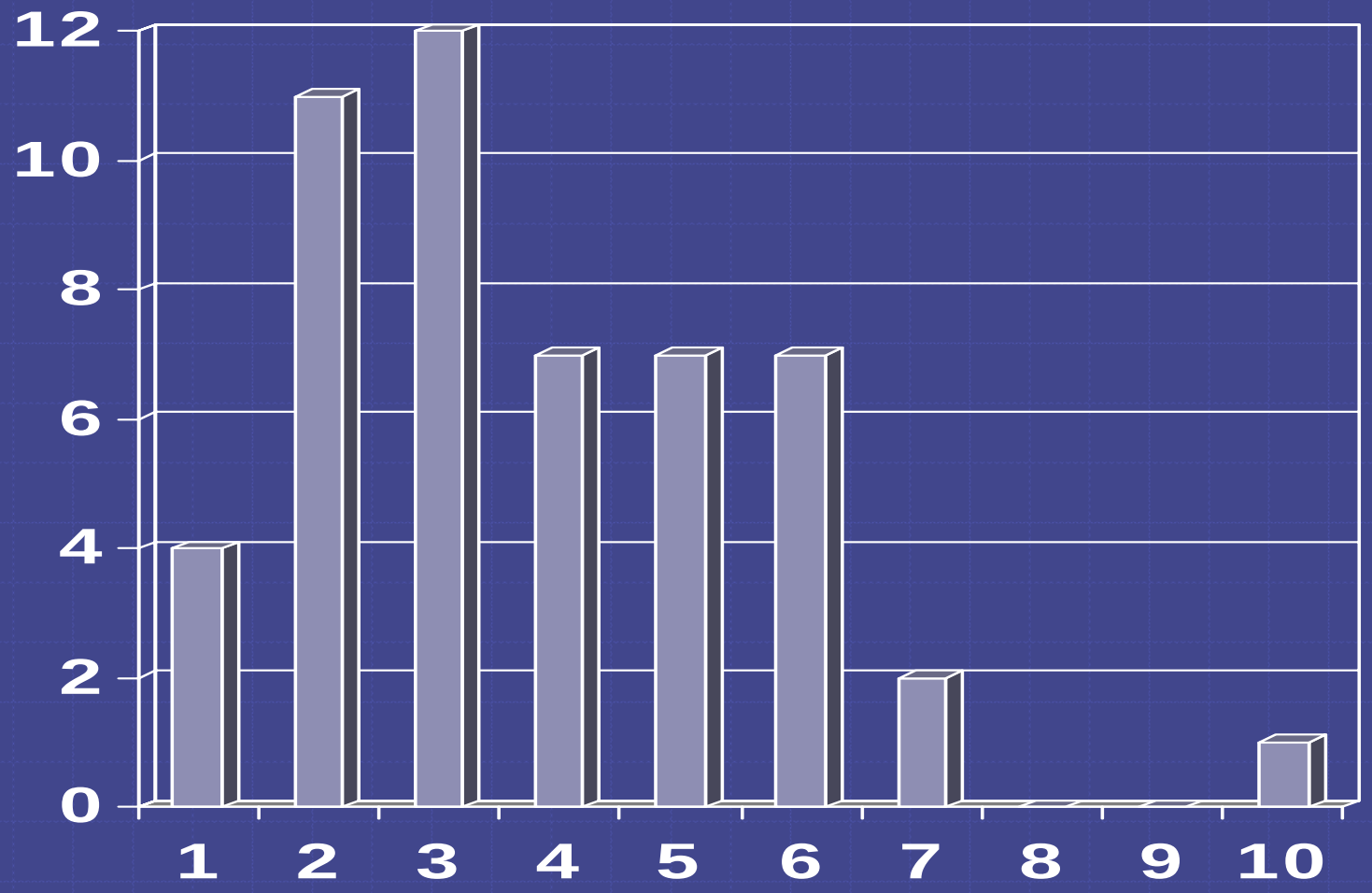
Criteria for CT Preparedness

- **Safety procedures and equipment**
  - Are safety procedures and protective equipment adequate?
- **Instrumentation**
  - Is the required instrumentation available?
- **Test methods**
  - Are validated test methods available and proficiency demonstrated?

Criteria for CT Preparedness

- **Data management**
  - Is the laboratory data system capable of supporting the analysis of samples/specimens for chemical agents?
  - Are systems in place to rapidly and securely report results to appropriate agencies?
  - Are systems in place to provide interpretation of results from clinical or environmental samples?

Preparedness: Self-Rating of Laboratory Readiness - January, 2003



Chemical Terrorism Planning Jan 6 – 9, 2003

- State Public Health Laboratories
- CDC
- EPA
- USDA
- FDA
- FBI

Level I Laboratories

- Develop and maintain capacity to collect and transport clinical specimens to other laboratories for analysis for chemical agents
  - Chemical Terrorism Laboratory Program Manager
  - Packaging and Shipping Specialist
  - Develop response plan for Chemical Terrorism
    - Coordinated with State Plan

Level II Laboratories

- Chemical agent measurements of moderate complexity

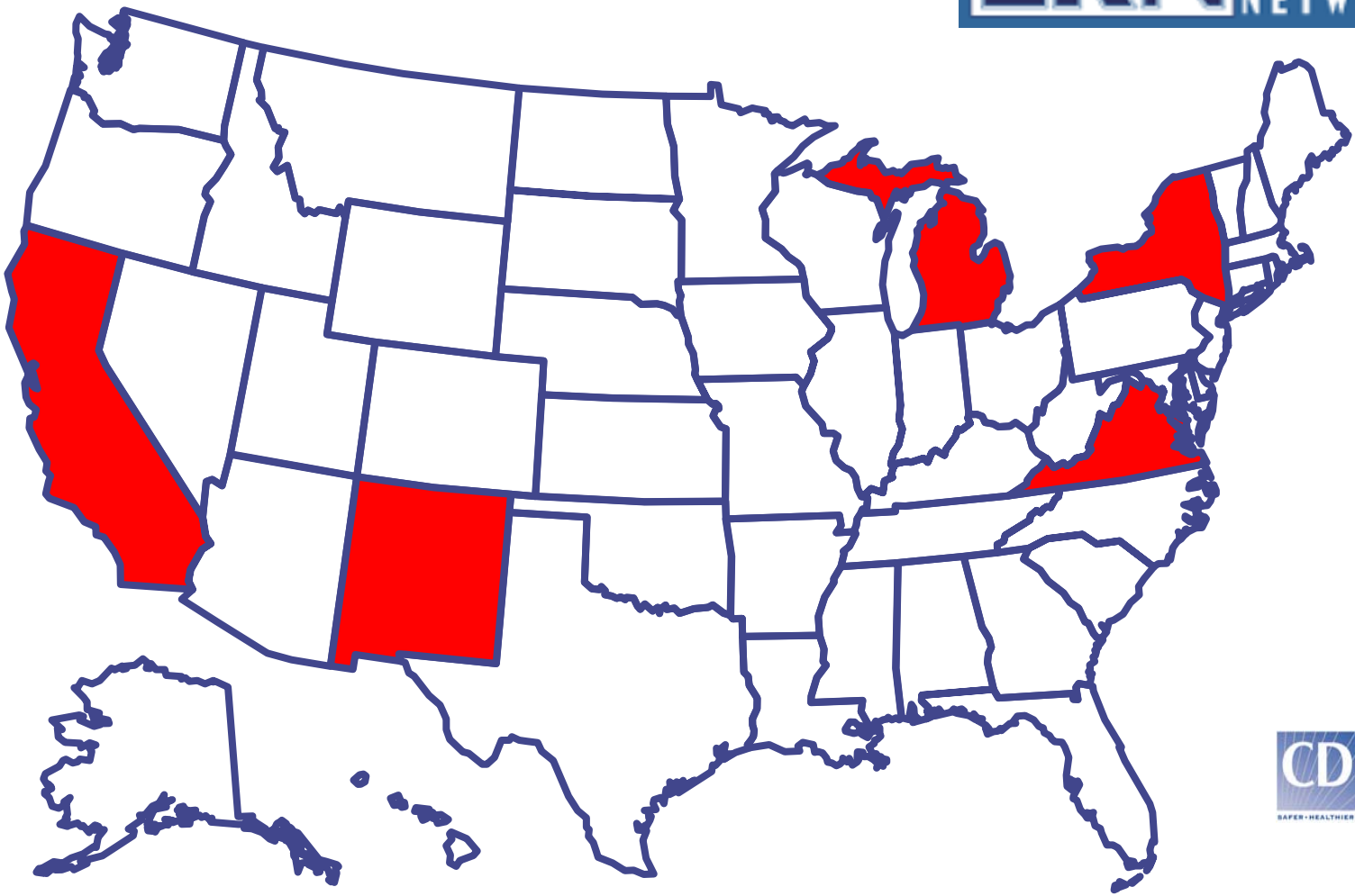
- Includes all Level I requirements
- Two chemist positions
- Clinical sample analyses for metals by ICP/MS
- Clinical sample analyses for Level II agents or their metabolites by GC/MS

Level III Laboratories

Perform chemical agent measurements of high complexity

- Includes all Level I and Level II responsibilities
- High complexity analyses (LC and GC/MS/MS)
  - Nerve agents
  - Mustards
  - Tricothecene
  - Mycotoxins
  - Selected incapacitating agents
  - Selected toxic industrial chemicals

Chemical Laboratory Response Network
1999-2003



Chemical Laboratory Response Network 2003-2004

LRN LABORATORY RESPONSE NETWORK

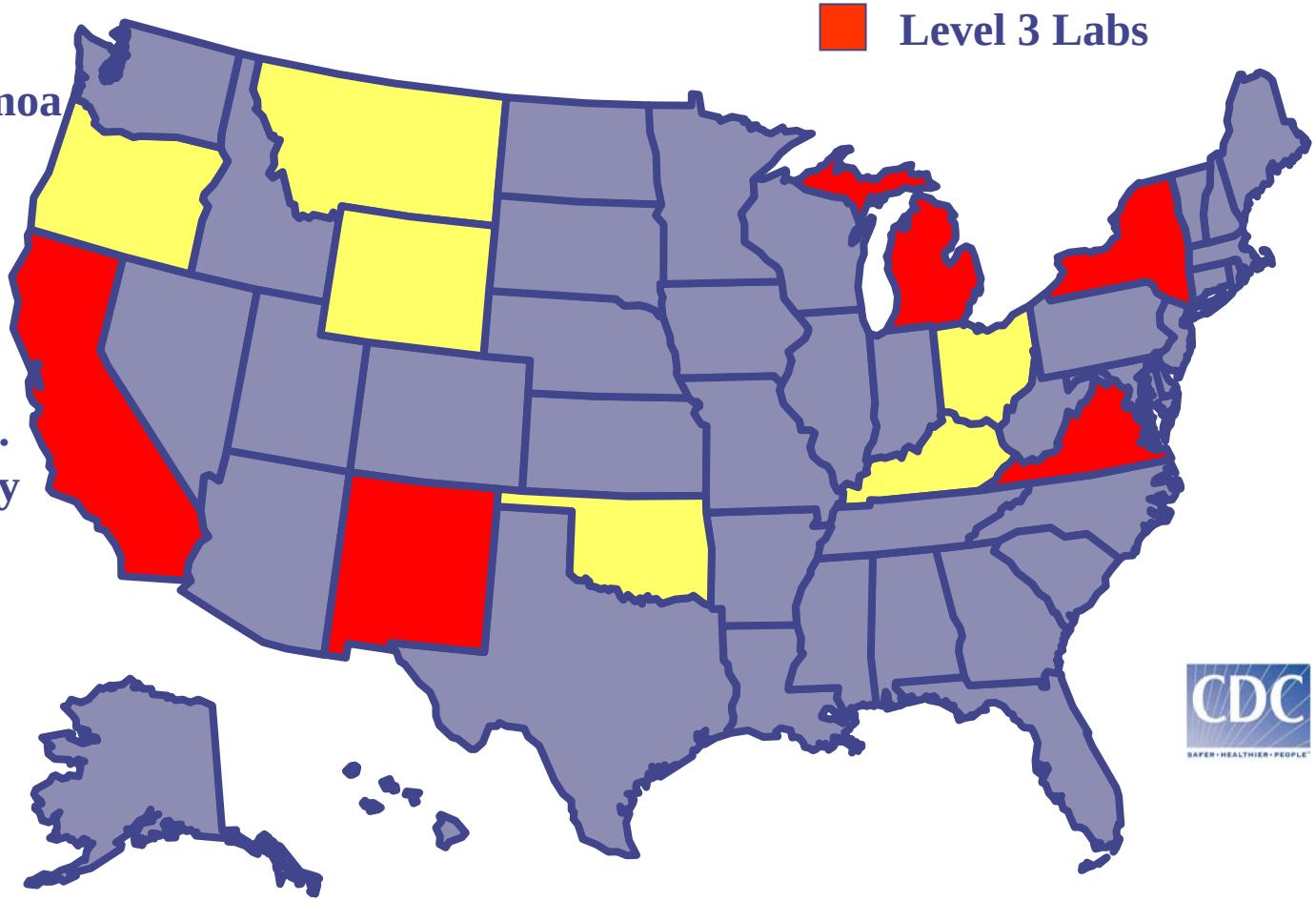
Level 1 Labs

Level 2 Labs

Level 3 Labs

Also:
American Samoa
Chicago
Guam
Micronesia
Los Angeles
Marshall Is.
N. Mariana Is.
New York City
Palau
Puerto Rico
US Virgin Islands

District of Columbia



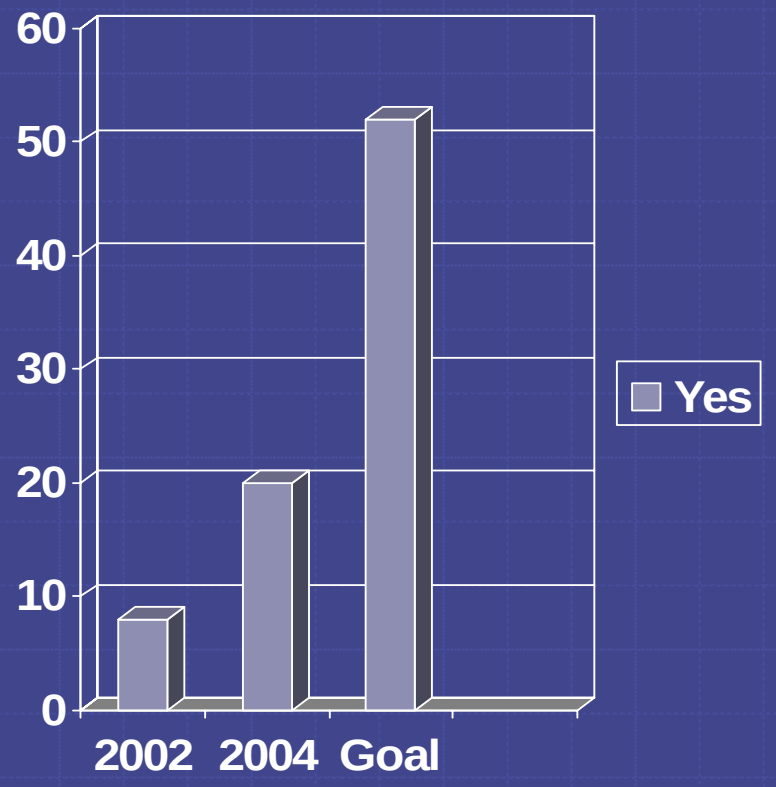
CDC
SAFER • HEALTHIER • PEOPLE™

APHL Survey December 2004

- How prepared are we today for a chemical terrorism event?
- What progress has been made?
- What remains to be done?

Response Plan

- Does your laboratory have a formal response plan to handle a chemical terrorism event?



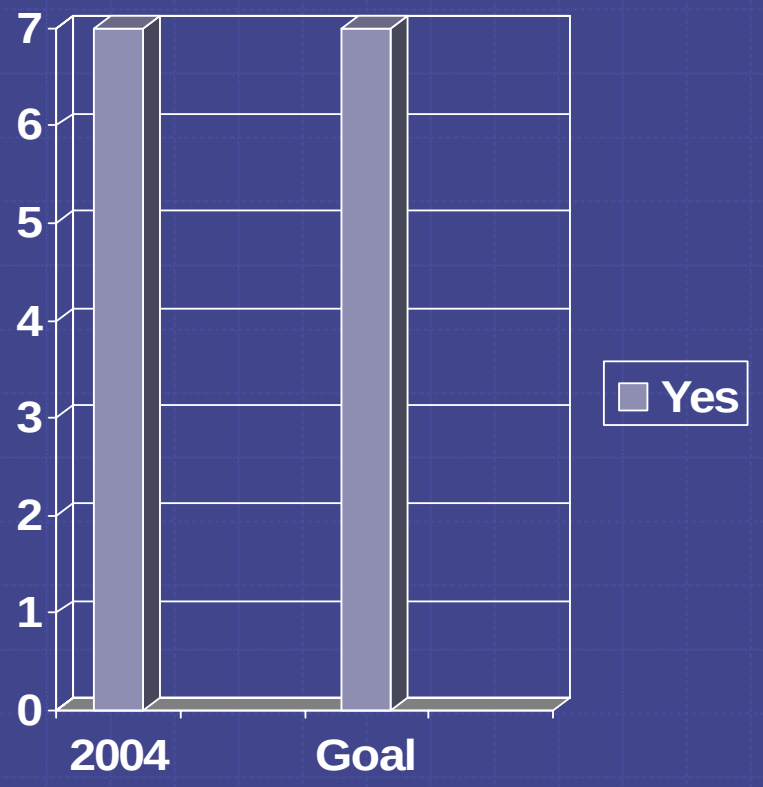
Trained staff for CT Testing

Is your laboratory adequately staffed for a CT event?

Trained staff for CT Testing Level I

Is your laboratory adequately staffed for a CT event?

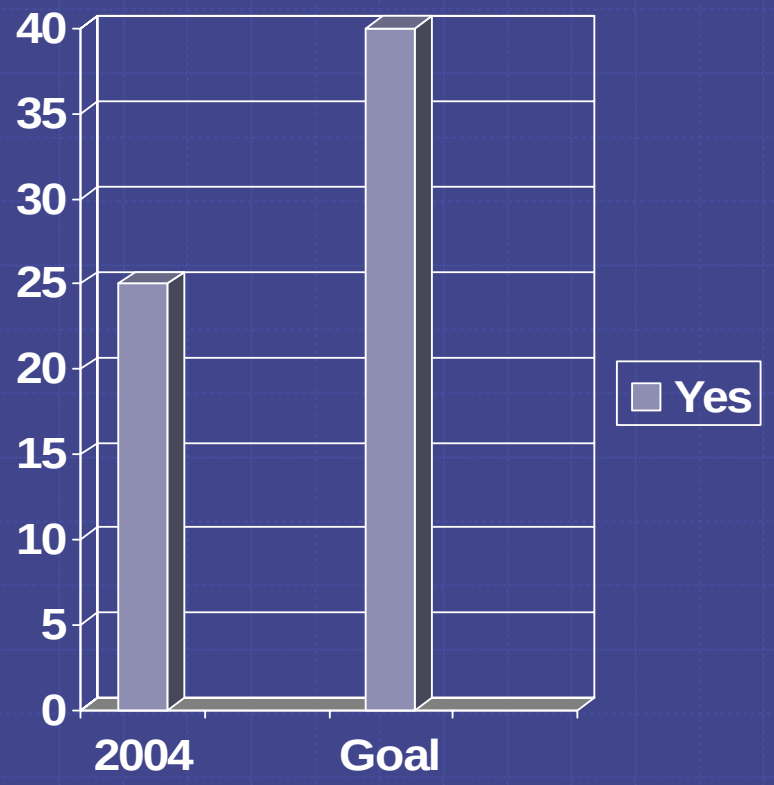
Yes



Trained staff for CT Testing Level II

Is your laboratory adequately staffed for a CT event?

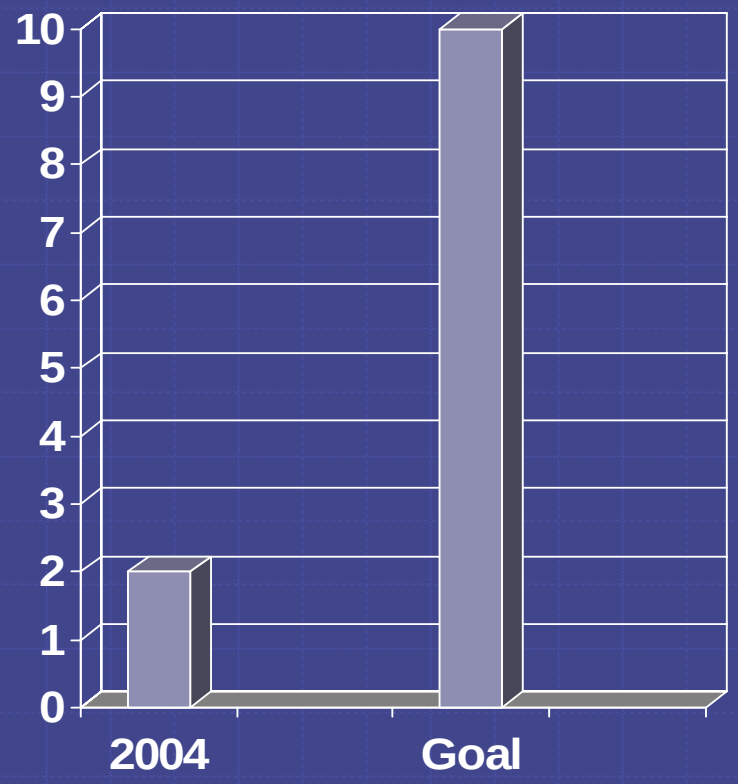
Yes ≥ 2



Trained staff for CT Testing Level III

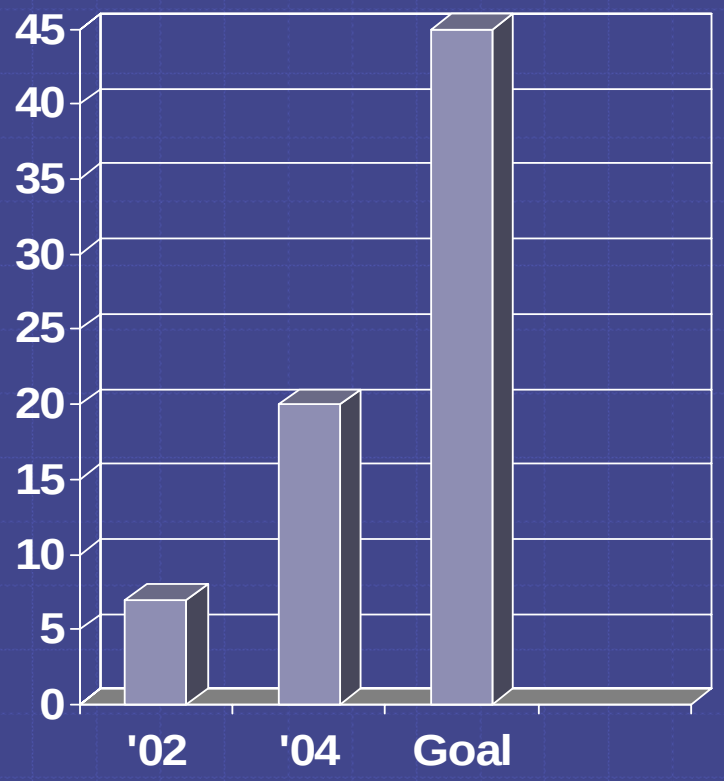
Is your laboratory adequately staffed for a CT event?

No. Labs = 5



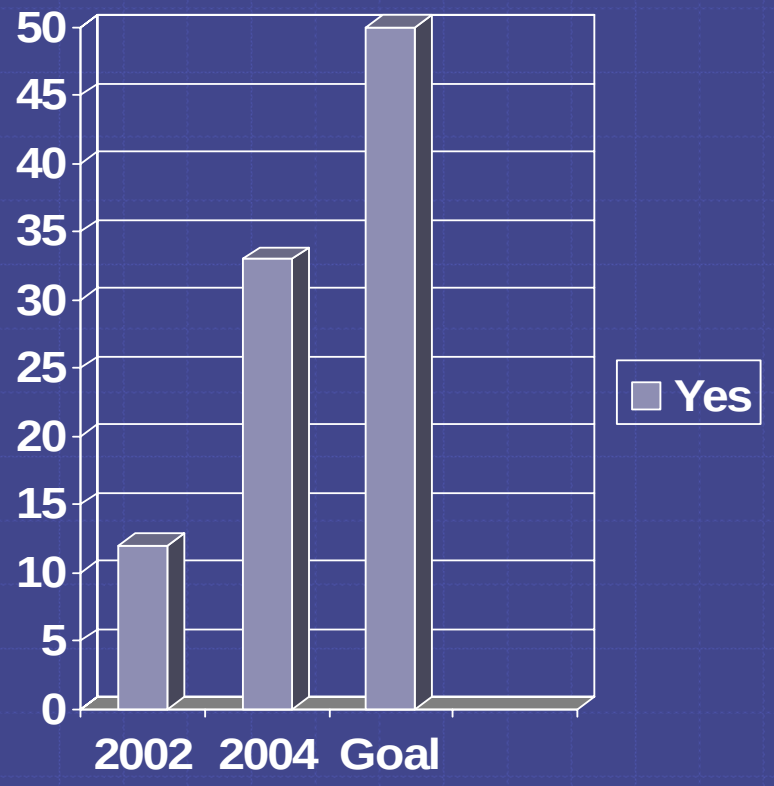
CT PPE Adequate?

- **States performing chemical tests reporting their PPE is adequate.**

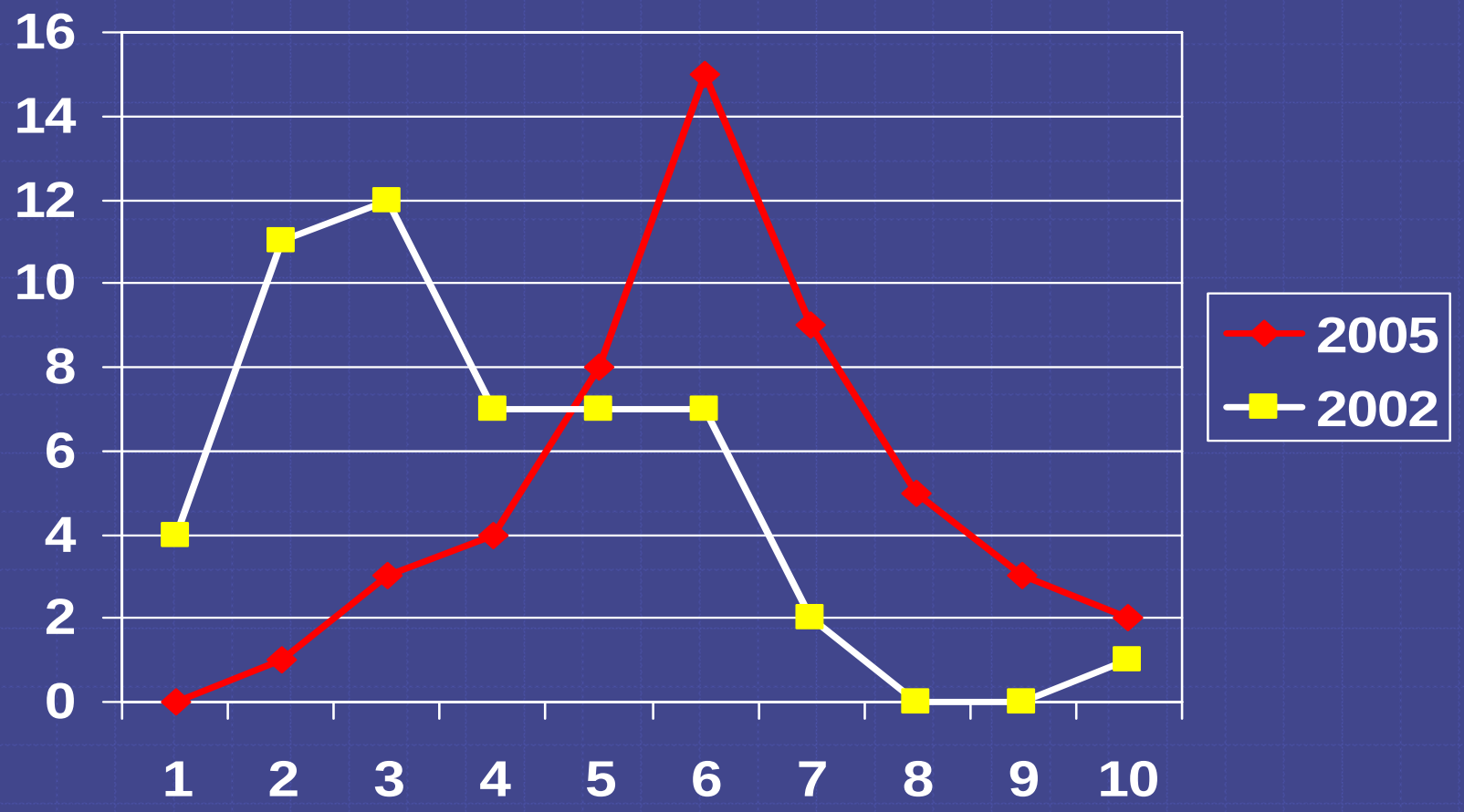


Mixed Hazards

- Is your laboratory capable of safely handling samples containing mixed hazards?
- Chemical
- Radiological
- Biological



Preparedness Self-Rating of Laboratory Readiness Jan. 2005



Achievements

- LRN-C
- EPA is addressing drinking water testing for potential CT agents.
- FDA/USDA initiated proficiency testing for FERN laboratories.

Rapid Toxic Screen

- CDC can conduct rapid response procedures to identify hazardous substance(s) present in a clinical sample
- Determine plan of action for testing additional samples/specimens

GAPS

- Coordination with first responders and Civil Support Teams for sample collection, field testing and interpretation of field test data needs development.

- Procedures for collection, packaging, shipment and testing for environmental samples are needed.

Analytical Laboratory Systems

Capability: On-site chemical, biological, and radiological agent identification for the purposes of incident assessment and hazard communication.

Technologies:

- **Gas Chromatograph/Mass Spectrometer -** Detect and identify chemical warfare agents and TIC/TIMs. Provide a spectrum that can be sent via reachback to SMEs. Provide high-confidence qualitative data within 15-30 minutes.
- **Gamma Spectrometer -** Provide isotopic identification to determine half-life and medical considerations with a 5 to 25 minutes processing time.

Analytical Laboratory Systems

- **Technologies**:
  - **Polymerase Chain Reaction** - Specimen analysis for biological agents, providing high-confidence identification of standard biological warfare agents
  - **Fluorescent Microscope** - Provide morphological identification of biological samples with digital reachback capabilities.
  - **Fourier Transform Infrared** - Chemical and biological analysis that produces a spectrum that can be compared with onboard libraries or electronically passed back to SMEs for identification.

Gaps

- CT planning has been focused upon rapid response (first 12 hours)
- Planning for the time period following this initial period is very limited and not widely understood

GAPS

- Planning for food protection including sample collection, test methods and identification of laboratories that will perform the analysis is needed.
- Coordination between FERN laboratories with LRN laboratories is needed.

GAPS

- Provision for radiological testing is needed.
- Integration of the CT, BT and radiation programs needs improvement to ensure a unified all hazards response to a terrorism event

BT Program Gains

- Laboratory facilities, instrumentation, communications and experienced staff are available for response to non-terrorist related health threats.
- Public health infrastructure has been significantly strengthened at the local and state level.

CT Goals

- Increase utilization of CT instrumentation for bio-monitoring projects.
- Increase awareness of environmental health issues.
- Strengthen toxicology and environmental epidemiology capabilities within the states.
- Integrate Environmental Health into the Public Health System

Biomonitoring

Biomonitoring ---**Uses**:

Surveillance, Post-threat Assessment, Epidemiology, Environmental Health Tracking, NHANES, Report on Human Exposure

(Sounds a lot like traditional public health)

What are the Requirements?

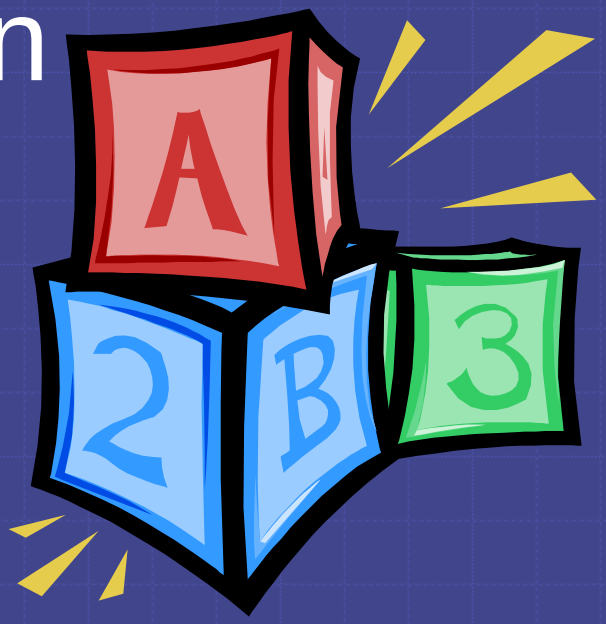
- We need laboratories to measure,
- We need epidemiologists to design experiments,
- We *really need* <u>environmental tracking</u> to tie it all together.

Environmental Tracking - Chemists' Viewpoint:

- *We can identify chemicals in the environment*
- *We can track them through humans*
- *But in the end we need public health to relate both to health effects in humans.*

Building Blocks

- The Three “C’s”
  - Communication
  - Coordination
  - Cooperation



State Public Health Labs 2005

- Laboratory data is only But as good as the sample that is collected and . . .
- All data is worthless without a plan for using it.