Introduction

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Overview

Trends in Public Health Design

Case Studies

Benchmarking

- Program
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Overview

Background – Public Health Experience

Arizona
California
Georgia
Hawaii
Illinois
Indiana
Iowa
Maryland
Minnesota
New Jersey
New Mexico
New York
North Carolina
North Dakota
Oregon
Utah
Virginia
Vermont
Washington
Wisconsin
Wyoming

Federal Labs
CDC
USAMRIID
NIH - NIAID
Overview
Mission

- Diagnostic & Analytical Services
- Disease Surveillance
- Outbreak Investigation
- Outreach Programs
- Training & Consulting

Method

- Quality Scientific Talent & Equipment
- Laboratory Building as a Partner
  - Enables the Sciences
  - Creates a Safe Workplace
  - Provides Appropriate Security Measures
  - Flexible, Adaptable, Easily Changed
  - Facilitates a Quality Work Environment

Issues and Drivers

Improving the Health of the People of the State

“Can Do”

Not just “Make Do”
Issues and Drivers

Site Protection & Chain of Custody
- Secure Testing & Contaminant Control
- Sample Intake Security
- Secure Storage

Unknown Agents (BSL3-E to Glovebox 4)
- Increased Virulence
- Multiple Drug Resistance
- Modified Path of Transmission
- Modified Diagnostic Characteristics

Select Agents (CDC & USDA)
- Increased Environmental Containment
Design for the Lab Hazards

- Biological - Chemical - Radiological - Physical
- Safe Layout: Consider Safe Paths of Travel
- Interrelated HVAC & Primary Containment
- Transparency – See and Be Seen

Layout as a Flow Diagram

Central Accessioning / All Hazards Receipt = First Line of Defense

Open Labs Wherever Possible
Closed Labs as Required

Layers of Flexibility in Labs and Systems

Quality Working Environment
Trends – Design Issues

Laboratory Hazards
Laboratory Hazards

Chemical:
Flammables, acids, corrosives, reactive chemicals, carcinogens, mutagens, teratogens, toxins, compressed gases

Radiological:
Radionuclides and equipment that produces ionizing radiation

Physical:
Lasers, magnetic fields, moving parts, high voltage, high noise, ultraviolet light, extreme heat or cold, high pressure vessels

Biological:
Etiologic agents, material containing etiologic agents, organisms with recombinant DNA, toxins, allergens
Trends – Design Issues

Building As Flow Diagram

Public & Personnel

Non Hazardous

Hazardous

Administrative - Public

Clerical - Semi Public

Laboratory - Restricted Access

Specimens
Mail & Deliveries

Processing

Receiving & Accessioning

Supplies

Media Prep

Sample Storage

Waste Holding

Disposal

Lab Support - Restricted Access

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Securely Managing the In/Out Flow

- Loading Dock
- Waste/Supply
- Elevator
- Unknowns
- Central Accessioning
Samples of Unknown Origin: CT/BT/Radiological
Central Accessioning for Routine Specimens
Open Laboratory Concept

- BSL-3 Labs
- TB Suite
- BT Suite
- Support Labs
- Specimen Corridor
- Open Labs
- Tech Space
- Elevator
- Offices
Trends – Design Issues

Open Laboratory Concept
Concepts of Biocontainment

Containment Barriers
- Primary - BSC’s, PPE, Glovebox,
- Secondary - Rooms, systems
- Tertiary - Containment around systems

Access Control and Separation
- Key card, Cameras, Biometric
- Safety Starts with Good Personnel Protocol

Redundancy and Reliability
- Mechanical Systems
- Security
- Flexibility of Spaces
- Surge Capacity

Barrier Minimization
- Flow of Personnel
- Flow of Specimens for Analysis

Decontamination
- Strategies
- VHP, Autoclaves, Incinerators, Digestors
Concepts of Biocontainment
Concepts of Biocontainment – BSL -3 Enhancements

- Autoclave in Containment
- Gown In / Shower Out
- HEPA Filtered Exhaust
- Effluent Decontamination
Trends – Design Issues

Space Changes - Flexibility

- High Service Lab
- Low Service Lab
- Office
- Bioinformatics

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Trends – Design Issues

Flexibility
Trends – Design Issues

Flexibility
Trends – Design Issues

Quality Environment

Lighting
- Views and Daylight
- Lighting Levels
- Glare Control

Ventilation
- Temperature Control
- Air Movement and Ventilation
- Humidity Control
- Air Quality

Structure
- Contamination Control
- Vibration Isolation
- Noise Attenuation

Quality of Space
- Facilitation of Interaction
- Attracting and Retaining Staff
- Multidisciplinary Facility
- Flexible and Adaptable
Trends – Design Issues

Quality Environment - Casework
Trends – Design Issues
Quality Environment – Containment Devices
Trends – Design Issues

Quality Environment – Training Labs and Classrooms

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Quality Environment – House Systems
Case Studies and Benchmarking

Recently Completed - Arizona
Case Studies and Benchmarking

Recently Completed – Indiana Health and Forensic Sciences
Case Studies and Benchmarking

Recently Completed – Minnesota Depts. Of Health and Ag.
Case Studies and Benchmarking

Recently Completed – Virginia DCLS
Case Studies and Benchmarking

In Construction – Iowa University Hygienic Laboratory
Engineering Issues

Engineering Philosophy

Safety
- For Scientific and Maintenance Staff

Flexibility
- Modular in Design for ease of Renovation
- Maintenance Ability to easily service all systems to achieve optimum operation

Reliability and Redundancy
- Reliability is not Redundancy
- Adequate backup to protect research
- Reliability Critical Systems based on reliable capacity
- Controls Ensure appropriate level of control for temperature, humidity, pressurization and filtration

Energy Conservation
- Utilization of energy recovery techniques and controls methodology
- Integrated Systems working together