

Workshop on Local, State and Federal Partnerships for Chemical Preparedness and Response

<http://www.cdc.gov/niosh/ershdb/>



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(NIEHS, Cincinnati – April, 2009)

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.



Presentation Outline

- Background and Rationale
- Targeted Levels of Technical Information
- Stages of Database Development
- Needs Assessment and Goals
- Selective Agent List
- Prioritization
- Description of Database
- Signs/Symptoms Demonstration

BACKGROUND

- **Coalescence of various NIOSH efforts in ER**
 - CBRN PPE, bloodborne disease, trauma, injury and fatality investigations, World Trade Center, anthrax
 - CDC Emergency Preparedness and Response website
 - State environmental, public and occupational health
 - Emergency response guidance –various sources
 - WHO/IPCS International Chemical Safety Cards (~1650)
 - Terrorism and Hazardous Materials prioritization efforts

Rationale for Database Development

- general lack of expertise in this area
- large geographical dispersion of the potential threats
- no centralized database containing all required information
- duplication of effort by individual locales, states and agencies
- difficulties in quickly accessing reliable information

Purpose

- better serve the emergency response community
- provide rapidly-accessible *OS&H information*
- includes high priority chemicals, biotoxins, and radiological agents
- concise, referenced, peer-reviewed, and rapidly accessible database
- format tailored to emergency response needs

GOAL: To serve as a knowledge resource system for emergency response personnel as well as other workers involved in rescue, recovery, and clean-up efforts.

The *objectives* of this database are to:

- Rapidly disseminate *needed on-the-scene* information
- Provide information for *pre-incident planning and training*
- Provide information for *continuing education* and curricula for training programs

Levels of Technical Information

Source: CDC Bioterrorism Website Committee, 1999

- **Fact Sheets**

general public, news media, elected officials, public health announcements,
e.g. ATSDR ToxFAQs

- **Emergency Response S&H Cards**

emergency response (police, firefighters, EMS, HazMat, remediation workers, mortuary workers, public health officials, etc.),
e.g., WHO/IPCS International Chemical Safety Cards, MSDSs, ERSHDB

- **Medical Management Guidelines**

clinical workers, EMT, emergency rooms, poison control centers,
e.g. ATSDR Medical Management Guidelines

Stages of Database Development

- Target Audience
- Needs assessment and analysis
- Design
- Development / Implementation
- Evaluation
(appearance, performance, content)

Target Audience

(emergency response community)

- cleanup and recovery workers
- emergency medical services
- federal, state, and local public health officials
- fire fighters (paid and volunteer)
- hazmat teams
- health care providers
- incident commanders
- law enforcement
- mortuary/funeral home workers/medical examiners
- safety and health professionals
- urban search and rescue

Needs Assessment

Initial Focus Group (Nov 2000)

- Firefighters (paid and volunteer), ER nurses, hazmat teams, funeral director, police (city and county), local emergency planner
- Queried on information sources, needs, availability, reliability
- Commentary sought on different document types:
 - *Prototype* emergency response safety and health card
 - WHO/IPCS International Chemical Safety Card
 - ATSDR ToxFAQs and Medical Management Guidelines

Electronic Focus Groups

- Commentary sought on *revised* Emergency Response S&H card
- Information needs, format, appearance, technological reading level, organization of information, and channels of communication

FOCUS GROUP RESULTS

Information Organization

- What am I dealing with?
- How can it affect me?
- How do I protect myself when performing my job?
 - Information was organized that incorporated how emergency responders approach an incident - “incident strategy”
 - Data presented in order of importance based on focus group rankings

Communication Methods Currently Used

Technology type	Participants Responding
Briefings	57%
Cellular telephone	74%
E-mail	43%
Facsimile (Fax)	38%
Radio (handheld or in vehicles)	51%
Not applicable	12%
Other	6%

Information Delivery Technology

(current vs. future use)

- Paper – fact sheets, manuals, books (61% vs. 45%)
- PDA or Laptop with static materials (51% vs. 62%)
(CD-ROM or downloaded files)
- PDA wireless (5% vs. 43%)
- Laptop wireless (18% vs. 59%)
- Radio or telephone relay from source (0% vs. 57%)

Sources of Published Information Most Frequently Consulted

Source (% of Total)

NIOSH Pocket Guide*	41	Marplot*	13	
Chemical Dictionary*	36	GATX Tank Car*	12	
CDC / NIOSH* /ATSDR Website	35	DOT Emergency Response Guidebook	7	
Merck Index*	33	Micomedex / TOMES / Poisindex	6	
CHRIS Manual*	30	Union Tank Car Blue Book*	6	
CFR 49 books*	25	Toxnet /Hazardous Substances Database/National Library of Medicine	4	
Chemical Reactivity Guide*	24	Brethenicks Readie Chemical Handbook*	4	
CAMEO*	23	Military References/ Military Blue and Red Books/Army Field Guides	3	
ALOHA*	21	Jane's Manual	2	
ATSDR Medical Management for Acute Chemical Exposure*	21	MSDSs	2	
Hawley's Condensed*	20	ACGIH TLVs	1	
SAX*	20	Cats Plume Dispersion	1	
American Railroad Emergency Action Guides*	19	Hazmat Team and Satellite Units	1	
Permeation Guides*	19	NFPA CD Quick Guide	1	
Emergency Handling of Hazmat in Surface Transit*	17	Olson	1	
Fire Protection for Hazmat*	15	Protection for Hazmat	14	1

* This resource was listed as one of 20 selections

DATABASE DESIGN

Characteristics

- SQL server to serve as foundation for other databases, e.g. PocketGuide
- hyperlinked references
- public and administrative sites
- on-line peer review (controlled access)

Electronic Peer Review

- internal and external by various experts, i.e., IH, safety and PPE specialists, firefighters, medical toxicologists, chemists, physicists, etc.
- comments captured on-line and responses/fixes documented in database

Time Schedule

- Awarded contract in Sept. 2002
- Database structure completed by April 2003
- 200 agents total by FY 2009

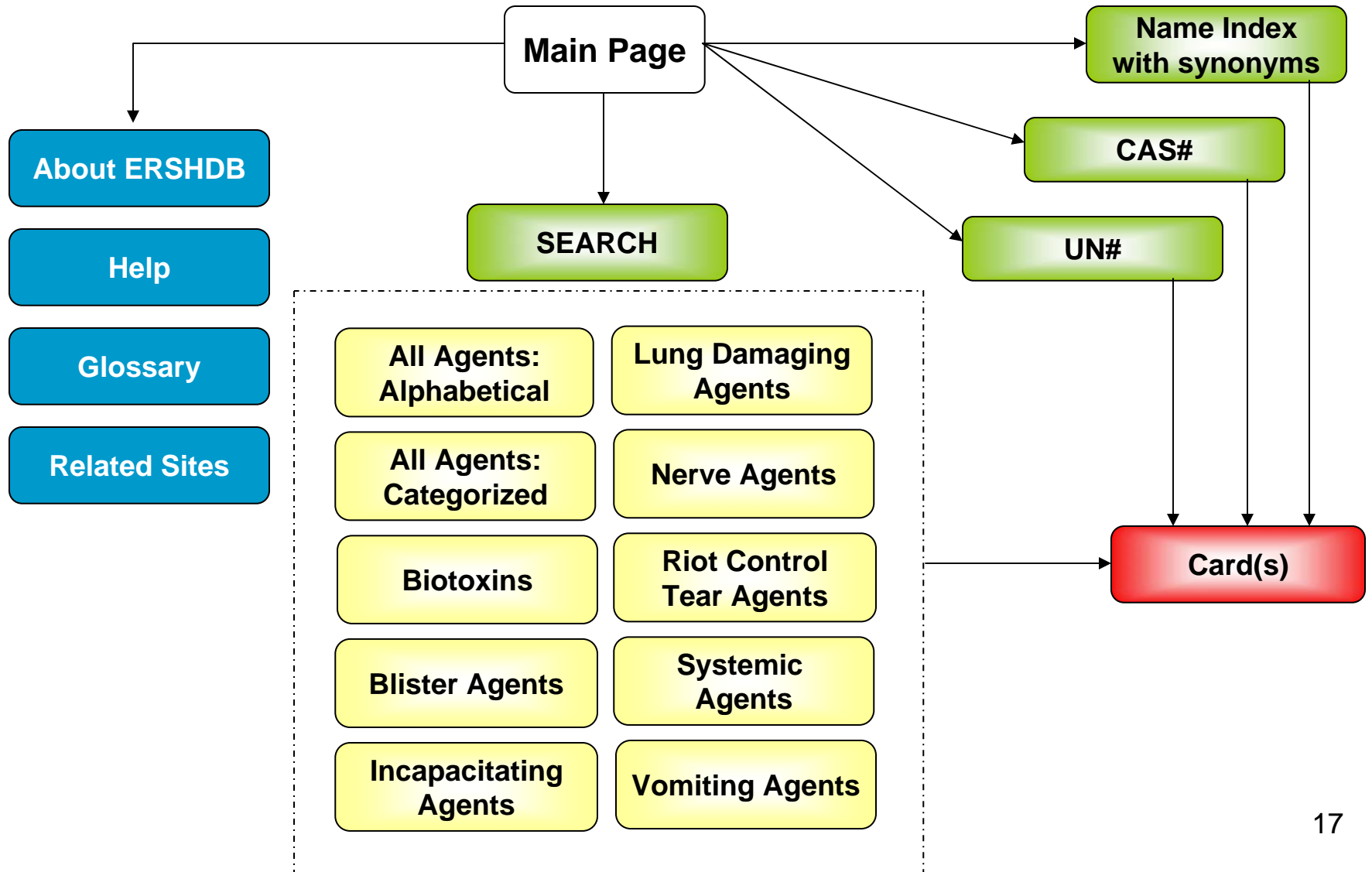
Chemical Agents List

- CDC website chemicals (500)
- FDA prioritized food threat agents
- EPA prioritized water threats list
- FBI-SWGFAC 900+ List (Extreme and High BINS)

Matrix = Indoor Air > Food > Water > Outdoor Air > Agriculture

Priority based on delivery matrix, toxicity, availability, historic profile, persistence, organoleptic properties, decon, detection, medical intervention, degradation products

INTERFACE DESIGN



CARD CONTENT OUTLINE & Searching Fields

Agent name and category

Agent characteristics

Personal Protective Equipment

Emergency Response Information



Signs/Symptoms

Decontamination (human)

First Aid

Long-term implications

On-site fatalities

Occupational and Emergency Exposure Limits

Decontamination (environment and equipment)

Agent Properties (chemical/physical)

Packaging and Labeling

Trade names and other synonyms

The Emergency Response Safety and Health Database

[All Agents](#) >> [Nerve Agents](#) >> VX

VX :: Nerve Agent


[Print](#)

CAS #: 50782-69-9
RTECS #: TB109000
UN #: 2810 (Guide 153)

Common Names:

- Methylphosphonothioic acid
- O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate

Agent Characteristics

[top](#)

- **APPEARANCE:** Clear, amber-colored, oily liquid.
- **DESCRIPTION:** VX is one of the nerve agents, which are the most toxic of the known chemical warfare agents. It is tasteless and odorless. Exposure to VX can cause death in minutes. As little as one drop of VX on the skin can be fatal. Nerve agents are chemically similar to organophosphate pesticides and exert their effects by interfering with the normal function of the nervous system.
- **METHODS OF DISSEMINATION:**
 - Indoor Air: VX can be released into indoor air as a liquid spray (aerosol) or as a vapor when temperatures are high.

ERSH-DB Index

[Search](#)
[About ERSH-DB](#)
[Help](#)
[Agent Name Index](#)
[CAS Number Index](#)
[UN Number Index](#)
[Glossary](#)
[Related Sites](#)

Agents

[All Agents: Alphabetized](#)
[All Agents: Categorized](#)
[Biotoxins](#)
[Blister Agents](#)
[Incapacitating Agents](#)
[Lung Damaging Agents](#)
[Nerve Agents](#)
[Riot Control/Tear Agents](#)
[Systemic Agents](#)
[Vomiting Agents](#)

Emergency Response Card

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AGENT :: Health Effect Category

CAS #:

RTECS #:

Common Names:

Agent Characteristics

•**APPEARANCE:**

•**DESCRIPTION:** (overview)

•**METHODS OF DISSEMINATION:**

–Indoor Air:

–Water:

–Food:

–Outdoor Air:

–Agricultural:

•**ROUTES OF EXPOSURE:**

Personal Protective Equipment

•**CLOTHING:**

•**EYE PROTECTION:**

•**GLOVES:**

•**RESPIRATOR:**

Emergency Response

-2-

- CHEMICAL DANGERS:
- EXPLOSION HAZARDS:
- FIRE FIGHTING INFORMATION:
- INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES:
 - Small spills, when used as a weapon:
 - Large spills, when used as a weapon:
 - Small spills: (initial and day vs. night distances)
 - Large spills: (initial and day vs. night distances)
- PHYSICAL DANGERS:
- NFPA 704 Signal:
- SAMPLING AND ANALYSIS:**

Signs/Symptoms

- TIME COURSE:
- EFFECTS OF SHORT-TERM EXPOSURE:
- EYE EXPOSURE:
- INGESTION EXPOSURE:
- INHALATION EXPOSURE:
- SKIN EXPOSURE:

Decontamination (Human)

- FIRST RESPONDER:
- PATIENT:
 - Guidance for First Responders:
 - Procedures for patient decontamination:

First Aid

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- GENERAL INFORMATION:
- ANTIDOTE:
- EYE:
- INGESTION:
- INHALATION:
- SKIN:

Long-Term Implications

- MEDICAL TREATMENT:
- EFFECTS OF LONG TERM OR REPEATED EXPOSURE:

On-Site Fatalities

- INCIDENT SITE:
- RECOVERY AND ON-SITE MORGUE

Occupational and Emergency Exposure Limits

- NIOSH REL:
- OSHA PEL:
- ACGIH TLV:
- NIOSH IDLH:
- DOE TEEL:
- AIHA ERPG:
- NAS Acute Exposure Guidelines (AEGs)

Decontamination (Environment and Equipment)

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- ENVIRONMENT/SPILLAGE DISPOSAL:
- EQUIPMENT:

Agent Properties

Chemical Formula

Aqueous solubility

Boiling Point

Density

Flammability

Flashpoint

Ionization potential

Log $K_{\text{benzene-water}}$

Log K_{ow} (estimated)

Melting Point

Molecular Mass

Soluble In

Specific Gravity

Vapor Pressure

Volatility

Other Constants (as needed)

Packaging and Labeling

UN #

Proper Shipping Name

DOT Hazard Class

DOT Label

DOT Marking

DOT Placard

Trade Names and Other Synonyms

Who to Contact in an Emergency

Important Notice

Test Search (unknown A)

1. Search Terms: blister

- ABRIN
- ADAMSITE (DM)
- AMMONIA
- ARSENIC PENTOXIDE
- BENZENE
- CHLORINE
- CHLOROACETOPHENONE (CN)
- CHLOROPICRIN (PS)
- COLCHICINE
- HYDROGEN FLUORIDE
- LEWISITE (L)
- MUSTARD-LEWISITE MIXTURE (HL)
- NITROGEN MUSTARD HN-1
- NITROGEN MUSTARD HN-2
- NITROGEN MUSTARD HN-3
- PHOSGENE OXIME (CX)
- RICIN
- SODIUM AZIDE
- SULFUR MUSTARD

2. Search Terms: blister stinging burning lacrimation

- AMMONIA
- CHLOROACETOPHENONE (CN)
- LEWISITE (L)
- MUSTARD-LEWISITE MIXTURE (HL)

3. Search Terms: blister stinging burning lacrimation keratitis

- CHLOROACETOPHENONE (CN)

Test Search (unknown B)

1. Search Terms: **miosis**

- FENTANYL
- NITROGEN MUSTARD HN-1
- NITROGEN MUSTARD HN-2
- NITROGEN MUSTARD HN-3
- SARIN (GB)
- SOMAN (GD)
- SULFUR MUSTARD
- TABUN (GA)
- VX

2. Search Terms: **miosis rhinorrhea dyspnea**

- NITROGEN MUSTARD HN-1
- NITROGEN MUSTARD HN-2
- NITROGEN MUSTARD HN-3
- SARIN (GB)
- SOMAN (GD)
- SULFUR MUSTARD
- TABUN (GA)
- VX

3. Search Terms: **miosis rhinorrhea dyspnea seizures twitching sweating**

- SARIN (GB)
- SOMAN (GD)
- TABUN (GA)
- VX

Test Search (unknown C)

1. Search Terms: **nausea vomiting**

- 35 hits

2. Search Terms: **nausea vomiting sneezing**

- ADAMSITE (DM)
- CHLOROACETOPHENONE (CN)
- LEWISITE (L)
- NITROGEN MUSTARD HN-1
- NITROGEN MUSTARD HN-2
- NITROGEN MUSTARD HN-3
- SULFUR MUSTARD

3. Search Terms: **nausea vomiting sneezing cramp burning cough**

- ADAMSITE (DM)
- SULFUR MUSTARD

4. Search Terms: **nausea vomiting sneezing cramp burning cough secretions**

- ADAMSITE (DM)

Test Search (unknown D)

1. Search Terms: **dry skin**

- 39 hits

2. Search Terms: **dry skin dry mouth**

- 27 hits

3. Search Terms: **dry skin dry mouth hyperthermia**

- QNB (BZ)

3. Search Terms: **dry mouth dry skin dilated pupils**

- CYANOGEN CHLORIDE (CK)
- HYDROGEN CYANIDE (AC)
- POTASSIUM CYANIDE
- QNB (BZ)
- SODIUM CYANIDE

4. Search Terms: **dry mouth dry skin dilated pupils hyperthermia**

- QNB (BZ)



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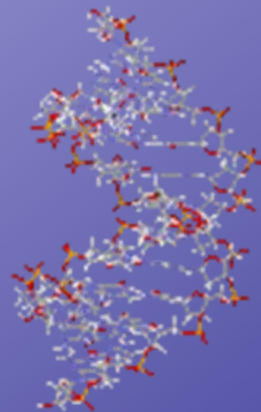
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QUESTIONS?

ABRIN	BROMINE CHLORIDE	COBALT HYDROCARBONYL	ETHYLDICHLORARSINE
ACETYL CHLORIDE	BROMINE PENTAFLUORIDE	COBALT-60	ETHYLENE DIBROMIDE
ACONITE	BROMOBENZYL CYANIDE	COLCHICINE	ETHYLENE FLUOROHYDRIN
ACROLEIN	3-BROMOPROPYNE	COPPER ACETOARSENITE	ETHYLENE GLYCOL
ADAMSITE	BUTADIENE	COUMAPHOS	ETHYLENE OXIDE
AFLATOXIN B1	BZ	CRIMIDINE	ETHYLENEIMINE
ALDICARB	CANNABINOIDS	CROTONALDEHYDE	FENAMIPHOS
ALLYL CHLOROFORMATE	CARBOFURAN	CYANOGEN CHLORIDE	FENTANYL
alpha-AMANITIN	CARBON DISULFIDE	CYCLOHEXYL ISOCYANATE	FLUORINE
AMERICIUM-241	CARBONYL FLUORIDE	CYCLOHEXYL SARIN (GF)	FLUOROACETIC ACID
AMMONIA	CESIUM -137	DIACETYLMORPHINE (heroin)	FONOFOS
ARSENIC	CHLORETHOXYFOS	DIBORANE	FORMALDEHYDE
ARSENIC TRICHLORIDE	CHLORINE	DICHLORVOS	FURAN
ARSENIC TRIOXIDE	CHLORINE DIOXIDE	DICROTOPHOS	GERMANE
ARSINE	CHLORINE PENTAFLUORIDE	DIGOXIN	HEXAFLUOROACETONE
AZINPHOS-METHYL	CHLORINE TRIFLUORIDE	1,1-DIMETHYLHYDRAZINE	HYDROCHLORIC ACID
BENZENE	CHLOROACETALDEHYDE	1,2-DIMETHYLHYDRAZINE	HYDROFLUORIC ACID
bis(CHLOROMETHYL)ETHER	CHLOROACETOPHENONE	DIPHENYLCHLOROARSINE	HYDROGEN BROMIDE
BORON TRIBROMIDE	CHLOROACETYL CHLORIDE	DIPHOSGENE	HYDROGEN CYANIDE
BORON TRICHLORIDE	CHLOROFORM	DISULFOTON	HYDROGEN IODIDE
BORON TRIFLUORIDE	CHLOROPICRIN (trichloronitromethane)	ETHOPROP (MOCAP)	HYDROGEN SELENIDE
BOTULINUM TOXIN A	CHLOROSARIN	ETHYL ISOCYANATE	HYDROGEN SULFIDE
BREVETOXIN	CHLOROSOMAN	ETHYL MERCAPTAN	IRIDIUM-192
BROMADIOLONE	CHLOROSULFONIC ACID -SO ₃ mix (FS)	ETHYL PARATHION	IRON PENTACARBONYL
BROMINE	CHROMIUM CARBONYL	ETHYL TRICHLOROSILANE	LEWISITE

LSD	NITROGEN DIOXIDE	PICROTOXIN	TABUN (GA)
MERCURY	NITROGEN MUSTARD (HN1)	POTASSIUM CYANIDE	TELLURIUM HEXAFLUORIDE
MERCURY BICHLORIDE	NITROGEN MUSTARD (HN2)	RED PHOSPHORUS	TERBUFOS
METHACRYLOYL CHLORIDE	NITROGEN MUSTARD (HN3)	RICIN	TETANUS TOXIN
METHAMIDOPHOS	n-PROPYL CHLOROFORMATE	SARIN (GB)	TETRAETHYL PYROPHOSPHATE (TEPP)
METHANOL (methyl alcohol)	OSMIUM TETROXIDE	SAXITOXIN (and Saxitoxin p-Bromobenzenesulfonate)	TETRAMETHYL LEAD
METHIDATHION	OXAMYL	SCILLIROSIDE (red squill)	TETRAMETHYLENEDISULFOTETRAMINE
METHOMYL	OXYDEMETON METHYL	SELENIUM HEXAFLUORIDE	TETRANITROMETHANE
METHOXYETHYLMERCURIC ACETATE	OXYGEN DIFLUORIDE	SODIUM ARSENITE	TETRODOTOXIN
METHYL CHLOROSILANE	OZONE	SODIUM AZIDE	THALLIUM
METHYL DICHLOROARSINE	PARAQUAT and its salts	SODIUM CYANIDE	THIONYL CHLORIDE
METHYL FLUOROACETATE	PENTABORANE	SODIUM FLUOROACETATE	THIOPHOSGENE
METHYL ISOCYANATE	PERCHLORYL FLUORIDE	SOMAN (GD)	THIOSULFAN
METHYL MERCAPTAN	PERFLUOROISOBUTYLENE	STAPHYLOCOCCUS ENTEROTOXIN B	TITANIUM TETRACHLORIDE
METHYL PARATHION	PERFLUOROPROPANE	STIBINE	TRICHLOROACETYL CHLORIDE
METHYL TRICHLOROSILANE	PHENCYCLIDINE	STRONTIUM-90	TRIFLUOROACETYL CHLORIDE
METHYL VINYL KETONE	PHENYL ISOCYANATE	STRYCHNINE	TUNGSTEN HEXAFLUORIDE
MEVINPHOS (Phosdrin)	PHENYLDICHLOROARSINE	SULFOTEPP	URANIUM HEXAFLUORIDE
MICROCYSTIN	PHENYLMERCURIC ACETATE	SULFUR DIOXIDE	VINYL BROMIDE
MONOCROTOPHOS	PHORATE	SULFUR MUSTARD (HD)	VINYL CHLORIDE
MUSTARD/LEWISITE MIXTURE (HL)	PHOSGENE	SULFUR TETRAFLUORIDE	VX
n-BUTYL ISOCYANATE	PHOSGENE OXIME	SULFUR TRIOXIDE	WHITE PHOSPHORUS
NICKEL CARBONYL	PHOSPHAMIDON (FAMFOS)	SULFURIC ACID	
NICOTINE and NICOTINE SULFATE	PHOSPHINE	SULFURYL FLUORIDE	
NITRIC OXIDE (nitrogen oxide)	PHOSPHORUS OXYCHLORIDE	T2 TOXIN	