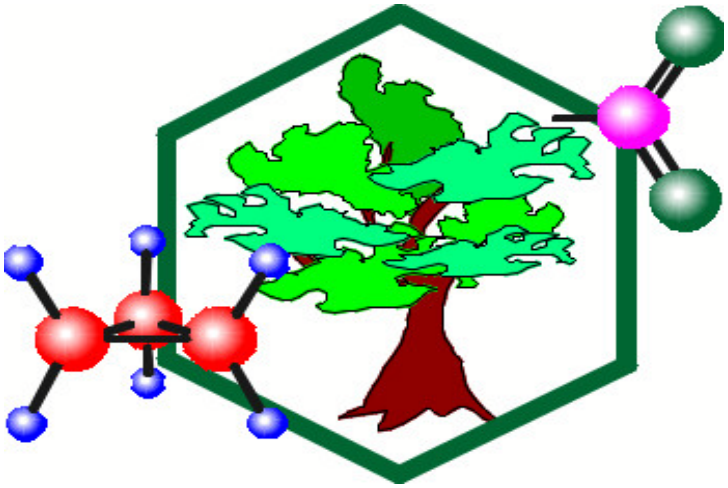
Moving Schools from Hazardous and Toxic Chemicals Towards **Safe, Green and Sustainable Chemistry**



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<u>Schools Chemical Cleanouts:</u>

Cleanouts are just the beginning to change. Schools must develop and implement an integrated chemical management program.

Here is our journey towards a safer, greener and sustainable system for the management of chemicals in schools.

-***ICM Team, 2011***

Why we are here!

Do no harm to our children!

Integrated Chemical Management

- “the pharmacy” approach
- Centralized, controlled stockroom
- All “stock” chemicals are removed from the classrooms, prep areas & labs
- All chemicals are inventoried
- Proper storage & labels
- Real time chemical database
- Complete MSDS library
- Controlled purchasing
- “Mercury Free” schools
- *Assistance, Training & Education*

Managing our chemical resources

- **<u>What, Where, When & Why</u>**

- **What do you have?**
- **Where are these chemicals?**
- **When are these chemicals on site?**
- **Why have ALL these CHEMICALS?**

Over 60+ School ICM Partners: 2011

- Brockton HS 4145
- Carver HS 932
- Dracut HS 1114
- Duxbury HS 963
- Greater Lawrence Regional HS* 1222
- Hanover HS* 699
- Haverhill HS* 1748
- Littleton HS 412
- Lowell HS 3403
- Malden HS* 1799
- Natick HS 1303
- Pike School 439
- Scituate HS 906
- Scituate MS 508
- Wellesley HS 1294
- Wellesley MS 1135

- Total Students 22,022

Schools Integrated Chemical Management Partnerships 2011

- 14 Massachusetts High Schools (1 Private)
- 2 MA Middle schools
- 13 Schools: Summer 2011
- 3,019 pounds removed
- 297 mercury thermometers
- 5 mercury barometers
- 31 mercury devises
- 13.3 pounds elemental mercury


Ramen
CONTAINS 12 PACKS
ACE
Hardware
Clear
Ammonia
all purpose cleaner
C. F. Pieper
Please Ask First!
WD12
Nutrition Facts
snack bags
zipper seal


FIRST
AID
STATION
Periodic Table of the Elements


Baker Analyz
DIL
ACID
SULFUR


Hydrochlo
Acid 12M
[7647-01-


CORROSIVE
ACETIC ACID GLACIAL


F1


Diet Coke


Metals

Root Causes: Schools Chemical Risk

- Not an OSHA state: chemical hygiene regulations do not apply
- No state chemical laboratory regulations
- Absence of college/university pre-school training
- Chemistry textbooks do not address chemical hazard characteristics
- Chemistry teachers do not take toxicology
- Outdated safety equipment & storage areas
- Everyone avoids the chemical issues

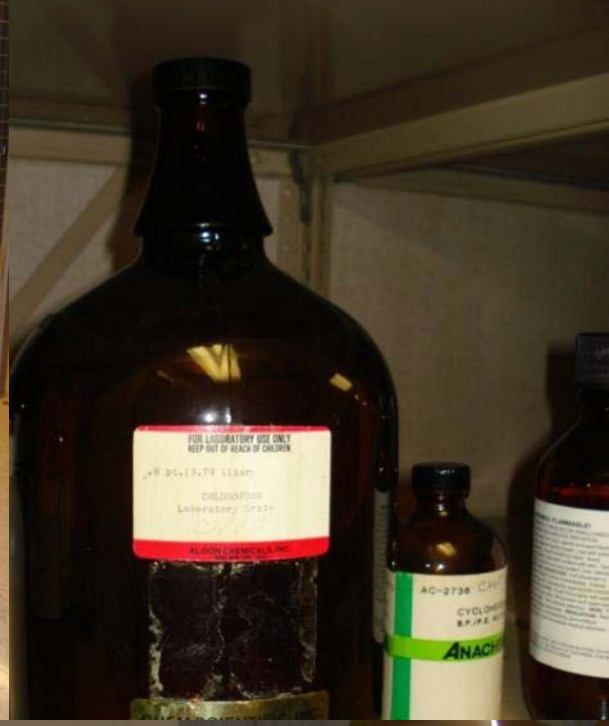
EPA's Region 1 ICM Program

- Unique and *FREE* on-site assistance program
- A pilot project that went viral
- NOT a "chemical cleanout project"
- **Integrated Chemical Management (ICM)**
- An ongoing partnership to reduce RISK
- ICP depends on volunteers, students and regional staff
- Each schools poses different challenges
- Training & Education for teachers are crucial

Integrated Chemical Management Protocol

- Meet, Walk-Thru & Discuss
- Request for Assistance
- Screen & Collect chemicals & mercury
- Organize and separate chemicals by compatibility
- Identify RCRA waste, unwanted & outdated
- Consolidate chemicals
- Inventory every stock chemical container
- Consolidate & process RCRA waste & others
- Clean & lip shelves
- Re-stock shelves
- Label shelves
- Secure RCRA Haz. Waste & Mercury


FLAMMABLE
KEEP FIRE AWAY


FOR LABORATORY USE ONLY
KEEP OUT OF REACH OF CHILDREN


K-10
Kerosene
ODORLESS
KEROSENE


Wood Turpentine
Acetone


CHROME


PEAT MOSS


Calcium Nitrate
C3436T
CAS# 13477-34-4
Lot No.
SARGENT-WELCH


TIC
PILLS


Used


SULFUR DIOXIDE (ANHY.)
CARBON DIOXIDE (BONE DRY)
OXYGEN
NITROGEN (PREP.)
HYDROGEN (PREP.)
CHLORINE

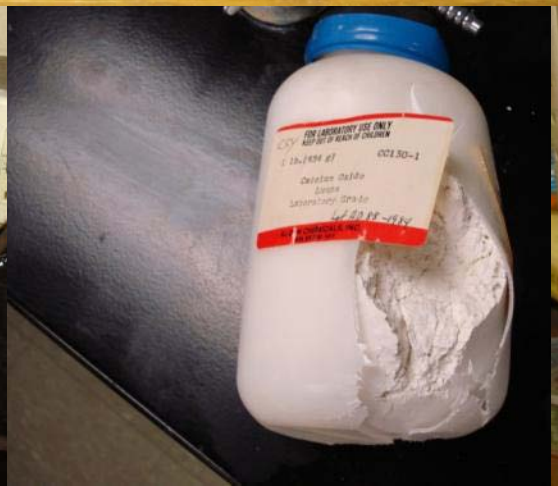

Conc
H2SO4


FLINN SCIENTIFIC
"Your Safer Source"
S0213 100 g
"dri-NA"
granular, sodium–lead alloy, 8.0% sodium
HAZARD ALERT:
FLAMMABLE/COMBUSTIBLE

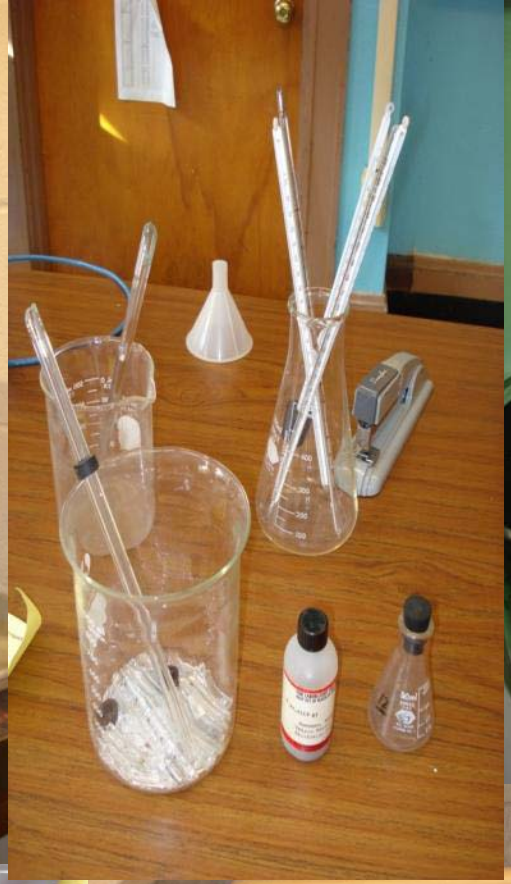

ACID TAN
Mallinckrodt
ACID
OXALIC
TECHNICAL CRYSTALS
POISON


1.0M FeSO4


CORN MEAL
SODIUM SULFATE
Mallinckrodt
SODIUM SULFATE


FOR LABORATORY USE ONLY
NOT FOR USE IN FOOD OR MEDICINE


ROSIVE
8
Hg Mercury




Mercury Metal
Science Grade
Hg
CAS # 7439-97-6
CORROSIVE


Phosphorus
Yellow


SODIUM


SODIUM
FOR LABORATORY USE


Sodium, Metal
Sargent-Welch
FLAMMABLE/COMBUSTIBLE
FLINN SCIENTIFIC INC.
9501904 100 g
Sodium
ScholAR Chemistry

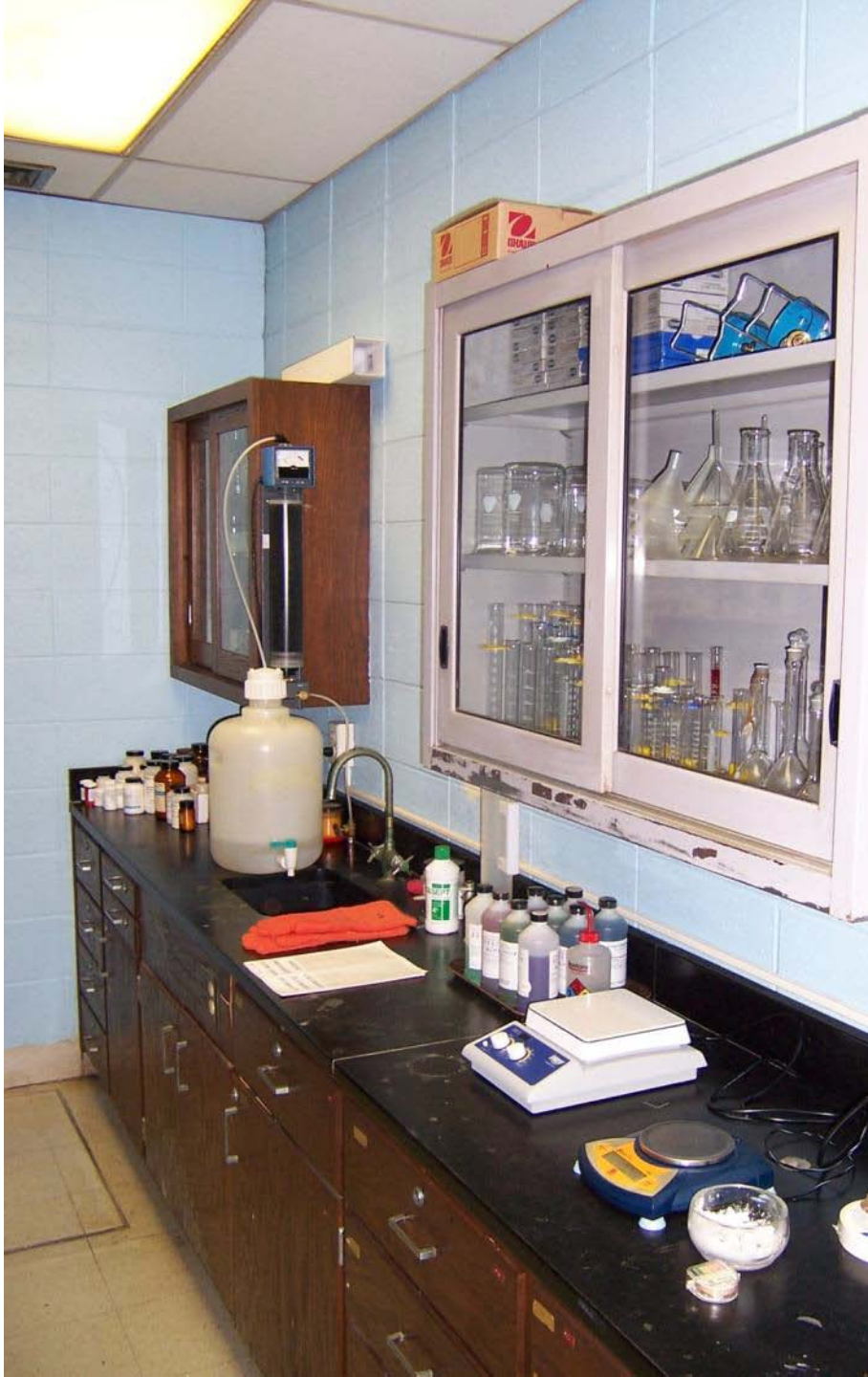

FLINN SCIENTIFIC INC.
THERMIT
FLAMMABLE/COMBUSTIBLE
Sargent-Welch
Calcium Carbide


AMMONIUM
NITRATE
NH4NO3


ACETATES
CHLORIDES
SULFATES
BICARBONATES
CARBONATES
HYDROXIDES
SULFUR
METALS
MISC. ORGANICS


CITRATES
SULFATES


Ramen
ACE
Clear
Ammonia



ICM Chemical Inventory Database

- Multi field, **“real-time"** Excel database
- Includes every stock chemical container
- Chemical, S/L/G, CAS#, Suppliers, Size & Type
- RCRA Yes/No Waste, RCRA Haz Waste Code
- MSDS’s NFPA/HMIS Codes for Health, Flammability & Reactivity & PPE
- Multi locations can be included
- Requires posting on shared drive (read only)
- A designated gatekeeper controls the database

Chemical Inventory Database: (xls)

CHEMICAL NAME	S/G/L	CAS #	SUPPLIER	AMOUNT	TYPE	Haz Waste	RCRA Code	Health	Flamability	Reactivity	PPE
1- Napthol	S	90-15-3				N	N	2	1	0	E
1-Pentanol (See N-Amyl Alcohol)	L	71-41-0				Y	D001	2	3	0	H
Abscisic Acid	S	14375-45-2				N	N	2	1	0	E

What is RISK?

RISK = Hazard X Exposure

Hazard = Health, Flammability & Reactivity

Chemicals of Unreasonable RISK

- Metals: Pb, Hg, Cd, Ba, Co
- Chromates & Cyanides
- Water reactive: Na & K
- Phosphorous
- Hydrofluoric acid
- Chromic acid
- Sulfides
- Azide
- Thermit
- Paradichlorobenzene
- Naphthalene
- Formaldehyde
- Benzene, Phenol
- Oxidizers: 30% H_2O_2, Chlorates & Permaganates
- Boric acid (ECHA VHC)
- Phenolphphthalein (ECHA VHC)
- Lecture Gas Cylinders

How schools address "Why"

- Assistance, Training & Education
- Control future inventory through hazard ranking
- Prohibit extremely hazardous or toxic chemicals/materials (not a prescribed list)
- Prohibit any mercury containing devices
- Require all chemical orders to address hazard(s)
- Understand the limitations of an MSDS
- Develop a school specific chemical safety program
- Promote greener, safer and sustainable science through non-toxic, less hazardous chemicals
- **Continuous improvement** through partnerships with EPA, Beyond Benign & others

Why partner with Beyond Benign?

- Internationally recognized advocate for green chemistry in education
- Workshops, conferences, & trainings
- “Drop in replacement” labs
- Integrated approach (K-12) programs
- Real world, exciting labs & supporting materials

- *Great friends who “Get it”*

Spreading the Word

- Direct referrals from other science dept
- Emergency Responders: Fire Dept
- Science & teachers conferences: Posters & Talks
- Beyond Benign & Mass Ed
- Next generation of superintendents
- Press, Awards & Internet exposure
- Friends, teachers, parents & concerned citizens
- You must be able to walk the talk!
- Email Dwight at **Peavey.Dwight@EPA.GOV**