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146592

# National Institute of Corrections Community Corrections Division



## \*\*\* CHEMICAL AGENT \*\*\* INSTRUCTOR'S MANUAL

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## CHEMICAL AGENTS

Dangerous conditions that are present in communities have raised the level of awareness of officers. In many jurisdictions, officers have demanded more training in self protection and the authority to carry lethal weapons. This concern is a real one and administrators are having to address issues of officer safety. The problem is not a simple one that can be solved with a new policy. Because this involves safety, in fact the very lives of staff, the matter is extremely serious. Training must be adopted to fit policy and not violate the goals, scope and mission of the agency.

The use of chemical agents have become very useful as a form of non-lethal force. Mace and tear gas sprays have been available for years and most law enforcement agencies seldom use them because of their limitations. A relatively new type of spray has been developed that uses the essence of cayenne or chili peppers (oleoresin capsicum) as the active ingredient. This chemical agent has been tested in the field and has been found to be superior to other types of defensive sprays (CS and CN.) Oleoresin Capsicum or OC is 100% effective in the 5% solution against attacking animals, people that are under the influence of alcohol, drugs, and highly motivated or emotionally disturbed individuals.

Training in the use of chemical agents is approximately four to six hours and trainers can be trained in two days. Additionally, it is not necessary to have refresher training. The cost of the product is reasonable and discounts are available for official government purchase orders. Cap-Stun (TM) is a leader in the production of this type of chemical spray. They produce a variety of sprays and the 5% solution is only sold to law enforcement and is not available for private citizens. Cap-Stun is being used by many probation and parole agencies with no negative reports.

The effects of oleoresin capsicum are immediate causing lacrimation, blepharospasm or a complete closing of the eye lids due to dilating capillaries. There will be swelling in the lining of the throat reducing the size of the airway. A temporary paralysis of the larynx and uncontrollable choking, gagging and gasping for breath will occur. A burning sensation as well as swelling of the mucous membranes causing extreme discomfort will occur. The skin will appear inflamed similar to an actual burn with a red color.

Once an individual has been sprayed and is in custody the first aid is fresh air, copious amounts of cool water and soap and water to the effected areas if necessary.

If you have further questions or want more information about oleoresin capsicum contact: J. Richard Faulkner, Jr., National Institute of Corrections, Community Corrections Division, 320 First Street, N.W., Washington, D.C. 20534



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**ALL OF THESE MATERIALS REGARDING THE SAFE AND PROPER USE OF THE CHEMICAL AGENT OLEORESIN CAPSICUM WERE COMPILED FOR YOUR EXAMINATION AND USE. THEY DO NOT ENDORSE ANY TRADE MARK PRODUCT.**

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**FOR LAW ENFORCEMENT DISSEMINATION ONLY**

**CHEMICAL AGENTS**

**IN**

**LAW ENFORCEMENT**

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## HISTORY OF CHEMICAL AGENTS

- I. 2300 B.C. - CHINESE ARMIES USED STINK POTS.
  - A. LEADERS BELIEVED IN MASSIVE FRONTAL ASSAULTS.
  - B. BURNED RED PEPPER IN HOT OIL PRODUCING AN IRRITATING AND SUFFOCATING SMOKE.
  - C. AFTER OPPOSING ARMIES WERE AFFECTED AND STARTED TO DISPERSE, CHINESE ARMIES WOULD ATTACK.
  - D. WIND DIRECTION AND VELOCITY HAD TO BE FAVORABLE.
  
- II. JAPANESE ADOPTED STINK POTS FROM CHINESE FOR MASSIVE FRONTAL ASSAULTS
  - A. SAMURAI WARRIORS CARRIED FINELY GROUND PEPPER WRAPPED IN RICE PAPER CONTAINERS.
  - B. CONTAINERS THROWN INTO FACE OF OPPONENT, TEMPORARILY BLINDING HIM.
  
- III. 431 B.C. - PELOPONNESIAN WARS - SPARTANS VS. ATHENIANS.
  - A. WOOD WAS SATURATED WITH SULFUR AND PITCH.
  - B. BURNED UNDER WALLS OF CITIES CAUSING SUFFOCATING SMOKE.
  - C. DEMORALIZE AND DIVERT ATTENTION OF PEOPLE INSIDE WALLS.

**IV. 673 A.D. - CONSTANTINE VS. SARACENS**

**A. GREEK FIRE - A LIQUID MADE OF SULFUR (SUFFOCATING SMOKE), QUICK LIME, PITCH (MAKES SUBSTANCE STICK), RESIN AND PETROLEUM.**

- 1. HEATED LIQUID PLACED IN TUBES AND PUMPED OUT OF FRONT OF SHIPS.**
- 2. LIQUID BECAME FLAMMABLE AS IT LEFT SHIP, FIRST FLAME THROWER.**
- 3. WOULD DISRUPT AND DISPERSE SARACEN CREWS WHILE THEIR SHIPS BURNED.**

**B. SARACENS LATER USED GREEK FIRE.**

- 1. PUT HEATED LIQUID ON PLATFORMS.**
- 2. CATAPULT OVER WALLS INTO CHRISTIAN CITIES.**

**V. MIDDLE AGES**

**A. CATAPULT OVER CASTLE WALLS - BOULDERS, DEAD HORSES, SLAIN SOLDIERS, LIVE PRISONERS, CANISTERS OF HOT OIL, GREEK FIRE.**

**B. USED TO DEMORALIZE AND DISORIENT OPPONENTS.**

**IV. 13TH CENTURY - HAND GRENADES FIRST USED CONTAINING CHEMICAL AGENTS.**

**A. CLAY AND GLASS JARS WITH TWO DIFFERENT SEPARATED CHEMICALS WOULD BE THROWN.**

**B. CHEMICALS WOULD MIX WHEN COMPARTMENTS BROKE PRODUCING A SPONTANEOUS CHEMICAL REACTION.**

**C. IF POSSIBLE, GRENADES BROKEN OVER HEADS OF ENEMY SOLDIERS DISORIENTING AND TEMPORARILY BLINDING THEM.**



- VII. 1422 A.D. - SIEGE OF TARANTINE, ITALY.
  - A. 2,000 CARTLOADS OF HORSE MANURE CATAPULTED OVER CITY WALLS.
  - B. CITY OCCUPANTS DISTRACTED, DISORIENTED AND DEMORALIZED.
  - C. IF NOT BEGINNING OF CHEMICAL WARFARE, BEGINNING OF BACTERIOLOGICAL WARFARE.
  
- VIII. CIVIL WAR - BEGINNING OF CHEMICAL WARFARE IN THE U.S.
  - A. WOOD SATURATED WITH SULFUR AND PITCH BURNED AROUND PARAPETS OR CITIES WHEN WIND DIRECTION WAS BENEFICIAL.
  - B. 1864 - CANISTERS OF GREEK FIRE LOBBED INTO CHARLESTOWN, S.C.
  
- IX. 1912 A.D. - FRENCH USE CHEMICAL AGENTS DURING AN ALGERIAN UPRISING IN PARIS.
  - A. USED GLASS CONTAINERS CONTAINING ETHYL BROMACETATE, A LACRIMATOR PRODUCING SEVERE WEEPING OR TEARING OF THE EYES.
    - 1. CAUSES EYELIDS TO SLAM SHUT FEELING LIKE THEY HAVE FINELY GROUND SAND INSIDE THEM.
  
- X. WORLD WAR I
  - A. 1ST BATTLE OF THE MARNE
    - 1. FRENCH USED METAL EXPLODING HAND GRENADES CONTAINING ETHYL BROMACETATE.
    - 2. SOME GERMANS WERE WOUNDED OR KILLED BY METAL SHARDS FROM GRENADES.
    - 3. REMAINDER OF GERMANS WERE SHOT OR BAYONETTED AFTER DISORIENTATION FROM ETHYL BROMACETATE.

B. APRIL, 1915 - YPRES, BELGIUM.

1. GERMANS USE CHLORINE GAS PUMPED OUT OF THEIR TRENCHES.
2. WIND CARRIES GREENISH YELLOW GAS TO ENEMY LINES.
3. GAS, BEING HEAVIER THAN AIR, WOULD HUG THE GROUND AND ENTER FOXHOLES AND TRENCHES.
4. ONLY FRENCH SURVIVORS WERE IN ELEVATED OBSERVATION POINTS.
5. WITHIN TWO DAYS BRITISH DEvised FIRST EFFECTIVE GAS MASK, TWO SURGICAL MASKS WITH POWDERED SODIUM CARBONATE BETWEEN THEM.

C. DURING WWI, FIVE FORMS OF LACRIMATORS WERE USED.

1. REPUTATION OF GAS AS BEING DEADLY, POISONOUS, AND INHUMANE ATTRIBUTED TO USE OF CHLORINE GAS.
2. TERM "TEAR GAS" STILL USED TODAY, BUT CHEMICAL AGENTS ARE NEVER MANUFACTURED OR CARRIED IN THE GASEOUS FORM.

IX. 1869 - GERMAN CHEMIST GRAEBE DISCOVERS CHLOROACETOPHENONE (CN), A LACRIMATOR.

- A. DURING WWI (1914-1918), U.S. ARMY NEEDED A NON-OFFENSIVE CHEMICAL AGENT TO TRAIN SOLDIERS WITH PROTECTIVE MASKS.
- B. DISCOVERED CN, IN PROPER CONCENTRATION, PRODUCED COPIOUS, UNCONTROLLABLE TEARING.
- C. AFTER SOLDIERS WERE REMOVED TO UNCONTAMINATED AREA, CN EFFECTS DISSIPATED LEAVING NO HARMFUL AFTER EFFECTS.

- XII. 1913 - GERMANS DISCOVER  
DIPHENYLAMINECHLORARSINE  
(DM), A SICKENING AGENT.
- A. GERMANS USE DM DURING WWI.
  - B. 1918 - MAJOR ROGER ADAMS, AMERICAN  
CHEMICAL WARFARE SERVICE, PERFECTS DM  
FOR POTENTIAL POLICE USE.
    - 1. DM IS ALSO CALLED "ADAMSITE."
  - C. AFTER WWII, BRITISH USE DM IN CYPRUS  
CIVIL DISORDERS RESULTING IN SEVERAL  
DEATHS.
  - D. 1958 - DM DECLARED A WAR GAS BY UN AND  
BANNED FOR EXPORT FROM U.S.
- XIII. 1923 - U.S. GOVERNMENT FUNDS LOCATION FOR  
RESEARCH OF CHEMICAL AGENT AT EDGEWOOD  
ARSENAL, MARYLAND.
- XIV. 1928 - U.S. SCIENTISTS B.B. CARSON AND  
R.W. SLOUGHTON DEVELOP  
ORTHOCHLOROBENZALMALONONITRILE (CS),  
A LACRIMATOR, SKIN AND RESPIRATORY  
IRRITANT.
- A. BRITISH SUCCESSFULLY USE CS IN CYPRUS  
DURING CIVIL DISORDERS IN 1961.
  - B. 1960S - CS REPLACES CN IN POPULARITY  
WITH POLICE DEPARTMENTS AND MILITARY  
UNITS.
- XV. 1934 - S&W DEVELOPS A 37 MM CHEMICAL  
PROJECTILE.
- XVI. 1962 - ENGLISH SCIENTISTS HIGGINBOTTOM AND  
SUCHITSKY DEVELOP DIBENZOXAPRINE (CR)
- A. 1976 - CR USED IN AEROSOLS BY USAF  
AROUND AIR BASES AND USMC IN EMBASSIES.
  - B. USED BY BRITISH IN NORTHERN IRELAND.
  - C. LEAKING CONTAINERS CAUSE THIRD DEGREE  
BURNS ON MILITARY POLICE, CR THEN  
DISCONTINUED.

- XVII. 1965 - GENERAL ORDNANCE EQUIPMENT COMPANY INTRODUCES CHEMICAL MACE.
- XVIII. JUNE, 1969 - AAI CORP. INTRODUCES LIQUID CS FERRET ROUND.
- XVIV. 1982 - OLEORESIN CAPSICUM, AN INFLAMMATORY AGENT, IS INTRODUCED IN AEROSOL FORM AT IACP CONVENTIION, ATLANTA, GEORGIA.

**CHEMICAL AGENTS**

**POLICY AND  
PROCEDURES**

**IN**

**LAW  
ENFORCEMENT**

**- POLICY -**  
**WHAT IS TO BE DONE**

**- PROCEDURE -**  
**HOW IT WILL BE DONE**

**MODERN USE**

**OF**

**CHEMICAL**

**AGENTS**

# **THE PROCESS OF ESCALATION**

- 1. PRESENCE**
- 2. VERBALIZATION**
- 3. PHYSICAL CONTACT**
- 4. HAND HELD IMPACT OR KINETIC TYPE WEAPONS.**
- 5. LETHAL FORCE**

**CHEMICAL AGENTS?**



# **INTENDED EFFECTS OF CHEMICAL AGENTS**

- 1. DISTRACT**
- 2. DISORIENT**
- 3. DISRUPT ACTIVITIES**
- 4. DISPERSE**
- 5. DISABLE**

# **LIFE SUSTAINING OXYGEN LEVELS**

**1. If oxygen in air is displaced.**

**A. 20-22% - normal oxygen intake to sustain life.**

**B. 17-19% - person will become comatose (dizzy, tired, disorientated).**

**C. 16% and below - life can't be sustained.**

**75% Effect of CN or CS is PSYCHOLOGICAL.**

# **INSTANCES WHERE CS OR CN IS NOT EFFECTIVE**

- 1. CN and CS not good with animals - don't have lacrimal apparatus. Animals may be frightened because of disorientation of smoke.**
- 2. Narcotics users, alcoholics, mentally ill people, highly motivated people, hyperactive, hysterical, multiple sclerosis, or muscular dystrophy have high tolerance CS or CN.**
- 3. People who have experienced exposure to CS or CN.**
- 4. Most people will be affected by Chemical Agents.**

**SITUATIONS WHERE CHEMICAL AGENTS ARE MOST  
COMMONLY USED**

- 1. RIOT CONTROL AND MOB DISPERSION**
  - A. AGITATORS MUST BE DISPERSED QUICKLY SO THEY DON'T BECOME BOLDER AND TOO NUMEROUS.**
  - B. PROPER MUNITIONS ARE HUMANE, EFFICIENT, AND ACCEPTABLE BY GENERAL PUBLIC.**
  - C. FIREARMS CAN RESULT IN CASUALTIES, RETALIATION, AND UNFAVORABLE PUBLICITY.**
  - D. FAILURE TO CONTROL MOB USUALLY LEADS TO INCREASED VIOLENCE.**
  - E. PROPER MUNITIONS DELIVERY BY SMALL, WELL TRAINED RIOT UNIT CAN CONTROL AND DISPERSE ALMOST ALL MOBS.**

## **2. BARRICADED CRIMINALS**

- A. PRIOR TO 1934, FIREARMS AND PHYSICAL ASSAULT ONLY MEANS TO SUBDUE CRIMINALS. RESULTS WERE INJURIES AND DEATH.**
- B. 1934 - S & W DEVELOPS 37MM BARRICADE PENETRATING PROJECTILE.**
  - 1. PERIOD OF VIOLENT UNION - MANAGEMENT ACTIVITIES IN AUTO INDUSTRY, COAL MINES, ETC.**
- C. CHEMICAL AGENTS DELIVERED FROM SAFE DISTANCE CAUSES CRIMINAL TO VACATE POSITION FACILITATING CAPTURE.**
- D. CHEMICAL LIQUIDS AND AEROSOLS ENHANCE SAFETY.**

**3. CONTROL AND DISCIPLINE IN PRISONS AND MENTAL INSTITUTIONS.**

**A. CONGREGATED PRISONERS POSE THREAT TO GREATLY OUTNUMBERED AUTHORITIES.**

**B. PROPER MUNITIONS OR FOGGERS CAN CLEAR THE YARD OR DINING HALL.**

**4. INDIVIDUAL PROTECTIVE DEVICES**

**A. 1965 - GENERAL ORDINANCE EQUIPMENT COMPANY (GOEC). DEVELOPS CHEMICAL MACE.**

**B. CN, CS AND CAPSAICIN AEROSOLS AND STREAMERS DEVELOPED .**

## **CRITERIA FOR SELECTION OF CHEMICAL AGENTS**

### **1. SAFETY**

- A. MUST BE NON-LETHAL IN ANY CONCENTRATION. DEVELOPED FOR POLICE APPLICATION.**

### **2. EFFECTIVENESS**

- A. PRODUCE RAPID PHYSIOLOGICAL AND PSYCHOLOGICAL REACTION.**
- B. PRODUCE DESIRED EFFECTS IN LOW CONCENTRATIONS.**
- C. PERMIT RAPID RECOVERY WITHOUT LASTING EFFECTS WHEN SUBJECT IS REMOVED FROM CONTAMINATED AREA.**

### **3. DELIVERABILITY**

- A. DELIVERABLE IN SUFFICIENT CONCENTRATIONS BY DELIVERY SYSTEMS ADAPTABLE TO SITUATION.**

**4. NON-PERSISTENCY**

**A. MUST BE TEMPORARY IN DURATION OF EFFECTIVENESS.**

**B. SHOULD NOT PRESENT MAJOR DECONTAMINATION PROBLEMS.**

**5. STABILITY**

**A. STABLE OVER WIDE RANGES OF TEMPERATURES AND STORAGE CONDITIONS.**

**6. ACCEPTABILITY**

**A. MUST BE TOLERATED BY GENERAL PUBLIC.**

**B. MUST PRODUCE INTENDED EFFECTS.**

**7. COST EFFECTIVENESS**

**A. MUNITIONS AND DELIVERY SYSTEMS MUST BE REASONABLE FOR DEPARTMENTAL RESOURCES.**



# OLEORESIN CAPSICUM CAPSAICIN

CLASSIFICATION: INFLAMMATORY AGENT

COMMERCIAL COLOR CODE: BLACK (AEROSOL)

CHEMICAL MAKEUP: ESSENCE OF CAYENNE OR CHILI PEPPERS  
THAT FORM A HEAVY DARK RED LIQUID

EFFECTS OF OC:

1. LACRIMATION, BLEPHAROSPASM, OR COMPLETE CLOSING OF THE EYE LIDS DUE TO DILATING CAPILLARIES
2. SWELLING IN THE LINING OF THE THROAT REDUCING SIZE OF THE AIRWAY.
  - A. TEMPORARY PARALYSIS OF THE LARYNX
  - B. RESULTS ARE UNCONTROLLABLE CHOKING, GAGGING, AND GASPING FOR BREATH
3. BURNING AND SWELLING OF THE MUCOUS MEMBRANES
4. INFLAMMATION OF THE SKIN SIMILAR TO A BURN
  - A. ACUTE BURNING SENSATION OF AFFECTED SKIN
  - B. REDDEN SKIN OF AFFECTED AREA

CHARACTERISTICS OF OC:

1. WORKS WELL AGAINST ANIMALS, ESPECIALLY ATTACKING DOGS
  - A. THE LACRIMAL APPARATUS IN DOGS IS NOT AS HIGHLY DEVELOPED AS HUMANS
  - B. SAME EFFECT AS HUMAN WITH SWELLING OF EYE CAPILLARIES
2. RESPONSE MORE PHYSIOLOGICAL THAN PSYCHOLOGICAL
  - A. PEOPLE UNDER THE INFLUENCE OF ALCOHOL OR NARCOTICS
  - B. PEOPLE WHO ARE HIGHLY MOTIVATED OR AGITATED
  - C. PEOPLE WHO ARE EMOTIONALLY DISTURBED

**FIRST AID:**

1. FRESH AIR
2. COPIOUS AMOUNTS OF COOL WATER
3. SOAP AND WATER IF NECESSARY

**HARDLY ANY CARCINOGENIC OR MUTAGENIC RESEARCH HAS BEEN CONDUCTED USING OC AS A CA**

**THERE IS NO KNOWN TOXICITY REGARDING OC**

**CAPSAICIN IS CURRENTLY USED IN PHARMACEUTICAL PRODUCTS AS WELL AS FOOD SEASONINGS**

**NO DEATHS FROM OC HAVE BEEN DOCUMENTED**

# INTENDED EFFECTS OF CHEMICAL AGENTS

1. DISTRACT
2. DISORIENT
3. DISRUPT ACTIVITIES
4. DISPERSE
5. DISABLE

## THE PROCESS OF ESCALATION

1. PRESENCE
2. VERBALIZATION
3. PHYSICAL CONTACT
4. HAND HELD IMPACT OR KINETIC TYPE WEAPONS
5. LETHAL FORCE

1. SHIELDING

2. DISTANCE

3. MOVEMENT

# THE PROCESS OF ESCALATION

1. PRESENCE

2. VERBALIZATION

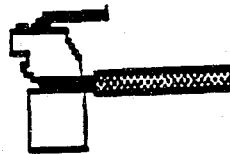
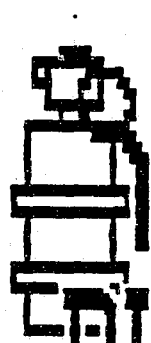
3. PHYSICAL CONTACT

4. HAND HELD IMPACT OR KINETIC TYPE WEAPONS.

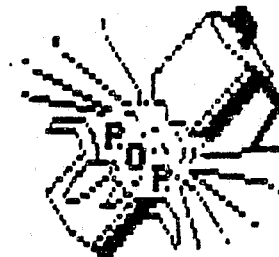
5. LETHAL FORCE

**CHEMICAL AGENTS?**





**DISSEMINATION**



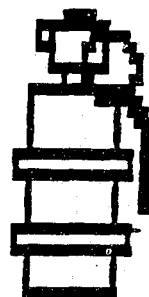
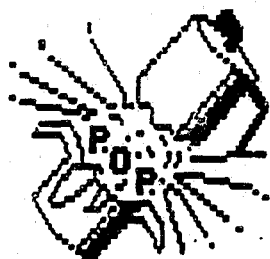
**AND**



**DELIVERY**



**SYSTEMS**





# DISSEMINATION METHODS

CHEMICAL AGENT IS IN ONE OF THE FOLLOWING  
CONDITIONS

1. SOLID - GRANULATED AGENT COMBINED WITH A  
PYROTECHNIC MIXTURE
2. MICROPULVERIZED - AGENT REDUCED TO AN  
EXTREMELY FINE POWDER OR DUST
3. LIQUID - AGENT SUSPENDED IN A LIQUID SOLUTION

**CHEMICAL AGENT FORMULATION IS DISPERSED BY  
FOLLOWING DISSEMINATION METHODS:**

**1. EXPULSION -**

**USE OF AN EXPLOSIVE OR OTHER FORCE  
TO EJECT MICROPULVERIZED CHEMICAL  
AGENT INTO THE ATMOSPHERE.**

**2. PYROTECHNIC -**

**BURNING OF GRANULATED CHEMICAL  
AGENT AND PYROTECHNIC MIX TO  
VAPORIZE AND RELEASE THE AGENT AS A  
SUBMICRON AEROSOL CLOUD.**

**3. FOG -**

**HOT GASES USED TO VAPORIZE A LIQUID AGENT  
FORMULATION WHICH IS RELEASED AS A FOG  
CLOUD.**

**4. LIQUID -**

**EXPPELLING FORCE USED TO PROJECT A LIQUID  
CHEMICAL AGENT FORMULATION.**

## **EXPULSION DISSEMINATION**

- 1. REQUIRE EXTREMELY FINE AGENT FORMULATION THAT WILL PROVIDE PARTICLES SMALL ENOUGH TO REMAIN AIRBORNE AND DRIFT WITH EXISTING WIND CURRENTS.**
- 2. MICROPULVERIZED CHEMICAL AGENT IS MIXED WITH VERY FINE CARRIER MATERIALS SUCH AS SILICA AEROGEL OR DIATOMITE ADDING FLUIDITY AND PREVENTING CAKING OF AGENT PARTICLES PRIOR TO DELIVERY.**
- 3. MIXTURE RATIO CAN BE FROM 95% AGENT AND 5% CARRIER FOR MILITARY TO 50/50 FOR COMMERCIAL DEVICES. MOST COMPANIES USE 95% AGENT AND 5% SILICA AEROGEL.**
- 4. MICROPULVERIZED AGENT PRODUCES 1 TO 10 MICRON SIZED PARTICLES ACCOUNTING FOR MORE PERSISTENT AND IRRITATING EFFECTS THAN SMALLER SUBMICRON PARTICLES PRODUCED BY PYROTECHNIC DEVICES.**
- 5. MUNITIONS THAT EMPLOY AN EXPLOSIVE FORCE TO SCATTER MICROPULVERIZED CHEMICAL AGENT ARE REFERRED TO AS EXPLOSIVE, BURSTING, INSTANANEOUS DISCHARGE, OR BLAST DISPERSION.**

6. MUNITIONS USE AN EXPLOSIVE FORCE THAT SHATTERS OR RUPTURES THE CONTAINER, GENERATE GASES THAT PROPEL AGENT OUT OF EXIT PORTS BUILT INTO MUNITION BODY, OR EXPEL AN AGENT CLOUD OUT THE MUZZLE OF A SPECIAL PURPOSE FIREARM.
  
7. PRESSURIZED DISPENSERS, REFERRED AS MECHANICAL OR BULK DISPENSERS, UTILIZE A COLD GAS SUCH AS COMPRESSED AIR OR NITROGEN TO EXPEL MICROPULVERIZED AGENT INTO THE AIR. USED WHEN LARGER AMOUNT OF AGENT OR GREATER AREA COVERAGE IS REQUIRED.

## **PYROTECHNIC DISSEMINATION**

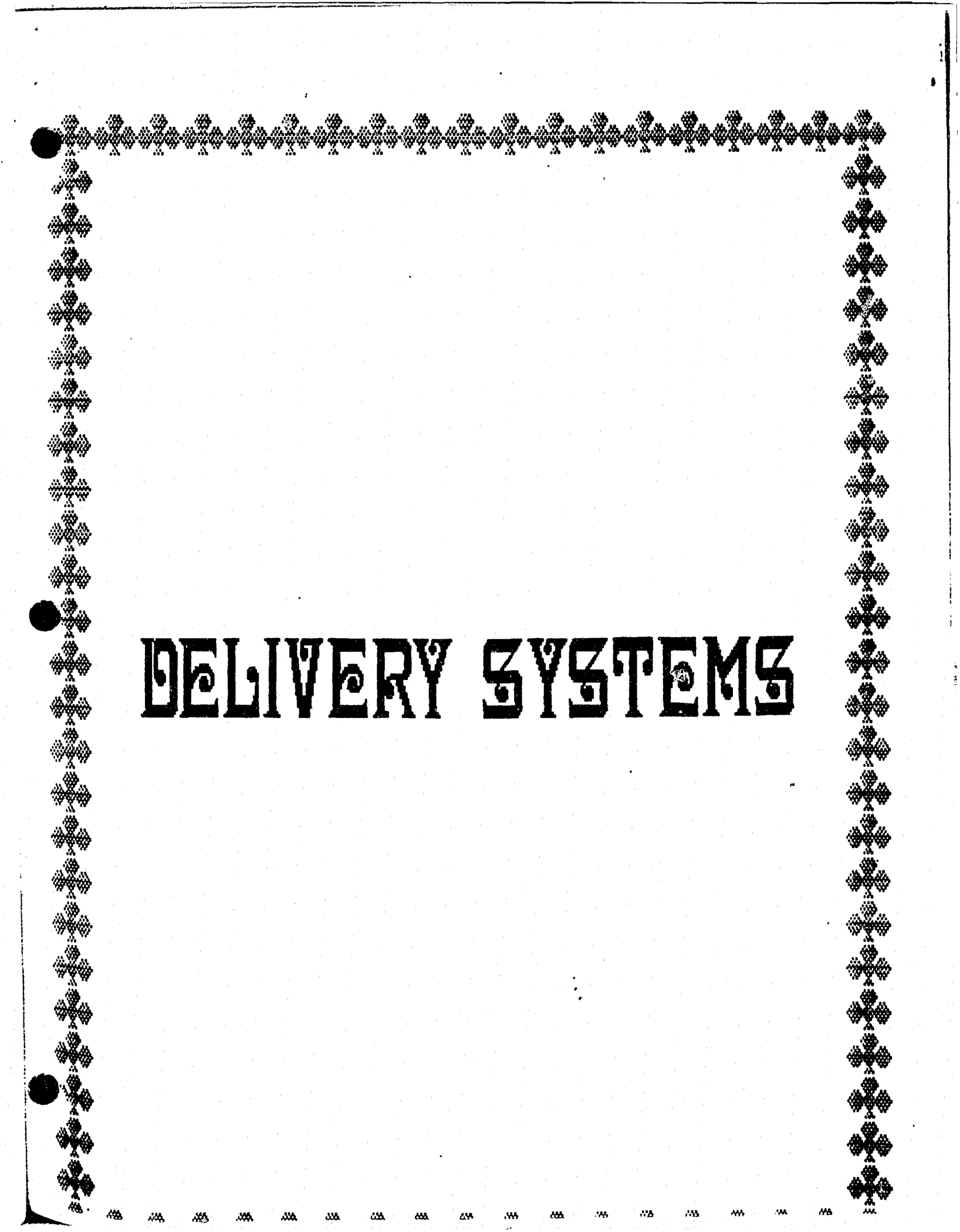
- 1. RELEASES AGENT CLOUD THROUGH A BURNING PROCESS AND ARE REFERRED TO AS COMBUSTION, CONTINUOUS DISCHARGE, OR BURNING METHODS.**
- 2. COARSELY GRANULATED CHEMICAL AGENT COMBINED WITH PYROTECHNIC SUBSTANCE IS PRESSED INTO A CAKE THAT WILL BURN UPON IGNITION. AGENT IS RELEASED INTO ATMOSPHERE WITH SMOKE CLOUD THAT CAN IDENTIFY CONTAMINATED AREA AND ITS DIRECTION OF MOVEMENT.**
- 3. TYPICAL PYROTECHNIC AGENT/FUEL MIXTURE IS 40% CHEMICAL AGENT AND 60% FUEL. RATIOS MAY VARY WITH MANUFACTURERS.**
- 4. ONCE AIRBORNE, VAPORIZED AGENT RECONDENSES AS SUBMICRON PARTICLES WHICH DRIFT WITH WIND UNTIL CONCENTRATION IS DILUTED TO THE POINT OF INEFFECTIVENESS.**
- 5. TEMPERATURE AT EMISSION POINT IS 750-800° F. WOOD FLASH POINT IS 450° F.**

## **FOG DISSEMINATION**

- 1. LIQUID AGENT IS INJECTED INTO A HOT GAS FLOW WHICH RAPIDLY EVAPORATES THE LIQUID AGENT.**
- 2. WHEN VAPORIZED AGENT CONTACTS COOLER AMBIENT AIR IT CONDENSES INTO A FOG AND ULTIMATELY INTO EXTREMELY SMALL AGENT PARTICLES.**

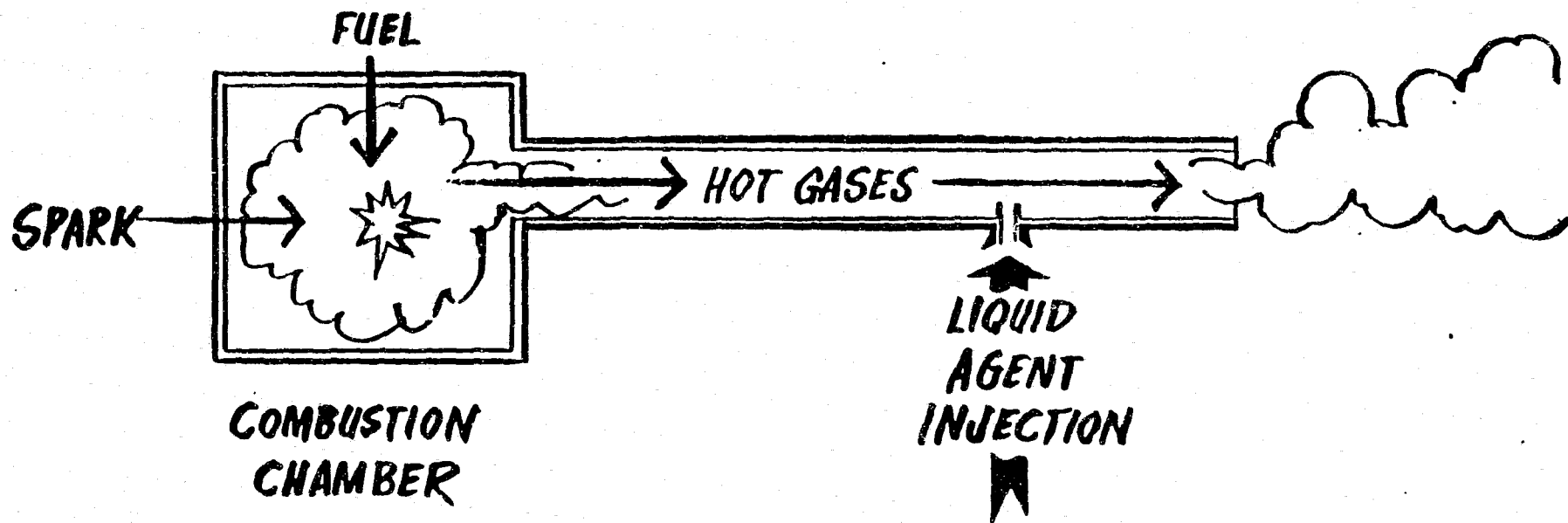
## **LIQUID DISSEMINTION**

- 1. EMPLOYED IN HAND HELD AEROSOL IRRITANT PROJECTORS, BULK DISPENSERS, AND 12 GAUGE, 37MM AND 40MM PROJECTILES.**
- 2. A GAS OR COMPRESSED AIR IS USED TO PROPEL THE LIQUID AGENT FORMULATION.**



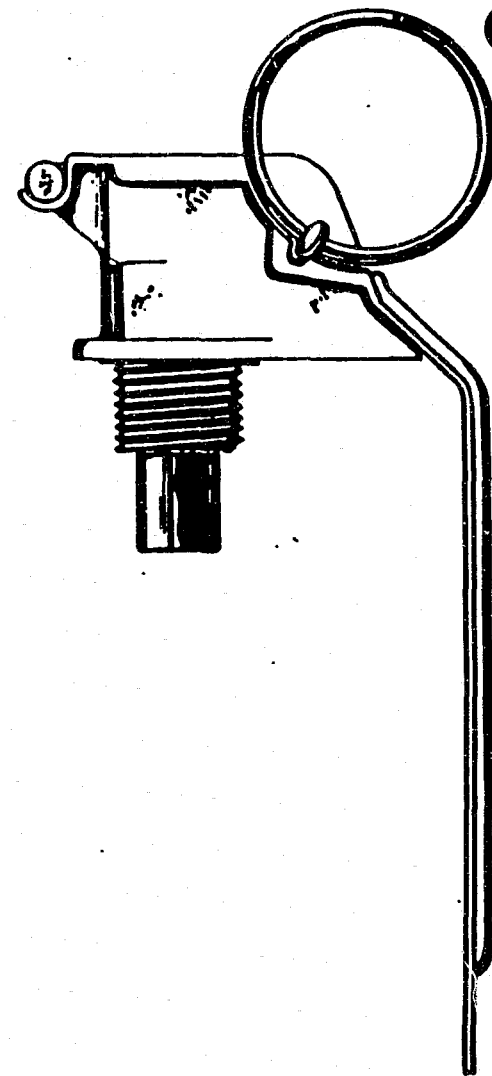
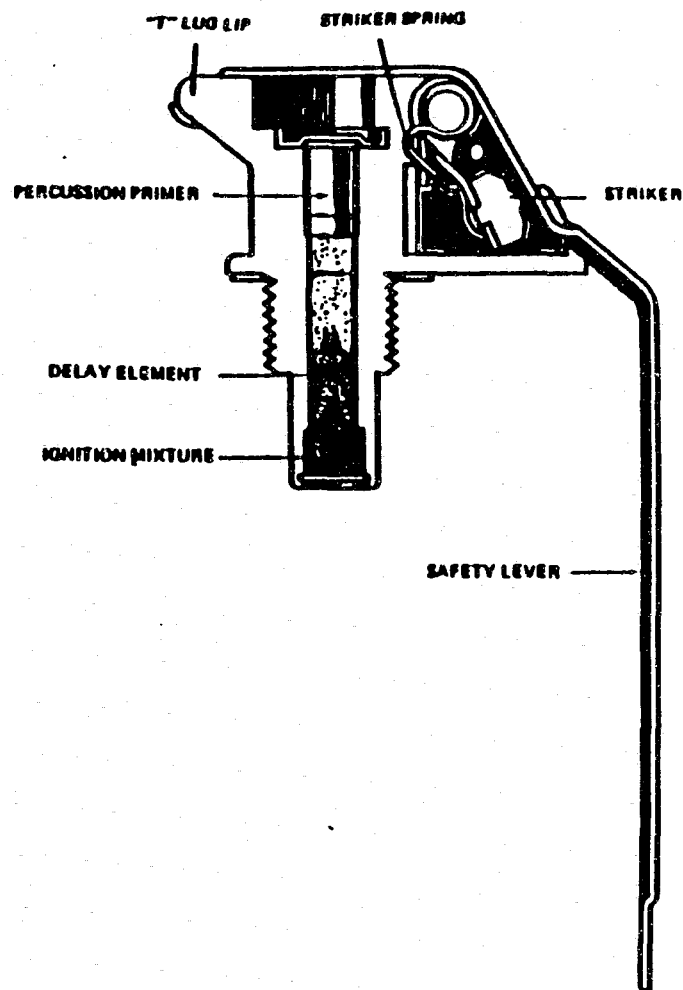
# DELIVERY SYSTEMS





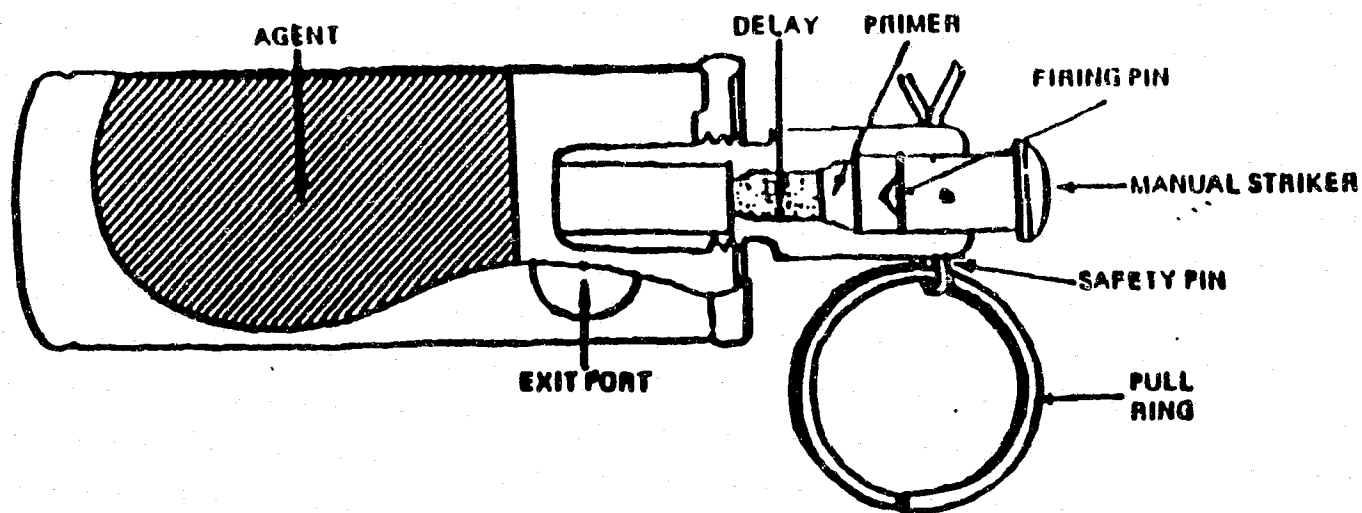
**FIGURE 4 - FOG DISSEMINATION**

A liquid chemical agent is vaporized by a hot gas flow and released as a fog cloud.



**FIGURE 5 – THE MILITARY M201A1 FUZE**

The hand grenade fuze is cocked and restrained from functioning by a safety pin. When the safety pin is withdrawn and the grenade thrown, a sequence of function is initiated: (1) The striker, driven by its spring, forces the safety lever out of its path, and the safety lever is thrown free of the grenade and releases the striker; (2) The striker strikes the percussion primer; (3) The primer emits a small intense spit of flame, igniting the delay element of the fuze; (4) Delay element burns for 1.2- to 2-seconds and sets off the ignition mixture of the fuze.



**FIGURE 7 – MANUAL PERCUSSION FUZE**

**A sharp blow against the striker: (1) shears the safety wire and drives the striker against the primer; (2) the primer ignites the delay element; (3) the delay burns for approximately 2.5 seconds and (4) ignites the fuel/agent mixture.**

# DECONTAMINATION

## PERSONAL (SKIN)

1. FRESH AIR
2. COPIOUS AMOUNTS OF COOL WATER
  - A. HOT WATER OPENS PORES, ALLOWS MORE EXPOSURE
3. WASH WITH SOAP AND WATER
  - A. NO OIL-BASED SOAPS
  - B. NO CREAMS OR SALVES THAT WILL CLOG PORES CAUSING BURNS OR RASHES
4. CN-MIX WATER WITH ISOPROPYL ALCOHOL
  - A. BATH OF TWO PERCENT SODIUM BICARBONATE
5. CS-BATH OF FIVE TO TEN PERCENT SODIUM BICARBONATE OR SODIUM CARBONATE
  - A. SKIN WASH SOLUTION (MIX IN WATER)
    1. 6.7 PERCENT SODIUM BICARBONATE  
( $\text{NaHCO}_3$ )
    2. 3.3 PERCENT SODIUM CARBONATE  
( $\text{Na}_2\text{CO}_3$ )
    3. 0.1 PERCENT BENZALKONIUM CHLORIDE
6. CN OR CS-HANDFULL OF SODIUM BISULFITE IN THREE OR FOUR GALLONS OF WATER
7. OC-COPIOUS AMOUNTS OF COOL WATER OR SOAP AND WATER IF NECESSARY

## **CLOTHING**

- 1. HANG OUT OR SHAKE OUT IN AIR**
- 2. CN-PLACE IN DRYER ON HIGHEST HEAT SETTING FOR 20-30 MINUTES**
  - A. INSURE DRYER IS PROPERLY VENTED**
- 3. CS-WASH IN COLD WATER WITH NORMAL DETERGENT**
- 4. OC-WASH IN COLD WATER WITH NORMAL DETERGENT**

## **AREA (OUTDOORS)**

- 1. USUALLY NOT NEEDED**
- 2. BLAST DISPERSION OR EXPULSION GRENADES**
  - A. HOSE DOWN ROAD, DRIVEWAY, SIDEWALK, OR GRASS; WHEREVER MICROPULVERIZED POWDER MAY BE KICKED UP**

## ENCLOSED AREA (INDOORS)

1. BLAST DISPERSION OR EXPULSION GRENADE
  - A. VACUUM FLOOR OR RUG RESIDUE WITH WET-VAC OR REGULAR CLEANER WITH WET FILTER BAG.
2. CROSS VENTILATION
  - A. GOOD AIR ENTERS ONE SIDE AND IS EXHAUSTED OUT OTHER SIDE.
  - B. AIR SHOULD NOT SWIRL AROUND INSIDE ROOM.
3. FORCED AIR HEATING OR COOLING SYSTEM
  - A. TURN SYSTEM OFF TO PREVENT CA FROM ENTERING DUCT WORK
4. CN-HEAT ROOM WITH PORTABLE HEATERS
  - A. EXHAUST FAN AT ONE OPENING
  - B. VAPORIZES AGENT AND CARRIES IT OUTSIDE OF BUILDING
  - C. WASH ROOM WITH FIVE PERCENT SOLUTION OF SODIUM CARBONATE (DECOMPOSES CN)
5. CS-APPLY SOLUTION WITH BROOM, MOP, OR BRUSH TO FLOORS, WALLS OR CEILING
  - A. LEAVE SOLUTION ON SURFACE FOR TEN MINUTES
  - B. RINSE SOLUTION AWAY WITH TAP WATER
  - C. WET-VAC SOLUTION IF NECESSARY

**D. SOLUTION CONSISTS OF FOLLOWING:**

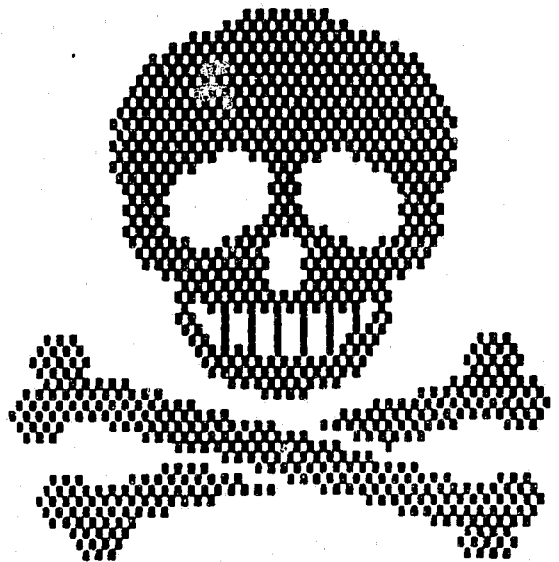
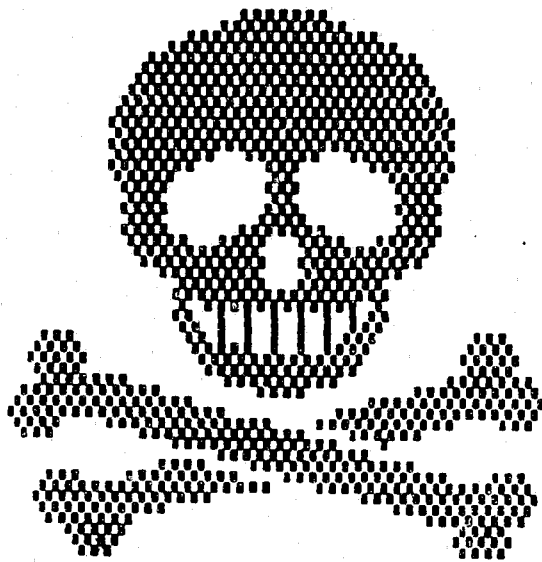
1. 10 PERCENT MONOETHANOLAMINE (MEA)
  - a. CHANGES CS CHEMICALLY  
PRODUCING HARMLESS BY-PRODUCTS
2. 3 PERCENT TRITON X-100 OR IGEPAL  
CO-630 (DISSOLVES CS)
3. IF #2 NOT AVAILABLE, USE TIDE OR  
JOY
4. USE DISTILLED WATER, NO CHLORINE,  
TO MIX WITH CN OR CS
5. IF TAP WATER USED, DOUBLE AMOUNT OF  
TRITON X-100

- E. MIX 6 2/3 PINTS OF MEA WITH 55 PINTS OF  
DISTILLED WATER, STIR IN 3 OUNCES OF  
TRITON X-100**

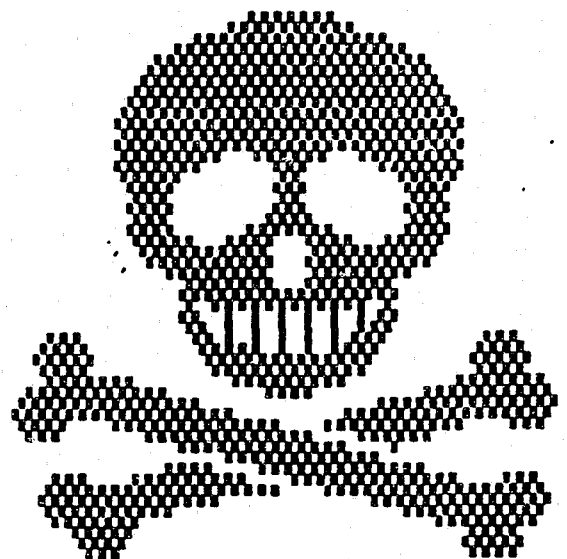
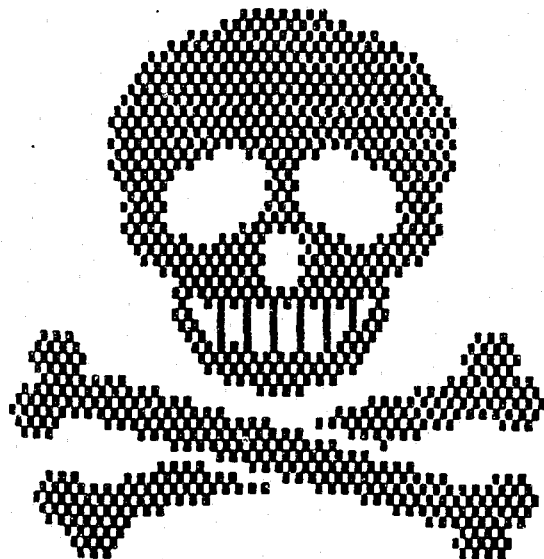
**REMOVAL**

1. CLOTH COVERED FURNITURE, RUGS, DRAPES,  
BLANKETS, CLOTHING SHOULD BE WASHED OR  
DESTROYED
2. THROW AWAY CONTAMINATED FOOD (DIARRHEA)
3. ELECTRICAL EQUIPMENT OR OTHER NON-  
WASHABLE EQUIPMENT MAY HAVE TO BE  
DISCARDED





**TOXICITY**

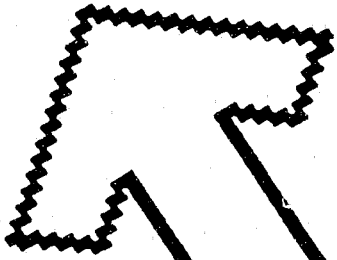


**AEROSOL -** A LIQUID OR SOLID, NOT VAPORIZED, BUT DIVIDED INTO PARTICLES SMALL ENOUGH TO FLOAT IN THE AIR FOR EXTENDED PERIODS OF TIME. EXAMPLES OF COMMON AEROSOLS ARE MIST, FOG, AND SMOKE. (A VAPOR IS THE GASEOUS FORM OF ANY SUBSTANCE THAT IS NORMALLY A SOLID OR A LIQUID.)

**CONCENTRATION -** THE AMOUNT OF CHEMICAL AGENT PRESENT IN A UNIT VOLUME OF AIR. USUALLY EXPRESSED IN MILLIGRAMS PER CUBIC METER OF AIR ( $\text{mg}/\text{m}^3$ ).

**DOSAGE OR  $Ct$  -** THE CONCENTRATION (C) OF CHEMICAL AGENT IN THE AIR MULTIPLIED BY THE TIME (t) THE CONCENTRATION REMAINS. DOSAGE IS USUALLY EXPRESSED AS MILLIGRAM MINUTES PER CUBIC METER ( $\text{mg-min}/\text{m}^3$ ).

MAXIMUM ●



HEAVY

MEDIUM

SLIGHT

NONE

EFFECTS

CONCENTRATION (C)

TIME (t)



## METEOROLOGICAL FACTORS AFFECTING USE OF CA

### CA AFFECTED BY 3 GENERAL GROUPS

- 1 - METEOROLOGICAL CONDITIONS
- 2 - MUNITIONS CHARACTERISTICS
- 3 - NATURE OF TARGET OR CRISIS AREA

### METEOROLOGICAL CONSIDERATIONS

- ELEMENTS OF WIND, TEMPERATURE, HUMIDITY  
DIFFICULT TO FORECAST WITH ANY ACCURACY
- USUALLY POLICE DEPARTMENT MUST ASSESS WEATHER  
CONDITIONS AT CRISIS SITE AT TIME OF CONTEMPLATED  
DEPLOYMENT

WIND - MOVING AIR WHICH TENDS TO TRAVEL PARALLEL TO  
SURFACE OF EARTH

SOME TACTICAL CONFUSION RESULTS WHEN CA ARE DEPLOYED IN HOT, HIGH  
RISE, URBAN SETTING, AS OPPOSED TO WIDE OPEN AREAS. CA WILL  
PERFORM DIFFERENTLY IN EITHER ENVIRONMENT

### WIND FACTORS

DIRECTION - WIND FLOW FROM ONE DIRECTION TO ANOTHER.  
THE SLOWER THE WIND SPEED, THE MORE THE DIRECTION  
FLUCTUATES WIDELY.

SPEED - CONTROLS THE RATE AT WHICH BOTH AEROSOLS AND  
VAPORS DISSIPATE. THE GREATER THE SPEED, THE QUICKER  
THE RATE OF EVAPORATION. MORE MUNITIONS WOULD BE  
NEEDED TO ESTABLISH SUFFICIENT CONCENTRATION OF RIOT  
CA. HIGHER SPEED ALSO PERMITS RAPID COVERAGE OF  
TARGET AREA, CONTINGENT UPON AMOUNT OF CA CONCENTRATION.

GENERAL RULE - WINDS NO FASTER THAN 10 MPH MOST  
EFFECTIVE FOR USE OF CA. LOW WIND SPEED ALLOWS CAM TO  
RISE TOO RAPIDLY.

TURBULENCE - SHORT GUSTS AND LULLS THAT ARE VARIABLE IN  
DIRECTION, STRENGTH, AND DURATION. IRREGULAR AIR FLOW  
OCCURS REGARDLESS OF AIR FLOW.

MECHANICAL TURBULENCE - EDDIES AND GUSTS ARE CREATED WHEN  
WIND SPEED CONTACTS SURFACE OBSTACLES. ALSO MT CREATED  
WHEN STRONG WIND BLOWS ACROSS IRREGULAR GROUND SURFACE.

## METEOROLOGICAL FACTORS AFFECTING USE OF CA

### CA AFFECTED BY 3 GENERAL GROUPS

- 1 - METEOROLOGICAL CONDITIONS
- 2 - MUNITIONS CHARACTERISTICS
- 3 - NATURE OF TARGET OR CRISIS AREA

### METEOROLOGICAL CONSIDERATIONS

- ELEMENTS OF WIND, TEMPERATURE, HUMIDITY  
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WHEN STRONG WIND BLOWS ACROSS IRREGULAR GROUND SURFACE.

## EFFECTS OF HUMIDITY/PRECIPITATION

HUMIDITY DOES NOT SERIOUSLY AFFECT CA.

PRECIPITATION ABSORBED INTO SMOKE PARTICLES PRODUCED BY PYROTECHNIC MUNITIONS, INCREASE IN SIZE GIVING APPEARANCE OF GREATER DENSITY. HIGHER TEMPERATURE AND HUMIDITY CAUSE INCREASED PERSPIRATION ALLOWING CA TO MORE SEVERELY IRRITATE SKIN.

HEAVY PRECIPITATION SHARPLY LIMITS EFFECTIVENESS OF CA.

U.S. Department of Justice  
Federal Bureau of Investigation



CHEMICAL AGENT RESEARCH:  
OLEORESIN CAPSICUM

## FOREWARD

During the summer of 1987, the Firearms Training Unit (FTU) of the FBI Academy, Quantico, Virginia, became interested in the chemical agent Oleoresin Capsicum (OC) as a supplement to Chloroacetaphenone (CN) and Orthochlorobenzalmalonitrile (CS), chemical agents that are presently utilized by the FBI. The following information is a compilation of background information and research conducted by the FTU.

\*

### MEDICAL RESEARCH

In 1987, the U. S. Army Chemical Research and Development Center (CRDEC), Aberdeen Proving Ground, Maryland, made available to the FTU open literature medical research documents regarding the experimentation with capsicum. These documents revealed the reaction of laboratory animals who were subjected to Capsicum by gastro-intestinal doses, subcutaneous injections, liquid droplets to the eyes, and skin patch tests.

CRDEC was not able to provide the FTU with any medical research whereby laboratory animals were placed in an enclosed area and were exposed to OC that was disseminated into the atmosphere in an aerosol form.

Unlike the available medical research regarding CN and CS, Median Incapacitating Dosage ( $IC_{t50}$ ), or Median Lethal Dosage ( $LC_{t50}$ ), of OC was not available.



Unlike the available medical research regarding CN and CS, CRDEC was not able to provide the FTU with any available short or long term mutagenic or carcinogenic medical research regarding exposure of laboratory animals to OC.

The FTU contacted two Research Chemists who are assigned to the FBI Forensic Science Research and Training Center and an Analytical Chemist who is a member of the Human Investigations Committee that meets at the FBI Academy.

These chemists advised that since OC is derived from a naturally occurring plant, cayenne pepper, which is used in foodstuffs and pharmaceutical products, its usage would fall outside of many governmental regulatory guidelines that would be applicable to synthetic man-made chemical agents, such as CN and CS. They also advised that they could foresee no long term health risks related to using OC as a chemical agent.

#### MANUFACTURER CONTACTS

The FTU contacted two of the largest manufacturers of OC aerosol units in the U.S. and they advised that since 1977, they have sold over 505,000 aerosol grenades and Individual Protective Devices (IPDs) that contain OC.

#### LEGAL RESEARCH

The FTU monitors lawsuits that have been filed against law enforcement officers or agencies resulting from the use of chemical agents. The FTU is unaware of any lawsuits resulting from the use of OC.

## HUMAN EXPERIMENTATION

From July 1987 to May 1989, 59 individuals have been sprayed directly in the face with IPDS containing solutions ranging from 1% to a 5% of OC. The observed physical effects of these individuals were more severe when they were exposed to a larger percent solution of OC and when they were sprayed with a continuous three-second burst or three one-second bursts as opposed to a single one-second or two-second burst.

The observed physical effects of these individuals ranged from severe blepharospasm (twitching or spasmodic contraction) of the eyes to involuntary closing of the eyes; respiratory inflammation ranged from coughing and shortness of breath to gasping for breath with a gagging sensation in the throat; exposed skin inflammation ranged from a burning sensation to an acute burning sensation and redness of the skin. Four individuals experienced a brief period of nausea and six individuals experienced the physical characteristics of loss of upper body motor skills.

Personal decontamination of these 59 individuals consisted of flushing the eyes and face with cool water. Facial burning persisted in 16 of these individuals and soap and water was used for further decontamination. Ice was used to relieve the persistent burning in 5 of the mentioned 16 individuals. Depending on the complexion of the individual and the concentration of aerosol sprayed on the face, discoloration would range from slight skin discoloration to bright redness of the

skin. This skin discoloration would disappear within two minutes to forty minutes after decontamination. When redness of the skin was no longer apparent, there was never any further irritation of the skin nor did any blisters or rashes develop on the skin.

The mucous membranes and upper respiratory systems in all 59 individuals were inflamed; however, respiratory functions appeared to return to normal within two minutes after each test. Most of the 59 individuals breathed through their mouths or breathed shallowly through their nose for approximately ten minutes after being sprayed. After ten minutes, these individuals could breathe deeply through their nose demonstrating relief from the inflammation of the mucous membranes.

Visual acuity returned within two to five minutes after decontamination. The eyes appeared bloodshot for 10 to 15 minutes after contact with the aerosol; however, once visual acuity was established, there were no further vision problems.

Although medical attention was readily available in all of the IPD tests, nobody required any further medical attention other than the mentioned personal decontamination.

From November, 1987 to July, 1989, a large number of individuals were placed inside various sized enclosed areas. They were exposed to solutions of OC ranging from 1% to 10% which were disseminated from one or more aerosol grenades.

The observed physical effects of these individuals were more severe when they were exposed to a greater percent solution of OC and when they remained inside the enclosed contaminated

area for a longer period of time. The duration of exposure lasted from 10 to 20 seconds in most cases to 45 seconds in relatively few cases.

The observed physical effects of the exposed individuals (a total of 899 were tested) ranged from stinging and lacrimation of the eyes to severe blepharospasm; respiratory inflammation ranged from coughing and shortness of breath to deep coughing, retching, and gasping for breath; exposed skin inflammation ranged from slight burning to a mild burning sensation and redness of the exposed skin.

Depending upon the deepness of breathing and the amount of exposure time, different degrees of temporary paralysis of the larynx were observed. Some individuals could talk but only in short phrases while other individuals could only emit a gasping noise when asked to speak.

Personal decontamination for these 899 individuals consisted of removal from the enclosed environment to fresh air. Approximately 500 individuals flushed their face with cool water and approximately 200 of these 500 individuals required soap and water to expedite their personal decontamination.

Medical attention was also readily available for these individuals but nothing more than fresh air, soap and water was required.

## QUESTIONNAIRE RESULTS

The FTU furnished questionnaires to 39 police agencies and 3 correctional institutions that are presently using aerosols containing OC.

The table below depicts the responses provided by these agencies regarding the number of times OC was used between 1987 and 1988:

<u>Number of Times Used</u>	<u>Number of Agencies</u>
1 - 5	27
6 - 15	8
16 - 25	1
26 - 40	3
41+	3

None of these agencies reported any medical problems encountered by subjects being subdued and/or arrested, and no medical problems were encountered by the law enforcement officers delivering the OC aerosol.

Some agencies wrote self-explanatory comments regarding their experiences using OC while other agencies were telephonically interviewed. Following are some highlights from these statements and interviews.

One agency advised that they frequently use OC and had positive results with one exception, which was when a frequent drug user was holding 3 officers at bay with the end of a pitchfork (the handle was missing). The subject was sprayed with OC but showed none of the mentioned physical effects.

Four agencies advised they have successfully used OC against an individual under the influence of narcotics. One agency (26-40 times used) and two agencies (41+ times used) advised that they have successfully used OC against individuals under the influence of narcotics on numerous occasions.

One agency reported they frequently use OC to break up fights on the street. Two agencies stated they have successfully used OC to subdue mentally unbalanced individuals. Another agency advised an unassisted uniformed officer successfully used an aerosol grenade containing OC to break up a fight in a union hall.

One agency advised that an individual under the influence of alcohol was successfully subdued by using OC and three agencies stated that they have successfully used OC on numerous occasions to subdue individuals under the influence of alcohol.

Six agencies reported that they have successfully used OC against individuals who are extremely excited or agitated. OC was used once to totally disable a very large biker pursuant to his arrest. One agency reported that a very aggressive poacher who was 6'6" tall and weighed 250 pounds was successfully arrested and transported by an unassisted officer.

Three agencies advised that they have successfully used OC on numerous occasions to subdue individuals who are highly excited or agitated. Two agencies reported OC is frequently used to subdue inmates who are violent and uncontrollable.

Ten agencies advised that they have successfully used OC aerosols against aggressive or attacking dogs. One agency stated that an OC aerosol grenade was used to break up a pack of wild dogs. Two animal control agencies advised that OC has been successfully used numerous times to subdue aggressive dogs. One agency stated that OC has been used 5 times to subdue guard dogs while the dog's owner was being arrested.

#### DECONTAMINATION

Aerosols containing OC are not persistent, therefore personal and area decontamination are relatively simple. Personal decontamination has been previously mentioned and consists of putting the subject in fresh air and providing soap and water if necessary.

If a subject has been in an environment contaminated by OC, removal into fresh air for a short period of time should be sufficient to remove the OC particles from the subject's clothing. The subject can then be transported without the transporting officers being effected by the OC.

If a subject is sprayed directly in the face with an aerosol from a unit containing OC and the subject's clothing is discolored as a result of coming into contact with a high concentration of OC, the subject should be removed to a fresh air environment until the clothing is dry. The subject will then be ready to transport without the transporting officers being effected by the OC. Normal machine washing will remove the discoloration caused by OC and other uncontaminated clothing can

be washed with OC contaminated clothing without fear of contaminating the entire load of laundry.

Area decontamination consists of ventilating the enclosed area by opening doors or windows. Cross ventilation was unnecessary with large fans as would be required with CS or CN, and within one half hour from the initiation of area decontamination there were no traces of OC contamination.

None of the 39 police agencies or the 3 correctional institutions that furnished the mentioned questionnaire results mentioned personal or area decontamination problems while using OC.



## INDIVIDUAL PROTECTIVE DEVICES (IPDs)

- I. DELIVERY SYSTEM
  - A. CONE SHAPED MIST vs. LIQUID STREAMER
  - B. FLAMMABILITY (ALCOHOL) vs. TOXICITY (CARCINOGENIC)
  - C. SAFETY FEATURES OF CONTAINER
- II. EFFECTIVE DISTANCES
  - A. SIZE AND SHAPE OF ORIFICE
  - B. AMOUNT OF PRESSURE IN CONTAINER
  - C. SIZE OF CONTAINER
  - D. CONCENTRATION OF CHEMICAL AGENT SUSPENDED IN SOLUTION
- III. TYPE OF CHEMICAL AGENT UTILIZED
  - A. CN, CS, CR, OC
- IV. AREA DECONTAMINATION
  - A. NORMAL VENTILATION
- V. DECONTAMINATION OF CLOTHING
  - A. IS AGENT PERSISTENT IN CLOTHING (TRANSPORTING PRISONERS)
  - B. WASH AND DRY CLOTHING IN NORMAL CYCLES
- VI. METHOD OF CARRYING
  - A. HOLSTER vs. CLIP, KEY RING
  - B. WEAPON SIDE vs. WEAK SIDE
  - C. BRIEF CASE, PURSE OR READY BAG
  - D. JACKET OR SHIRT POCKETS

5 D.C. OFFICERS INJURED  
IN ATTACK WITH BARBELL

MAN FIGHTS REMOVAL FROM HOME, POLICE SAY

BY SARI HORWITZ  
WASHINGTON POST STAFF WRITER

A D.C. POLICE OFFICER WAS SHOT, FOUR OTHERS WERE INJURED AND A NORTHWEST WASHINGTON RESIDENT WAS CRITICALLY WOUNDED YESTERDAY WHEN THE OFFICERS TRIED TO REMOVE THE MAN FROM HIS HOME AND HE THREW A BARBELL AT THEM, POLICE SAID.

IT ALL BEGAN WHEN FIVE OFFICERS WERE HELPING MEMBERS OF THE EMERGENCY PSYCHIATRIC RESPONSE DIVISION OF THE D.C. DEPARTMENT OF HUMAN RESOURCES REMOVE ONNIE B. GRAVES, 30, FROM HIS HOME ON THE 7600 BLOCK OF 12TH STREET NW FOR PSYCHIATRIC OBSERVATION.

POLICE GAVE THIS ACCOUNT OF THE INCIDENT: THE 250-POUND MAN REFUSED TO GO. THE NEXT THING OFFICERS KNEW, AN IRON BARBELL WAS FLYING TOWARD THEM.

THE OFFICER, SOME OF WHOM WERE STANDING ON A STAIRWAY TRIED TO RESTRAIN GRAVES BY SHOOTING HIM WITH A TASER GUN, WHICH EMITS TWO VOLTS OF ELECTRICITY AND IS USED TO IMMOBILIZE PEOPLE FOR A SHORT PERIOD. BUT POLICE SAY THERE WAS NO STOPPING GRAVES, WHO ALLEGEDLY ATTACKED THEM WITH THE BARBELL.

THE OFFICERS THEN STARTED FIRING THEIR .38-CALIBER REVOLVERS, STRIKING GRAVES IN THE ABDOMEN THREE TIMES, ACCORDING TO LT. REGINALD SMITH, A POLICE SPOKESMAN.

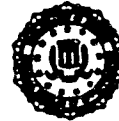
ONE OF THE FOUR OR FIVE BULLETS THAT OFFICERS FIRED RICOCHETED AND STRUCK 4TH DISTRICT OFFICER JOSEPH LONON, 28, IN THE THIGH. LONON, WHO JOINED THE DEPARTMENT TWO YEARS AGO, WAS ADMITTED TO WASHINGTON HOSPITAL CENTER FOR OBSERVATION.

ANOTHER OFFICER, DENNIS WILLIAMS, 30, WHO ALSO JOINED THE FORCE TWO YEARS AGO, SUFFERED A POSSIBLE FRACTURE OF HIS LEFT ANKLE. OFFICER ROBERT ALBRECHT, 44, WITH THE DEPARTMENT FOR 20 YEARS, SPRAINED HIS RIGHT ANKLE. SGT. MICHAEL MATTHEWS WAS LEFT WITH A BRUISE ON HIS FACE AND RIGHT SIDE. AND OFFICER LOREN COOK, 36, STRAINED HER LEFT TRICEP MUSCLE. ALL FOUR WERE TREATED AT THE HOSPITAL AND RELEASED.

GRAVES WAS LISTED IN CRITICAL BUT STABLE CONDITION LAST NIGHT AT THE HOSPITAL. HE HAS BEEN CHARGED WITH MULTIPLE COUNTS OF ASSAULT ON A POLICE OFFICER AND WILL BE ARRAIGNED IN D.C. SUPERIOR COURT WHEN HIS CONDITION PERMITS, POLICE SAID.

U. S. Department of Justice  
Federal Bureau of Investigation

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**OLEORESIN CAPSICUM  
TRAINING AND USE**

**FBI ACADEMY  
FIREARMS TRAINING UNIT**

**FOR LAW ENFORCEMENT DISSEMINATION ONLY**

**Oleoresin Capsicum Training and Use**

**Firearms Training Unit  
FBI Academy  
Quantico, Virginia 22135**

## **FOREWORD**

Over the years law enforcement officers have experienced an increase in the number of incidents wherein officers are attacked by dogs and/or are confronted by individuals who display violent and aggressive behavior. Oftentimes these situations can be adequately controlled by the officer using some form of chemical agent product.

Because these types of incidents have escalated over the years, the Firearms Training Unit (FTU) located at the FBI Academy in Quantico, Virginia, began conducting research and testing on the various types of available chemical agent products. The ultimate goal of the FTU's research was to obtain the most effective chemical agent product that could be carried by Special Agents (SA). As a result of the research and tests conducted, the Federal Bureau of Investigation (FBI) has approved for use by its SAs the chemical agent Oleoresin Capsicum (OC).

This publication sets forth the information compiled by the FTU with regard to the results of the research conducted as well as, outlines the reasons as to the importance of proper training in the use of chemical agent products. The FTU has incorporated in its New Agent training curriculum an instruction block which familiarizes trainees with the proper dissemination of chemical agent products.

The course curriculum used by the FTU consists of classroom lecture and hands-on experience with chemical agents. Law enforcement agencies may not find all aspects of the information set forth in this document applicable to their specific department.

## BACKGROUND INFORMATION

The FTU contacted various chemical agent manufacturers and, after reviewing the available literature on the various products, (OC) appeared to be a product which warranted research as to the feasibility of its use as a supplemental chemical agent. The U.S. Army Chemical Research and Development Center (CRDEC), Edgewood Arsenal, Maryland, was contacted regarding research and experiments they had conducted using OC.

The CRDEC tested the effects of OC on laboratory animals. The tests consisted of subjecting the animals to OC by such means as gastrointestinal doses, subcutaneous injections, liquid droplets to the eyes, and skin patch tests. CRDEC did not have available any documentation which revealed any short, or long-term mutagenic or carcinogenic effects on laboratory animals that were exposed to OC. No data was available regarding Median Incapacitating Dosage ( $IC_{50}$ ) or Median Lethal Dosage ( $LC_{50}$ ) on OC.

Two research chemists assigned to the FBI Forensic Science Research and Training Center and an analytical chemist who is a member of the Human Investigations Committee were consulted regarding possible long-term health risks which might be associated with the use of OC. These individuals advised that OC is derived from the cayenne pepper plant which is used in foodstuffs and pharmaceutical products. They could not foresee any long-term health risks associated with the use of OC as a chemical agent. The use of OC would fall outside of many governmental regulatory guidelines that would be applicable to man-made chemicals (Chloroacetaphenone (CN) and Orthochlorobenzalmalononitrile (CS), for example).

Two of the largest manufacturers of OC aerosol units in the United States have advised that since 1977, they have sold over half a million aerosol grenades and Individual Protective Devices (IPDs) that contain OC. These manufacturers have not received any reports of long-term health risks based on its use. It should be noted that, to date, the FTU is unaware of any law suits filed against law enforcement officers and/or agencies as a result of the use of OC

## TESTING PROCEDURES AND RESULTS

During the period July, 1987 to May, 1989, the FTU conducted numerous tests using OC. During the above period, 828 individuals were sprayed with IPDs containing from 1% to 5% solution of OC. The FTU varied the manner in which the OC was disseminated. Some of the individuals were sprayed directly in the face, while others were sprayed in an open environment, and others in an enclosed area. The duration of the exposure ranged from 10 to 45 seconds. The FTU observed the physical effects of individuals who were sprayed with the 1% solution and with the 5% solution. A variety of spray bursts were used over the duration of the tests.

The physical effects upon those individuals sprayed with the higher content of OC were more severe. Also, those individuals who were sprayed with a continuous, three-second burst or three, one-second bursts experienced more severe physical reactions to the OC. The physical effects observed of the individuals tested ranged from severe twitching of the eyes to involuntary closing of the eyes; respiratory inflammation consisting of coughing and shortness of breath to gasping for breath with a gagging sensation; exposed skin inflammation ranging from slight to acute burning sensation and redness of the skin. Some of the individuals tested experienced minor cases of nausea and catatonia. None of the individuals tested experienced any long-term effects from the OC.

Personal decontamination of the individuals tested consisted of flushing the eyes and face with cool water. The facial burning in some of the individuals persisted; therefore, it was necessary for them to wash the exposed area with soap and water for further decontamination. In some cases, ice was used to relieve the persistent burning. The range of skin discoloration ranged from slight discoloration to a bright red. This range depended on the complexion of the individual and the dose of aerosol sprayed. Usually the skin discoloration would disappear from 2 minutes to a maximum of 40 minutes after decontamination. No further skin irritation developed on the skin once the discoloration disappeared.

All individuals experienced upper respiratory inflammation. The individuals experienced coughing, shortness of breath to a gagging sensation in the throat. The respiratory functions usually returned to normal within 2 minutes after each test. No further discomfort was

experienced by any of the individuals tested. Visual acuity returned within 2 to 5 minutes after decontamination. The eyes of most individuals appeared bloodshot from 10 to 15 minutes after contact with the OC. No further visual problems were noted once visual acuity was regained.

Unlike CS or CN, OC particles will dissipate from an individual's clothing in a relatively short period of time. Therefore, if a subject has been exposed to OC or his/her clothing has been sprayed with OC, it will not persist in the clothing and the arresting officer should not be physically affected while transporting the prisoner. However, it should be noted that some OC products are mixed with CS, and the CS will persist in clothing. Area decontamination can be accomplished within a half hour from contamination and consists of ventilating the enclosed area by opening the doors and/or windows.



## LAW ENFORCEMENT USE OF OLEORESIN CAPSICUM

In an effort to gain some insight as to the frequency in which law enforcement agencies are using OC, as well as its success rate, the FTU furnished a questionnaire to 42 departments that have used or are currently using OC. The questionnaire requested such information as frequency of use, reported medical problems among the officers/subjects, success rate, and any other experiences which might be of interest.

### REPORTED USE OF OC

<u>TIMES USED</u>	<u>NUMBER OF AGENCIES</u>
1 - 5	27
6 - 15	8
16 - 25	1
26 - 40	3
41 +	3

None of the agencies reported any medical problems encountered by subjects and/or law enforcement officers through the use of OC.

The majority of the agencies that responded to the questionnaire stated that OC was used in instances where the subject was highly aggravated or agitated; under the influence of drugs and/or alcohol; mentally unbalanced; and in instances where an officer was attacked by a dog. Of all the agencies, only one cited an example of where the OC did not produce any physical effects after the subject was sprayed with OC. In this instance, there were no unusual circumstances to prevent the OC from working.

A number of agencies that responded to the questionnaire set forth specific incidents in which officers used OC and had positive results. Four of the agencies reported that they have had a high success rate when using OC in incidents where the subject is under the influence of narcotics.

Several agencies reported successful use of OC when attempting to subdue individuals who were under the influence of alcohol.

One agency reported using OC to break up fights on the street. Two agencies advised they have successfully used OC to subdue mentally unbalanced individuals. Another agency advised that one of their officers successfully used an aerosol grenade containing OC to break up a fight in a union hall.

Nine agencies reported successfully using OC against individuals who were extremely excited or agitated. Two of these agencies reported using OC to subdue violent and uncontrollable inmates. OC was used on one occasion to disable a large biker who was being arrested. One agency reported that an aggressive poacher who was approximately 6' 6" tall and weighed 250 pounds was successfully subdued, arrested, and transported by one officer.

Ten agencies advised that on numerous occasions OC has been successfully used against aggressive and attacking dogs. One agency reported using OC against a pack of wild dogs. One agency stated that OC has been used five times to subdue guard dogs while the dog's owner was being placed under arrest.

## **TRAINING WITH OLEORESIN CAPSICUM**

The FBI might find it necessary to use chemical agents in incidents such as barricade situations, SAs who are attacked by dogs, individual protection against uncontrollable and/or violent subjects during an arrest situation, etc. Some situations may be adequately controlled by using chemical agents. However, it is certain that proper training in using the various chemical agent products plays a vital role in its success rate.

For this reason, each New Agent trainee class is presented with a four-hour block of instruction regarding chemical agents. This block of instruction includes a classroom presentation and hands-on use of chemical agents.

A portion of the instruction block is used to describe the various situations in which the introduction of chemical agents might be warranted, and the selection criteria as to what type of device would be appropriate for different situations. Trainees are given information relating to the chemical makeup of various tear gases and OC, and the physiological effects of such chemicals. Devices such as handgrenades, launching projectiles, liquid and powder containers, shotgun ferret rounds, etc., are displayed to assist them in identifying the various products. Trainees are given a brief overview in rendering first aid as well as the proper decontamination procedures.

Since many of the SA trainees have never been exposed to the effects of chemical agent products, it is important to expose them to a contaminated environment to test their reactions. Trainees are exposed to an enclosed contaminated area. They are first required to use their gas masks, and then they are required to remove their masks. In this regard, it aids in stressing to them that they can survive and function in a contaminated environment, even if their only alternative is to extricate themselves from the area of danger. From a tactical standpoint, trainees are made aware that the use of chemical agents should always be given consideration as a less than lethal force option.

**THE FOLLOWING LESSON PLAN WAS DEVELOPED USING CAP-STUN SPRAY.**

**THIS IS NOT INTENDED TO BE AN ENDORSEMENT OF ANY SINGLE PRODUCT OR BRAND NAME.**

Utilization of the Inflammatory Agent

Oleoresin Capsicum

Thomas C. Overman, III

Police Officer

Arlington County, VA Police Department

2100 N. 15th St.,

Arlington, VA 22201

(703) 358-4249

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**COURSE NAME:**

Utilization of the Inflammatory Agent  
Oleoresin Capsicum

**COURSE LENGTH:**

Eight Hours

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**INSTRUCTOR'S NAME:**

T.C. Overman  
Arlington County, VA Police Department

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**DATE OF PREPARATION:**

December, 1990

**PRESENTED TO:**

Philadelphia Adult  
Probation and Parole  
Officers

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**DATE OF INSTRUCTION:**

December 18, 1990

**PLACE:**

Philadelphia, PA

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**COURSE REFERENCES/RESOURCES:**

Arlington County Police Department Cap-stun Policy and Procedure

U.S. Department of Justice/NIC Publication - Worker Safety in  
Probation and Parole April, 1990

U.S. Department of Justice/FBI Publication - Chemical Agent  
Research: Oleoresin Capsicum 1987

Lucky Police Products, Oakland Park, FL

**INSTRUCTIONAL GOAL:**

To provide Adult Probation and Parole Officers with the information necessary to be familiar with the proper handling and utilization of the inflammatory agent oleoresin capsicum (Cap-Stun).

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**INSTRUCTIONAL OBJECTIVES:**

Upon completion of this training session the student will:

- Be familiar with the Escalation of Force Model
- Know the make-up, effects, characteristics and advantages of Cap-Stun
- Be familiar with the delivery system and carry techniques
- Be prepared to utilize Cap-Stun if necessary

LESSON OUTLINE

INSTRUCTOR NOTES

I. Introduction

A. The purpose of this training session is to provide information necessary for the practical application and utilization of the inflammatory agent Cap-Stun.

Read objectives

B. Instructor Introductions

C. Student Introductions

Brief - names, background, work assignment, etc.

D. Outline of Day's Activities

1. Lecture

2. Demonstration

3. Student involvement

4. Practice

5. Written test

From notes

6. Practical application

E. Topics to be Covered

1. Escalation of force

2. Chemical agents

3. Cap-Stun

4. Delivery systems

5. Usage and carry techniques

F. Arlington Training Video



LESSON OUTLINE

INSTRUCTOR NOTES

II. Escalation of Force Model

AKA continuum of force

A. Mental and Physical Preparedness

1. Physical preparation

- a. a physically fit person is better able to handle both physically and mentally stressful situations
- b. a reasonable level of fitness should be maintained by anyone having the potential of physical contact
- c. also means having tools of trade in proper working order

2. Mental preparation

Discuss stressful reactions, adrenalin dump

- a. proper mental state can reduce likelihood of injury
- b. condition white - unaware/unprepared
- c. condition yellow - relaxed/alert
- d. condition orange - specifically alert; think tactics
- e. condition red - action mode; tendency to revert to conditioned response - training

LESSON OUTLINE

INSTRUCTOR NOTES

B. Process of Escalation

1. Presence

- a. authority figure may be enough for compliance

2. Verbalization

- a. this is your best line of defense
- b. develop and use

3. Physical contact

- a. may be necessary to supplement verbalization
- b. only that force necessary to overcome force used
- c. remember physical and mental preparation?

4. Impact weapons

- a. must be properly trained to use
- b. not meant for deadly force
- c. again, only that force necessary.....

5. Lethal force

- a. used to protect your life or the life of another

## LESSON OUTLINE

## INSTRUCTOR NOTES

C. Where do chemical agents fit in to the use of force model?

Ask question for student involvement

1. May depend on particular assignment, job description, etc.

### III. Chemical agents

1. Riot control - historically the usage
2. CN and CS
  - a. CN - used by L.E. since 1920's; color code red; intense irritation of eyes and mucous membranes
  - b. CS - standard in military; increased L.E. use over last 20 years; color code blue; intense irritation of all moist skin areas
  - c. both designed for extreme temporary discomfort
  - d. not always effective on all individuals or animals
  - e. decontamination sometimes lengthy and involved

Elaborate if necessary

LESSON OUTLINE

INSTRUCTOR NOTES

IV. Cap-Stun

A. Chemical name and composition

1. Oleoresin capsicum.
  - a. derivative of cayenne or chili peppers
  - b. heavy dark red liquid

B. Inflammatory agent

5% solution for  
L.E. usage only  
1% for civilian

\* 1. Effects

- a. more physiological than psychological
- b. immediate closing of the eyes
- c. choking, gagging, gasping for breath
- d. burning and swelling of mucous membranes
- e. inflammation/acute burning sensation of affected skin

2. Characteristics

- a. works well against animals
- b. works against persons on drugs and alcohol
- c. works on highly motivated or agitated persons
- d. works on emotionally disturbed individuals

Discuss raid  
with pit bull

We have several  
documented  
cases

Discuss raid  
in Crystal City

LESSON OUTLINE

INSTRUCTOR NOTES

3. Advantages

- a. works on wider variety of people
- b. faster, more intense effects
- c. little discomfort to the user, provided the user is not directly hit
- d. complete decontamination in short time

Discuss raids

4. Intended effects

- a. distract
- b. disorient
- c. disrupt
- d. disable

5. Decontamination

- a. ventilation of closed-in area
- b. normal washing and drying for clothing

6. First aid

- a. fresh air
- b. copious amounts of cool water
- c. soap and water if necessary

LESSON OUTLINE

INSTRUCTOR NOTES

V. Delivery Systems

A. Grenade type

1. Available for emergency response teams

a. tossable grenade

b. constant spray

c. on demand spray

Discuss tubing, auto-ejector

B. Personal type

1. Available for individual use

a. various sizes

See handout

b. key ring, clip, belt, pocket

Some lock, some do not

c. holders available for most sizes

d. all on demand spray

M-3, 93 one second sprays

C. Method of delivery

1. Fog or mist for all systems

a. advantage over streamer - more accurate delivery

b. directed at assailant's face; effective distance for M-3 is 6 to 10 feet

c. contents do not deteriorate, but should be shaken periodically

d. warning - contents are flammable due to presence of alcohol in product

Show video

LESSON OUTLINE

INSTRUCTOR NOTES

VI. Utilization and Carrying Techniques

A. Carrying Techniques

Recommended, but not policy and procedure

1. Interview stance

- a. feet shoulder width, body bladed to subject

Briefly discuss and review

2. Belt carry

- a. if unarmed, carry on strong side - nozzle to center - use weak hand to protect from attack

- b. if armed, carry on weak side - nozzle to center - use strong hand to protect weapon

- c. use thumb or index finger to activate

- d. may be activated without removing from holder

Demonstrate techniques

3. Utilization

- a. quickly spray into face

- b. protect canister

- c. distance yourself from assailant

- d. keep moving

Demonstrate

- e. vacate area or effect arrest

LESSON OUTLINE

INSTRUCTOR NOTES

VII. Conclusion

- A. Review of Key Points for Quiz
- B. Allow Study Time for Quiz
- C. Practice and Practical Application
  - 1. Divide class for practice
  - 2. Practice stance, carry, and delivery techniques with inert canisters
  - 3. Conduct live practical application
- D. Show Video
- E. Questions?