Science & Safety
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House Bill 1531

ERC Meeting

April 11, 2006

Linda M. Stroud, Ph.D.

North Carolina Schools

34 LEAs–Science Safety Presentations / Customized Comprehensive Science Safety Program

175 Middle / Secondary School Assessments

States with School Mercury Programs

State	Laws/ Regs	Lab Clean-out	Collect/ Replace Inst.	Ed Program
CT		X	X	
IL	X		X	
IN	X		X	X
KS				
ME		X		
MD	X			
MA			X	X
MI	X			
MN			X	
NY	X	X	X	
OR	X			
VT		X		
VA		X		
WI	X			X

Massachusetts School Mercury Cleanout

26 elementary, 24 middle, 53 high schools

- Thermometers

Lab	4322
Fever	1368
• Sphygmomanometers	112
• Barometers	65

Total Mercury	936 lbs.
Elemental Mercury	699 lbs.

Items That Contain Mercury

- Bulk elemental mercury
- Laboratory chemicals
  - Mercury II oxide
  - Mercury II chloride
  - Mercury II sulfate
  - Mercury II nitrate
  - Mercury II iodide
- Mercury containing instruments
  - Thermometers
    - Lab thermometers
    - Fever thermometers
  - Sling psychrometers
  - Barometers
  - Mercury switches
  - Fluorescent lights

Mercury Vapor

- UV Lamp (254/356 nm)
- Thin Layer Chromatography Paper
- Glass Jar with Mercury: Tightly Capped
- Emission of Vapor
- 75 – 80 % Hg absorbed by inhalation
- Higher temperature: more vaporization of Hg

Non-Mercury Alternatives

Chemical	Alternative
Mercury II oxide	Copper catalyst
Mercury II chloride	Magnesium chloride Sulfuric acid
Mercury II sulfate	Silver nitrate (?)
Mercury II nitrate	Ammonia, Copper II sulfate, Neosporin
Source: www.epa.gov WI DNR Mercury Sourcebook: Educational Institutions	

Non-Mercury Alternatives

Instrument	Amount of Hg (grams)	Alternatives
Thermometers	1/2 - 3	Alcohol thermometers, (glass-teflon coated), digital
Manometers	29 - 74	Non mercury gauges
Psychrometers	5.2 - 6	Digital, Spirit-filled glass sling psychrometers
Gauges	>1	Electronic (digital)
Barometers	395 - 622	Aneroid, piston or capsule, electronic digital
Sphygymomanometers	104 - 124	Aneroid and electronic devices

ERTCO Recycling Program

- Fisher
- NC Public Schools
- All North Carolina colleges and universities

- Thermometers
- Sling Psychrometers
- Barometers

Mercury Cleanup Cost

- Granville County: (2005) $3000 –$4000 / classroom (19)
- Triangle Area – April 3 or 4, 2006

  K-8 School - < 1 tsp = 5 mL = 67.95 g = 2.4 oz

  Principal called Emergency Response

  Lumex Instrument needed to quantify mercury levels to determine if it was safe for children

  Only 1 company in state has Lumex instrument

April 6, 2006 - Another Mercury Spill in NC Pre-K to Middle School in Chapel Hill

- Mercury in sink trap during maintenance
- Water and mercury spilled onto countertop and floor
- Most of mercury removed but tracked into carpet
- Certified mercury cleanup group Hepaco used Gerome instrument to measure mercury (only tells you if mercury is present) didn't use Lumex
- Children allowed back into classroom three days
- School called State Health Department over weekend - UNC has only Lumex available in state
- Mercury vapor levels as high as 10,000 ng/m^3 which is greater than EPA recommended level 1,000 ng/ m^3
- Cleanup planned this week but children not allowed to use classroom

Health Symptoms Within a Few Hours of Mercury Vapor Exposure

GI - nausea, vomiting, abdominal pain, diarrhea

Neurological - headache, tremor, visual disturbances

Respiratory - cough, shortness of breath, chest tightness

Health Symptoms Following Long-term exposure (Weeks)

Psychiatric effects including depression, loss of self confidence, shyness, anger, irritability, anxiety, insomnia, aggressiveness, nervousness and impatience

Science Safety Needs in North Carolina Schools

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- Lack of PPE for teachers/students
- Need for updated facilities:
  - 40% are outdated buildings
- New facilities does not necessarily meet safety standards
- No chemical management (procurement, inventory, storage and disposal)
- Lack of equipment and materials to support instruction and meet safety regulations
- Poor air quality in labs
- Overcrowding in laboratories
- No ventilation in chemical storage rooms

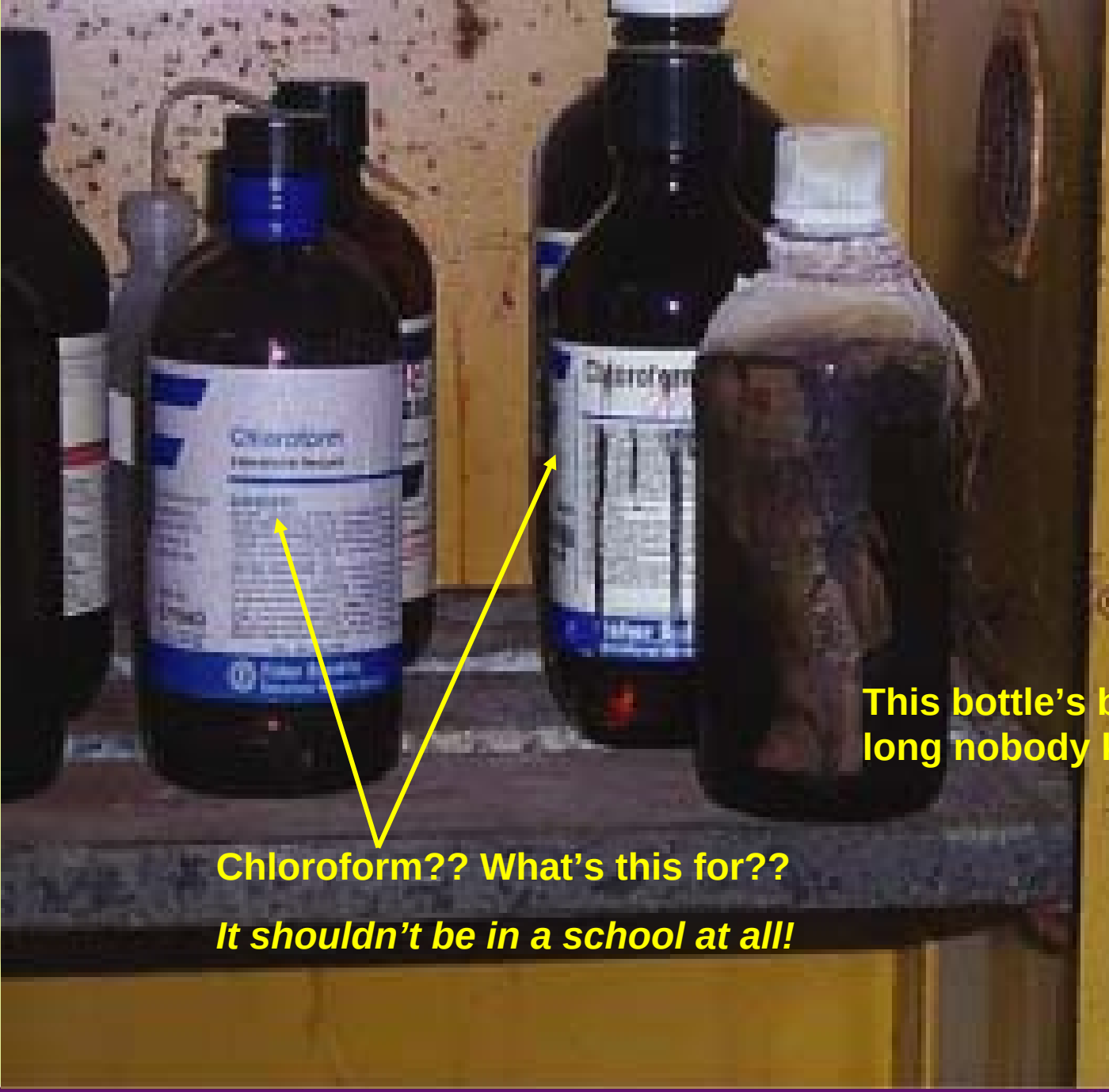
Chemical Hazards in NC Schools

Photographs courtesy of:
Larry Cockrell, Risk Management Specialist,
NCDPI-Insurance Section

The Correct Storage of Chemicals

The Way Most Store Rooms / Prep Rooms Look!

The Way Most Store Rooms / Prep Rooms Look!



This chemical storeroom has no ventilation.

This school is within a short drive of this meeting.

This bottle's been here so long nobody knows what it is!

Chloroform?? What's this for??

It shouldn't be in a school at all!

Incompatible Storage and Excess Volumes

Nasty Chemicals in Schools

Forms Explosives

- **Picric Acid**
- **Ethyl Ether**
- **Sodium azide**

Carcinogens

- **Benzene**
- **Formaldehyde**
- **Pyrogallic acid**
- **Asbestos wire mats**
- **Arsenic**
- **Chromium, lead compounds**

Radioactive

- **Uranium acetate – 7 lbs**
- **Strontium nitrate – l lb**
- **Cesium**

Shock Sensitive

- **Ammonium perchlorate**
- **Ammonium nitrate**
- **Mercury fulminate**
- **Nitroglycerin**
- **Nitrogen triiodide**
- **Fulminating gold**
- **Fulminating silver**

Nasty Chemicals in Schools

Ingredients to make

- 20 lbs gunpowder
- Nitroglycerine
- Crystal Meth

Costs of Chemical Clean-up

Arsenic	$3000
Ethyl ether	$5000
Uranium acetate	$4000
Strontium nitrate	$5000
Per School Clean out	$4-7000
LEA Clean out	$22000

Costs given by Professional Waste Disposal Companies

Mercury Cleanup Cost

- Broken thermometer: 1/2 gram $75 – $110
  Foster, B. JCE 2005
- EPA: 12 schools: (2004) $1000 – $200,000
- Granville County: (2005) $3000 – $4000
  classroom (19)
- Ballou High School, Washington DC:
  (2005) $1.5 million

Costs of Chemical Clean-up

- Arsenic - $3000
- Ethyl ether - $5000
- Uranium acetate - $4000
- Strontium nitrate - $5000
- LEA Clean out - $22,000
- $3.00 to dispose of a fluorescent light bulb that cost 90 cents

My Office

Recommendations

Recommendations

K-12 Schools

- Eliminate Hg, Hg compounds, Hg-containing instruments
- Eliminate hazardous / unwanted chemicals
- Require LEAs / schools to have a comprehensive chemical management system to prevent constant buildup of hazardous waste

Expand HB 1531 to Include

- Policy similar to:
  NC School Board Association Policy 7265:
  Occupational Exposure to Chemicals
- Require NCDPI and LEAs to follow
  State Board of Education Policy HSP-F-017
- Establish / fund School Safety Officer @
  NCDPI to implement a 5-year plan to bring all
  LEAs into OSHA laboratory standards
  compliance.

Expand HB 1531 to include:

- **Policy similar to NC School Board Association Policy 7265: Occupational Exposure to Chemicals**
- **Require State Board of Education Policy HSP-F-017 to be followed by NCDPI and LEAs**
- **Establish/fund School Safety Director @ NCDPI to implement a 5-year plan to bring all LEAs into OSHA laboratory standards compliance. (Write grants for removal chemical waste from schools-Homeland Security and EPA)**

Expand HB 1531 to Include

- **Establish compliance and accountability standards for laboratory safety**
- **Require Audit and Technical Assistance System by NCDPI to LEAs**
- **Implement Professional Development Program for personnel:**

  29 CFR 1910.1200 Hazard Communication Plan

  29 CFR 1910.1450 Laboratory Standard

  29 CFR 1910.1030 Bloodborne Pathogen

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Thank You!