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A REFINED PLAN FOR ELIMINATION OF UNWANTED/DANGEROUS CHEMICALS

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Through the cooperative efforts of numerous state agencies, the state of Iowa has refined its plan for safe, expeditious and effective identification and redistribution and/or disposal of hazardous chemicals from school science storerooms.

Following assessment of high school and community college storerooms, review of Environmental Protection Agency (EPA) guidelines for handling and disposal of hazardous substances, review of related chemical literature, and testing at the University of Iowa, a list of 100 "chemicals considered more hazardous than their education value" was synthesized (Table 1).

Science teachers should seriously review their educational needs for the listed materials. The decision to remove listed chemicals should be made on the basis of age, quantity, alternatives available and frequency of utilization. Assistance with disposal of chemicals is not limited to those listed in Table 1.

Through cooperative efforts of university chemists, the EPA, State Department of Environmental Quality, the State Fire Marshall's office, State Department of Education and local schools, a telephone network and redistribution and/or disposal plan was designed and is being communicated to teachers via varied media. The telephone response form, which the cadre of chemists will use when teachers call for assistance in chemical redistribution or disposal, is provided in Figure 1. Teachers desiring assistance should be prepared to address the items outlined.

Assistance suggested by chemists will center upon evaporation, dilution, neutralization, open burning, redistribution to colleges/universities, or disposal in an approved landsite. Unlabeled containers, or acutely hazardous materials, are referred by the university chemists to the DEQ and fire marshall along with packaging instructions to assure safe transportation of the chemicals from the school to their redistribution or disposal site. The regional fire marshalls often arrange for transportation and disposal of these materials. The usual disposal mechanism is by open burning, or remote detonation according to DEQ guidelines.

The details of the chemical redistribution and/or disposal plan are outlined below:

- (1) Each school should submit a list in writing, or by telephone, of unwanted chemicals to one of the professional chemists identified below. These chemists will return suggestions for neutralizing, oxidizing, reducing, etc., those chemicals that can be safely handled and that can enter the environment safely. The list of chemicals remaining after this exchange will be forwarded to the Department of Environmental Quality by the professional chemists.

*David Drummond, Frank Kilpatrick, University of Iowa
(319) 353-5125

*Ivan Schwaubaer, University Hygienic Lab, Iowa City
(319) 353-5990

*Emory Sabottka, Joseph Klinsky, Iowa State University
(515) 294-5359

*Lee Friell, University Hygienic Lab, Des Moines
(515) 281-5371

*Leland Thomson, LeRoy McGrew, University of Northern Iowa
(319) 273-6181

- (2) The Department of Environmental Quality (DEQ) will act on the list of chemicals according to the following scheme:
 - All shock-sensitive, flammable, and potentially explosive materials will be referred by DEQ to the State Fire Marshall's office for disposal. The school will segregate these chemicals into containers, as instructed, and pack them to prevent breakage during transportation. A field agent will come directly to the school and transport the substances to an approved, remote area for detonation/ignition.
 - The list of remaining materials will be processed for acceptance at a local landfill. A Special Waste Authorization (SWA) will be issued by DEQ to each school for disposing of the chemicals with specific handling instructions.
 - Acutely hazardous substances, as defined by the rules of the Resource Conservation and Recovery Act (RCRA), may be identified as "not controllable" in Iowa. Each school with these substances may be notified by DEQ to contact chemical suppliers, university laboratories, or hazardous waste repositories in another state for assistance in disposing of these substances. Each school would be responsible for this contact.

Each of these steps is necessary to protect the health of individuals who handle the materials as well as to prevent indiscriminate introduction of potentially harmful substances into the environment.

The plan outlined above will remain in effect for five years or more to help assure that all schools have an opportunity to carefully assess their specific situation and arrange for necessary redistribution and/or disposal of unwanted chemicals.

Table 1
Chemicals Considered More Hazardous than their Educational Value

2, 4 dichlorophenoxy acetic acid (2,4,D)	25WP (wetable powder) Cythion (Malathion)	Nicotine (nicotine sulfate) Nitrilotriacetic acid
2-acetylaminofluorene	1,2-dibromo-3-chloropropane (DBCP)	4-nitrobiphenyl (ONB)
Acrylonitrile	dibromochloropropane	Nitrocellulose
alpha-naphthylamine	3,3-dichlorobenzidine (all salts)	Nitrogen triiodide
Ammonium perchlorate	1,2-dichloroethyl ether	N-Nitroso dimethylamine
4-aminobiphenyl	DDT	Nitrosophenols (meta and para phenols)
anhedron (cyclothiazide)	Dieldrin	Nitrotoluene (all isomers)
Arsenic (inorganic)	Diethyl sulfate	Perchloric acid
Arsenic acid	Dimethyl sulfate	Perosmic acid
Arsenic sulfide	4-dimethylaminoazobenzene	Phenanthrene
Arsenic trioxide	Ethyleneimine	Phosphides (all metal)
Arsenic pentoxide	Ethylene chlorohydrin	Phosphorus (white, yellow, red)
Arsenic trichloride	Ethylene dibromide (EDB) (1,2-dibromoethane)	Phosphorus pentoxide (phosphorus anhydride)
Arsenious acid	1-Fluoro-2,4,-dinitrobenzene	Picric acid
Asbestos (friable)	Formaldehyde (not formalin)	Potassium
Barium chromate	Hydrazine	Potassium amide
Benzene	Hydrofluoric acid	Potassium azide
Benzidine (all derivatives)	Hydrogen cyanide (hydrocyanic acid)	Potassium cyanide
Benzyl chloride (chlorotoluene)	Isobutyl mercaptan (2-methyl-1-propanethiol)	Silver cyanide
Benzoyl peroxide	Lead Arsenate	Sodium arsenite
Beryllium	Lithium aluminum hydride	Sodium azide
Beryllium nitrate	Malathion	Tetraethyldithiopyrophosphate (TEDP)
beta-naphthylamine	4,4-methylene bis (2-chloroaniline)	Thallium (all compounds)
beta-propiolactone	Mercury alkyls	Thermite (igniting mixture, aluminum filings and iron oxide)
Biphenyls (all derivatives)	Mercury cyanide	Thionyl chloride
Bis-chloromethylether	Methylchloromethyl ether	Vinyl chloride monomer (chloroethene)
Bromotoluene	Monochloroacetic acid (chloroacetic acid)	Zinc chromate
Calcium Carbide		
Carbamates (all derivatives)		
Chloral hydrate		
Chlorosulfonic acid (sulfuric chlorohydrin)		
1-chloro-2,4-dinitrobenzene		

For more information, call Jack A. Gerlovich, Science Consultant, Iowa Department of Public Instruction (515) 281-3749.

**Figure 1
TELEPHONE RESPONSE FORM**

- * Date
- * Contact Person
- * School and Address
- * Telephone Number
- * Professional background of contact person
(Education degree, Chemistry training, etc.)
- * School Facilities, Equipment
 - Functional Exhaust Hood
 - Sewer System
 - Septic Tank
 - Proximity to Sewage Treatment Plant
- Goggles
- Gloves
- Apron
- Face Shield

* Chemical Data

	<u>Name of Substance</u>	<u>Physical State</u>	<u>Age</u>	<u>Container Type, Condition</u>	<u>Quantity</u>	<u>Proposed Action</u>
1						
2						
3						