International Association of Fire Fighters®

Mini-Drill #004

Response to a Hazardous Materials Incident
Students Mix Cleaning Agents

Developed by

Hazardous Materials/Weapons of Mass Destruction
Training Department

Harold A. Schaitberger
General President

Thomas H. Miller
General Secretary-Treasurer

Disclaimer

Disclaimer and Notice of Copyright© 2009

This program was developed by the International Association of Fire Fighters (IAFF) and is funded by the following federal agencies:

- Department of Energy (DOE)
- Department of Homeland Security (DHS)
- Department of Labor (DOL)
- Department of Transportation (DOT)
- National Institute for Occupational Safety and Health (NIOSH)
- National Institute of Environmental Health Sciences (NIEHS)

Every effort has been made to ensure the information contained in these materials is accurate and reflects the latest scientific knowledge on its subject matter. However, proper training for, and understanding of, any emergency response situation is the responsibility of the responding agency or organization, and not of the IAFF. Furthermore, the IAFF and/or its agents cannot warranty the material presented in this program complies with requirements found in local policies or procedures.

These materials are copyrighted and may not be sold. Reproduction of these materials in the course of conducting any for-profit training program is prohibited. Exact and complete copies of the materials may be reproduced solely for the purpose of assisting departments in building a self-sufficient, non-profit training program. Permission to duplicate these materials for any purpose may be revoked by the IAFF at any time for failure to comply with these terms.

Training Materials

Visit the IAFF Education & Training web site (www.iaff.org/ET/index.htm) for electronic copies of this and future Mini-Drills as well as materials for crew-, station- and department-wide health and safety training.

IAFF Mini-Drills

Facilitator Instructions

PURPOSE

The purpose of the IAFF Mini-Drill is to provide emergency responders with an opportunity to utilize their local jurisdictions' standard operating procedures/guidelines (SOPs/SOGs) documents to address the issues present during an incident involving hazardous materials.

Each drill consists of:

- Facilitator Guide
- Photograph(s) or diagram(s) from an actual incident
- Incident information for each stage of the response process[1]
- Resource documents (e.g., Material Safety Data Sheets (MSDSs) for the materials involved in a product release)

The length of each drill will vary by the incident and student involvement, but is intended to last between 1½ to 2 hours.

PROCEDURE

The Facilitator should:

1. Read through the Facilitator Guide prior to delivery with the students and note the points where the incident photograph, incident information and resource documents should be used. These areas are indicated by boxes and bold type.

2. Be familiar with local jurisdictional SOPs/SOGs that address the type of incident, and adapt them to the situation presented.

3. Have a working knowledge of the definitions presented in the chemical and physical properties of hazardous materials.

4. Guide the discussion and make sure that it stays focused on the issues presented in the drill.

---

1 The systematic response process Analyze, Plan, Implement and Evaluate (APIE) correlates with the competencies outlined in NFPA® 472, Standard for Competence of Responders to Hazardous Materials/ Weapons of Mass Destruction Incidents, 2008 Edition.

Facilitator Guide

Topic: Response to a Hazardous Material Incident

Time Required: 1½ to 2 hours

Materials:

- Local jurisdiction's SOPs/SOGs
- Chalkboard, white board or large paper pad
- Chalk/markers
- References:
  - 2008 Emergency Response Guide (ERG)
  - NIOSH Pocket Guide to Chemical Hazards
  - MSDS for material(s) involved

Incident information handouts—Analyze, Plan, Implement and Evaluate with photographs of incident

Motivation: During an emergency, the decisions and actions of the initial responders are critical to the successful outcome of an incident. This includes the rapid assessment of the situation, identification of the materials involved and establishing an Incident Action Plan (IAP). Personnel must be familiar with their jurisdiction's SOPs/SOGs and implement them effectively, based upon the situation present.

Objective: Given photographs of, and information about, an emergency incident and references, e.g., Emergency Response Guide (ERG), National Institute for Occupational Safety and Health (NIOSH) Pocket Guide and Material Safety Data Sheet (MSDS), students will demonstrate the necessary actions to identify the hazardous material(s) involved, conduct a hazard and risk analysis and identify the incident priorities. Use local jurisdictional standard operating procedures/guidelines (SOPs/SOGs) to establish an incident management system, based upon the National Incident Management System (NIMS) principles.

Enabling Objectives:

1. Identify locations where hazardous materials may be present and how the locations relate to the type and quantity of materials present.

    - Residential
    - Commercial fixed sites
    - Transportation routes
    - Non-structural/outside locations

2. Use the MSDS to identify the following chemical and physical properties and how they relate to the release of a hazardous material.

    - Physical state
    - Vapor pressure
    - Boiling point
    - Vapor density
    - Specific gravity
    - Solubility
    - Flammability
        - Flash point
        - Ignition temperature
        - Flammable range
    - Toxicity
        - Routes of entry
        - Acute versus chronic effects
    - Incompatibilities

3. Identify clues for recognizing hazardous materials.

    - Dispatch information
    - Occupancy and location
    - Container shape and size
    - Placards, labels and markings
    - Shipping papers and facility documents

4. Identify considerations when developing an IAP for an emergency response.
   - Incident priorities
   - Personal Protective Equipment (PPE)
   - Resources available
     - Personnel
     - Equipment
     - References
   - Incident Command System (ICS)
     - Single command
     - Unified command
   - Accidental versus intentional

5. Identify the emergency response actions taken when implementing the plan.
   - Establish ICS, scene control and zones
   - Perform:
     - Rescue/recovery
     - Fire extinguishment
     - Decontamination
     - Vapor suppression
     - Defensive spill control

6. Identify benchmarks when evaluating effectiveness of emergency response actions.
   - Incident priorities
     - Successful completion
     - Deficiencies
   - Scene security
   - Termination activities

Overview:

- Locate and recognize hazardous materials
- Determine chemical and physical properties
- Develop and implement an IAP
- Evaluate the effectiveness of emergency response actions

Introduction

Discuss the following with students.

Emergency responders must be able to quickly respond to emergency incidents, rapidly assess the conditions present, and determine the incident priorities. When hazardous materials are involved, they must be able to perform a hazard and risk analysis and determine the appropriate strategy and tactics to produce a more favorable outcome.

Using the APIE process[1] will help responders during the decision-making process:

1. Analyze the problem.
2. Plan the response.
3. Implement the plan.
4. Evaluate the progress.

1 The APIE process is a simple response tool which provides a set of actions to implement for all emergency response situations—Analyze the Problem, Plan the Response, Implement the Plan and Evaluate the Progress. APIE is broad enough to be used for all types of response situations including fire, medical and HazMat/WMD incidents. The process is based on the tasks/competencies outlined in NFPA® 472, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, 2008 Edition.

Analyze the Problem

- Start with knowledge of area, pre-plans and previous experience
- Identify locations with hazardous materials
    - Residential
        - Normally do not have a large quantity
        - Small amounts of many substances
        - Materials involved in a fire produce hazardous gases
    - Commercial fixed sites
        - Manufacturing
            - Nature of site—chemical, industrial
            - Large quantity, small variety
        - Laboratory/research
            - Small quantity, large variety
            - Synergistic effect—what happens when mixed with other materials
            - Stability of materials, e.g., picric acid with presence of crystallization
    - Transportation routes
        - Highway—location, quantity
        - Rail—location, quantity
        - Air—location, quantity
    - Other non-structural/outside locations
    - Pipeline—location, quantity and type of material
    - Landfills

Notes for Facilitator

Provide students with the photograph of the incident (Handout 1). Review the information on the handout entitled Analyze the Problem (Handout 2) with students.

Discuss the considerations and questions you should ask yourself, when analyzing the problem:

- What type of facility or location is involved?
- What types of materials may be involved in this situation?
- What level of PPE should be used?
- What are the chemical and physical properties of the materials and what will be their effect on the incident? Use the MSDSs (Handouts 3 and 4) for this discussion.
- What additional resources may be needed to deal with the situation?

- Chemical and physical properties
    - Physical state—solid, liquid or gas
    - Vapor pressure
    - Boiling point
    - Vapor density
    - Specific gravity
    - Solubility
    - Flammability
        - Flash point
        - Ignition temperature
        - Flammable range
    - Toxicity
        - Routes of entry
            - Inhale
            - Absorb
            - Ingest
            - Inject
        - Acute versus chronic effects
    - Synergistic effects and incompatibilities

Plan the Response

- Consider the following:
  - Dispatch information
    - Location
    - Name of product(s), if known
    - Leak or fire
    - Injuries, victims entrapped
    - Exposures
    - Actions being taken at scene
  - Occupancy and location
    - Type of facility and chemicals involved
    - Pre-plans available
  - Container shape and size
    - Transportation
    - Storage
  - Placards, labels and markings
    - DOT placards and labels
    - NFPA 704 Marking System
    - Military Marking System
  - Shipping papers and facility documents
    - Shipping papers
    - MSDS

Notes for Facilitator

Review the information on the handout entitled Plan the Response (Handout 5).

Discuss the considerations for planning the response and developing an IAP:

- What are the priorities at this incident?
  - Life safety
  - Incident stabilization
  - Property conservation
- What types of monitoring equipment will be necessary?
- What PPE will be required during this incident?
- What are the properties of an industrial strength drain cleaner and its effects on the situation? (Refer back to Handouts 3 and 4.)
  - Acid or base
  - Incompatibilities of materials in the mixture
    - Potential reactions
    - Dangers of vapors/gases produced (toxic, flammable, etc.)
- What additional information is there related to chloramine? (Provide Handout 6.)

Implement the Plan

- Establish:
  - Scene control—establish zones and control procedures
  - Incident Command System (ICS)
    - Incident Commander (IC) and command post identified
    - Single command versus unified command
- Perform:
  - Don/work in PPE
  - Rescue/recovery
  - Control actions:
    - Fire extinguishment
    - Vapor suppression
    - Defensive spill control
    - Vapor dispersion
    - Remote valve shut-off
- Decontamination

Notes for Facilitator

Review the information on the handout entitled Implement the Plan (Handout 7). Discuss the following considerations for implementing the plan:

- What types of equipment will be necessary to successfully mitigate the spill?
    - Ventilation—fixed or portable fans
    - Absorbent
    - Overpack drum, etc.
- Do you have it available or know where to obtain it?

Have students draw the ICS for this incident on easel paper or white/chalkboard and discuss:

- Which branches will be necessary under Operations to manage this incident?
- What other agencies will need to be involved in this incident?
    - Will they just need to be notified of the incident?
    - Will they need to respond to the scene?

Evaluate Progress

- Evaluate the status of the IAP
    - Identify benchmarks to assist in identifying progress
    - Review incident priorities
        - Life safety—rescue, treatment and transport of patients
        - Incident stabilization—scene stabilizing versus incident escalating
        - Property conservation—includes the environment
- Identify any deficiencies in the IAP and determine cause(s)
- Discuss termination activities
    - Debriefing
    - Post-incident analysis
    - Critique

Notes for Facilitator

Review the information on the handout entitled Evaluate the Progress (Handout 8). Discuss the following considerations for evaluating the progress:

- What benchmarks could be established to evaluate the progress of the operation?
- If fire fighters' structural gear has been exposed/contaminated, what should be done with it?
- What is the appropriate material to neutralize this spill?
- Who will be responsible for the hazardous waste disposal and assume the financial liability?

Page left blank intentionally. Use for notes.

Mini-Drill #004

Response to a Hazardous Materials Incident
Students Mix Cleaning Agents

Handout #1

OBJECTIVE:

Given photographs of, and information about, an emergency incident and references (e.g., Emergency Response Guide (ERG), National Institute for Occupational Safety and Health (NIOSH) Pocket Guide and Material Safety Data Sheet (MSDS)), demonstrate the necessary actions to identify the hazardous material(s) involved, conduct a hazard and risk analysis and identify the incident priorities. Use local jurisdictional standard operating procedures/guidelines (SOPs/SOGs) to establish an incident management system, based upon the National Incident Management System (NIMS) principles.

Handout #2

ANALYZE THE PROBLEM

A call is received for a medical emergency at a small university.

Upon arrival, the ambulance company is told several students became ill while cleaning a bathroom in a dormitory with a variety of cleaning agents.

The entire suite (12 students) shares the bathroom. Some of the students are outside of the building and some are still in the dormitory. Shortly after beginning their clean up, several students began to experience difficulty breathing as well as eye and skin irritation.

The level of discomfort became so bad that all students left the bathroom area and many left the building. It was then that the 911 call was made.

Handout #3

Chemical Education Today

CLIP, Chemical Laboratory Information Profile

"Only when you know the hazards, can you take the necessary precautionary measures."

Ammonia, aqueous **$NH_3(aq)$** **CAS No.: 1336-21-6**

(approximately 30% NH_3)

Synonyms: Aqua ammonia, ammonia water, Spirit of Hartshorn, ammonium hydroxide

Physical Properties

A colorless alkaline liquid with a pungent odor.
Vapor pressure at 20 °C: 118 torr
Melting point: −77 °C
Boiling point: 36 °C

Exposure Limits

Limits pertain to the vapor, CAS No. 7664-41-7, not the liquid

OSHA PEL:	50 ppm
ACGIH TLV:	25 ppm
STEL:	35 ppm

Hazardous Characteristics

Overall toxicity	Flammability	Destructive to skin/eye	Absorbed through skin	Sensitizer?	Self-reactive?	Incompatible with
3	1	3	0	No	No	Acids, halogens and other oxidizing agents; aluminum, zinc, mercury, and other metals; silver oxide, hypochlorite solution."

0: None (or very low); 1: Slight; 2: Moderate; 3: High; 4: Severe.

"Reactivity Hazards

Although generally considered a weak base, aqueous ammonia reacts violently with most acids. It forms explosive compounds with mercury, silver oxide, and other compounds of silver. It corrodes many metals, notably those in Groups IIA, IIB, IIIA, and IIIB. With the halogens it forms the shock-sensitive, explosive nitrogen trihalides. With household bleach (sodium hypochlorite solution) it forms toxic and explosively unstable chloramines. The concentration of ammonia in the air above solutions of aqueous ammonia can be within the explosive limits for ammonia (15–28%). See Bretherick's *Handbook of Reactive Chemical Hazards* for details and for other incompatibilities.

Cited as known to be or reasonably anticipated to be carcinogenic in NTP-9? No

Identified as a reproductive toxin in Proctor and Hughes, *Reproductive Hazards of the Workplace*? No

Typical symptoms of acute exposure:

Irritation of skin and eyes, which can be severe. Sore throat, abdominal pain, nausea if ingested. Coughing, labored breathing if inhaled; inhalation can result in lung edema but the symptoms often are delayed up to a few hours. Physical exertion during this period can aggravate the symptoms when they do appear. Rest and hospitalization are essential.

Principal target organ(s) or system(s):

Respiratory system, eyes, skin.

Storage Requirements

Store separately, away from acids and oxidizing agents, in a cool, dry, well-ventilated location.

Additional Remarks

In a warm environment, high pressures can develop within a closed container. The aqueous ammonia solutions sold for household uses typically contain approximately 14% ammonia along with a little soap or detergent and perfume. The formula, NH_4OH, sometimes used for aqueous ammonia solutions, is incorrect; the molecular species, NH_4OH, does not exist.

Notes

Hazards.

This Chemical Laboratory Information Profile is *not* a Material Safety Data Sheet. It is a brief summary for teachers and their students that describes some of the hazards of this chemical as it is typically used in laboratories. On the basis of your knowledge of these hazards and before using or handling this chemical, *you need to select the precautions and first-aid procedures to be followed.* For that information as well as for other useful information, refer to Material Safety Data Sheets, container labels, and references in the scientific literature that pertain to this chemical.

Reproductive Toxins.

Some substances that in fact are reproductive toxins are not yet recognized as such. For the best readily available and up-to-date information, refer to "DART/ETIC". See the 'TOXNET' home page at *www.sis.nlm.nih.gov* and click on "Toxicology search". *Note that some of the data in DART/ETIC have not been peer-reviewed.* See also Linda M. Frazier and Marvin L. Hoge, *Reproductive Hazards of the Workplace*; Wiley, 1998; and T. H. Shepard, *Catalog of Teratogenic Agents*, 9th ed.; Johns Hopkins University Press, 1998.

Abbreviations.

ACGIH TLV—American Conference of Governmental Industrial Hygienists–Threshold Limit Value. C—Ceiling. CAS—Chemical Abstracts Service. mg/m³—milligrams per cubic meter. NA—Not applicable. NE—Not established. NI—No information. NTP-9—National Toxicology Program, Ninth Annual Report on Carcinogens. OSHA PEL—Occupational Safety and Health Administration–Permissible Exposure Limit. ppm—parts per million. STEL/C—Short-term exposure limit and ceiling.

Prepared by: Jay A. Young Date of preparation: October 10, 2002

Handout #4

SODIUM HYPOCHLORITE SOLUTION

TraumaClear

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

SODIUM HYPOCHLORITE SOLUTION

MSDS Number: S4106 — *Effective Date:* 03/26/99

1. Product Identification

Synonyms: Bleach; hypochlorous acid, sodium salt; soda bleach; sodium oxychloride
CAS No.: 7681-52-9
Molecular Weight: 74.44
Chemical Formula: NaOCl
Product Codes:
J.T. Baker: 0235, 9416
Mallinckrodt: 7216

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Hypochlorite (as NaOCl)	7681-52-9	4 - 7%	Yes
Water	7732-18-5	> 92%	No
Sodium Hydroxide	1310-73-2	< 1%	Yes

SODIUM HYPOCHLORITE SOLUTION

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Excessive inhalation of vapors, mists, or fumes may cause bronchial irritation, coughing, labored breathing, nausea, and pulmonary edema. Additional effects have included circulatory collapse and confusion, delirium, coma.
Ingestion:
May cause erosion of the mucous membranes. Symptoms include vomiting, circulatory collapse, confusion, coma, and death. May cause edema of pharynx, glottis, and larynx and perforation of the esophagus or stomach. Effects are less damaging at lower concentrations.
Skin Contact:
Contact may cause severe irritation with blistering and eczema, especially at higher concentrations.
Eye Contact:
Contact may cause severe irritation and damage, especially at higher concentration.
Chronic Exposure:
A constant irritant to the eyes and throat.
Aggravation of Pre-existing Conditions:
Persons with impaired respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

SODIUM HYPOCHLORITE SOLUTION

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Consider oral administration of sodium thiosulfate solutions if sodium hypochlorite is ingested. Do not administer neutralizing substances since the resultant exothermic reaction could further damage tissue. Endotracheal intubation could be needed if glottic edema compromises the airway. For individuals with significant inhalation exposure, monitor arterial blood gases and chest x-ray.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Substance releases oxygen when heated, which may increase the severity of an existing fire. Containers may rupture from pressure build-up.
Explosion:
This solution is not considered to be an explosion hazard. Anhydrous sodium hypochlorite is very explosive.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Use water spray to cool fire-exposed containers, to dilute liquid, and control vapor.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

SODIUM HYPOCHLORITE SOLUTION

Airborne Exposure Limits:
- AIHA (WEEL) -
Sodium Hypochlorite: 2 mg/m3 (STEL)
- OSHA Permissible Exposure Limit (PEL) -
Sodium Hydroxide: 2 mg/m3 Ceiling
Chlorine (from Sodium Hypochlorite): 0.5 ppm (TWA), 1 ppm (STEL)
- ACGIH Threshold Limit Value (TLV) -
Sodium Hydroxide: 2 mg/m3 Ceiling
Chlorine (from Sodium Hypochlorite): 0.5 ppm (TWA), 1 ppm (STEL), A4

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.
Odor:
Chlorine-like odor.
Solubility:
100% in water.
Density:
1.07 - 1.14
pH:
9 - 10 (neutral solution-no excess sodium hydroxide)
% Volatiles by volume @ 21C (70F):
ca. 95
Boiling Point:
40C (104F) Decomposes slightly
Melting Point:
-6C (21F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):

SODIUM HYPOCHLORITE SOLUTION

17.5 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Slowly decomposes on contact with air. Rate increases with the concentration and temperature. Exposure to sunlight accelerates decompotition. Sodium hypochlorite becomes less toxic with age.
Hazardous Decomposition Products:
Emits toxic fumes of chlorine when heated to decomposition. Sodium oxide at high temperatures.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Ammonia (chloramine gas may evolve),amines, ammonium salts, aziridine, methanol, phenyl acetonitrile, cellulose, ethyleneimine, oxidizable metals, acids, soaps, and bisulfates.
Conditions to Avoid:
Light, heat, incompatibles.

---

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure. Investigated as a tumorigen and mutagen. Irritation data: eye, rabbit, 10 mg - Moderate

--------\Cancer Lists\----------

	---NTP Carcinogen---		
Ingredient	Known	Anticipated	IARC Category
Sodium Hypochlorite (as NaOCl)	No	No	3
(7681-52-9)			
Water (7732-18-5)	No	No	None
Sodium Hydroxide (1310-73-2)	No	No	None

---

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

---

13. Disposal Considerations

Dilute with water and flush to sewer if local ordinances allow, otherwise, whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYPOCHLORITE SOLUTION
Hazard Class: 8
UN/NA: UN1791
Packing Group: III
Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: HYPOCHLORITE SOLUTION
Hazard Class: 8
UN/NA: UN1791
Packing Group: III
Information reported for product/size: 4L

International (Air, I.C.A.O.)

Proper Shipping Name: HYPOCHLORITE SOLUTION
Hazard Class: 8
UN/NA: UN1791
Packing Group: III
Information reported for product/size: 4L

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient TSCA EC Japan Australia

SODIUM HYPOCHLORITE SOLUTION

Ingredient	Korea	DSL	NDSL	Phil.
Sodium Hypochlorite (as NaOCl) (7681-52-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes
Sodium Hydroxide (1310-73-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Sodium Hypochlorite (as NaOCl) (7681-52-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes
Sodium Hydroxide (1310-73-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

	-SARA 302-		------SARA 313------	
Ingredient	EQ	TPQ	List	Chemical Catg.
Sodium Hypochlorite (as NaOCl) (7681-52-9)	No	No	No	No
Water (7732-18-5)	No	No	No	No
Sodium Hydroxide (1310-73-2)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

	-RCRA-	-TSCA-

http://www.tomsmsds.com/msds_sheets/Sodium_Hypochlorite.htm(7 of 9)12/23/2008 11:17:30 AM

SODIUM HYPOCHLORITE SOLUTION

Ingredient	CERCLA	261.33	8(d)
Sodium Hypochlorite (as NaOCl)	100	No	No
(7681-52-9)			
Water (7732-18-5)	No	No	No
Sodium Hydroxide (1310-73-2)	1000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No

SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No

Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2R
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 1
Label Hazard Warning:
DANGER! CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing,

give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) changed since last revision of document include: 9.

Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Handout #5

PLAN THE RESPONSE

The students had placed a 55-gallon trash can in the doorway of the bathroom. As each student entered, they donated or poured whatever cleaning product they had brought into the trash can in hopes of reducing the cleaning time.

When interviewing the students, responders discover the contributions included various floor cleaning solutions, along with materials used to bleach sinks and toilets, drain cleaner and window cleaner containing ammonia.

Handout #6

SEVERE LUNG INJURY

The inhalation of the noxious fumes associated with the mixing of household cleaners can lead to pulmonary irritation and pneumonitis. Household ammonia (3 to 10 percent aqueous NH_3) and bleach (5 percent NaOCl) are two of the most common cleaning agents. Combining them releases chloramine gas, which is a combination of monochloramines (NH_2Cl) and dichloramines ($NHCl_2$). When inhaled, chloramines react with the moisture of the respiratory tract to release ammonia (NH_3), hydrochloric acid (HCl), and oxygen free radicals. Typically, exposures to low concentrations of chloramines produce only mild respiratory tract irritation. In higher concentrations, the combination of hydrochloric acid, ammonia, and oxygen-free radicals may cause corrosive effects and cellular injury, resulting in pneumonitis and edema.

Emergency tracheostomy was required in a patient because of upper-airway compromise induced by chloramine gas. The patient, a previously healthy 53-year-old woman, was cleaning a walk-in freezer at her workplace with over-the-counter liquid ammonia and bleach. The door to the freezer was closed, and there was no air exchange with the outside. Approximately 30 minutes after beginning to clean, she noted shortness of breath and called 911. Over the next three hours, she had increased tightness of the throat and became unable to speak above a whisper.

Despite aggressive use of nebulized albuterol, racepinephrine and intravenous steroids, her symptoms progressively worsened. Rapid-sequence intubation was attempted but was unsuccessful because of swelling of the upper airway. Emergency tracheostomy was performed. The initial chest radiograph was unremarkable, but radiologic evidence of pneumonitis developed over the next four hours. At the time the second radiograph was obtained, the arterial-blood gas showed a pH of 7.23, partial pressure of carbon dioxide of 49 mm Hg, and partial pressure of oxygen of 102 mm Hg while the patient was breathing 100 percent oxygen with assisted ventilation. The patient received supportive care. Her tracheotomy was removed within five days, and she was discharged from the hospital within seven days.

Although it occurs infrequently, exposure to chloramine gas represents a substantial risk when household cleaners containing bleach and ammonia are mixed. As the course of our patient illustrates, upper-airway irritation can compromise the airway and require emergency tracheostomy.

References

1. Gapany-Gapanavicius M, Molho M, Tirosh M. Chloramine-induced pneumonitis from mixing household cleaning agents. BMJ 1982;285:1086.
2. Reisz GR, Gammon RS. Toxic pneumonitis from mixing household cleaners. Chest 1986;89:49-52.
3. Pascuzzi TA, Storrow AB. Mass casualties from acute inhalation of chloramine gas. Mil Med 1998;163:102-4.
4. Mrvos R, Dean BS, Krenzelok EP. Home exposures to chlorine/chloramine gas: review of 216 cases. South Med J 1993;86:654-7.

Source: The New England Journal of Medicine, September 9, 1999, Vol. 341, No. 11, Winter 99

Handout #7

IMPLEMENT THE PLAN

A hazmat alarm is dispatched and the hazmat team's chemistry consultant advised that along with the corrosive properties of the drain cleaner and floor cleaners, chloramine gas would have been produced by the combination of the chlorine bleach products and the ammonia content in the glass cleaner.

Handout #8

EVALUATE THE PROGRESS

The building is immediately and completely evacuated.

Level A chemical protective clothing (totally encapsulated entry suit) is used by the entry team. Air monitoring is done both inside and outside by fire personnel.

Medical monitoring of the affected students is done before they are allowed to leave the area, and several are transported to local medical facilities for observation of breathing problems.

The HazMat team used absorbent material, overpacked the trash can and prepared it for removal to a hazardous waste disposal site.