

SWGDOG SC8– SUBSTANCE DETECTOR DOGS

Explosives Detection

Posted for Public Comment June 3rd – August 1st 2007

Statement of purpose: To provide recommended guidelines for training, certification and documentation pertaining to explosives detector canines.

1. Initial Training

- 1.1. The training shall be conducted by a qualified explosives detector canine team trainer who is a competent individual from an entity that utilizes a structured curriculum with training designed to achieve specific learning objectives.
- 1.2. The training course shall include training to detect the following mandatory groups of explosives that contain (see Table 8.1 for details):
 - 1.2.1. RDX (RDX based Det cord)
 - 1.2.2. PETN (PETN based Det cord)
 - 1.2.3. TNT (Military TNT)
 - 1.2.4. Dynamite (containing EGDN and NG)
 - 1.2.5. Black powder (free flowing , time fuse or safety fuse)
 - 1.2.6. Double base smokeless powder
- 1.3. Other substances may be included in the detection training as required by mission or specific threat: (see examples in Table 8.2)
 - 1.3.1. Ammonium Nitrate (prilled or powder, or the solid component of binary explosives)
 - 1.3.2. Black Powder substitutes (e.g., Pyrodex, Triple Seven)
 - 1.3.3. Blasting Agents
 - 1.3.4. Cast Boosters
 - 1.3.5. Composition B
 - 1.3.6. Emulsions
 - 1.3.7. Nitromethane
 - 1.3.8. Photoflash/fireworks/pyrotechnic powders
 - 1.3.9. Plastic explosives (unmarked and marked with detection agent)
 - 1.3.10. Semtex
 - 1.3.11. Single Based smokeless powder
 - 1.3.12. Slurries
 - 1.3.13. Tetryl
 - 1.3.14. Water gels
 - 1.3.15. Home Made Explosives (HME)
 - 1.3.15.1. Chlorate based mixtures (e.g., Potassium chlorate)
 - 1.3.15.2. Nitrate based mixtures (e.g., Anfo Nitrate)
 - 1.3.15.3. Perchlorate based mixtures (e.g., Potassium perchlorate)
 - 1.3.15.4. Urea nitrate
 - 1.3.15.5. Peroxide based explosives

- 1.3.15.5.1. Due to the extreme instability of these explosive compounds, training must be conducted/supervised by a qualified chemist, bomb technician or explosives canine instructor.
 - 1.3.15.5.1.1. Hexamethylene Triperoxidediamine (HMTD)
 - 1.3.15.5.1.2. Triacetone triperoxide (TATP)
 - 1.3.15.6. Emerging Threats – Such as liquid explosives
- 1.4. Trainers and handlers shall be aware of whether or not the explosives they are using for training are tagged.
 - 1.4.1. Taggants – The antiterrorism and effective death penalty act of 1996 (Section 842 of Title 18, United States Code) mandated that as of April 24, 1997, all plastic explosives manufactured in the United States be marked with a chemical detection agent. The taggants are simply nitro compounds which vaporize rapidly and are added to enhance the detection of plastic explosives by instrumental analysis. Any plasticized high explosive (i.e., Detasheet, Flex X, Primasheet, C4, Semtex) legally manufactured after 4/24/97, contains taggants. They are listed below:
 - 1.4.1.1.1. EDGN (ethylene glycol dinitrate semtex discontinued in the mid-90's)
 - 1.4.1.2. DMNB (Dimethyl Dinitro Butane)
 - 1.4.1.3. o-MNT (Ortho-Mono nitrotoluene) less used Ortho-Mononitrotoluene (o-MNT)
 - 1.4.1.4. p-MNT (Para-Mononitrotoluene) Used by France and Russian
- 1.5. The training shall include varying quantities (typically varying by orders of magnitude) of the various substances (dependent on region, mission and operational deployment needs).
- 1.6. The training shall include exposing the canine to various heights and depths of training aid placement in different training scenarios.
- 1.7. The initial training shall continue until the explosives detection canine team is certified or deemed not certifiable.
- 1.8. Initial training shall represent all conditions that could be encountered during a certification process.

2. Canine Handler Team Certification

- 2.1. Certification for explosives detection dogs shall be comprised of a comprehensive assessment and shall include elements of odor recognition or double blind testing as outlined in the SWGDOG General Guidelines.
- 2.2. Test Parameters

Certification shall be conducted in accordance with SWGDOG General Guidelines.
The following parameters shall be utilized

- 2.2.1. The explosives detector canine shall be tested on the substance odors identified in section 1.2.
 - 2.2.1.1. Recommended minimum quantities of substance odors for certification shall be no less than ¼ lbs (113.5g).
 - 2.2.1.2. The following substances (examples shown) must be included in the test:
 - 2.2.1.2.1. RDX (e.g. RDX based Det cord) other examples to be added
 - 2.2.1.2.2. PETN (e.g. PETN based Det cord)
 - 2.2.1.2.3. TNT
 - 2.2.1.2.4. Dynamite (containing EGDN and NG)
 - 2.2.1.2.5. Black powder
 - 2.2.1.2.6. Double base smokeless powder
 - 2.2.1.3. Recommended optional substances are listed in section 1.3 and may be included in the test based on mission specific requirements.
- 2.2.2. As a minimum, the test shall include the following components:
 - 2.2.2.1. Scenarios resembling searches within the normal operational environment
 - 2.2.2.2. At least 4 different searches (see categories including additional test areas below) designed to evaluate the canine's ability to recognize the odor, respond to the odor and the handler's ability to recognize this response (3 search areas must be from 2.2.2).
 - 2.2.2.2.1. Parcels/Baggage (2-6 articles per odor, 2-6 parcels/bags per minute)
 - 2.2.2.2.2. Building/room search, of a 200 -1200 sq ft room with furniture, 1 room per odor. Should take 1.5 minutes or less to search 100 sq ft or 1000 cu ft in.
 - 2.2.2.2.3. Motor vehicles, both interiors and exteriors of passenger cars and trucks, using 2-6 vehicles per odor. Search time: 3 min per vehicle.
 - 2.2.2.2.4. Open area and perimeter searches of 1,000 to 10,000 sq ft per odor. Search time: 1-3 minutes per 1000 sq ft.
 - 2.2.2.3. All odors for which the dog will be certified must be tested but not all odors will necessarily be in each type of search and some search areas shall contain no odors (blanks).
 - 2.2.2.4. The recommended maximum time to complete an individual search is listed below but disqualification due to time shall be left to the discretion of the certifiers.
 - 2.2.2.5. The test shall end if the certifiers determine that the canine team is no longer working (e.g., Observable behaviors to be added).
 - 2.2.2.6. If fewer odors are being tested in a particular scenario, use more replications than those listed in the general numerical guidelines below.
- 2.2.3. Additional test areas based on mission requirements and unique environments may include, but are not limited to the following:
 - 2.2.3.1. Aircraft
 - 2.2.3.2. Maritime vessels

- 2.2.3.3. Mass transit vehicles including buses, light rail cars and subway cars
 - 2.2.3.4. Large cargo configurations
 - 2.2.3.5. Person/Crowd Search (3-6 persons per odor, 1 minute per person)
 - 2.2.3.6. Odor Recognition test (3-6 cans/containers per odor, 1 minute per can/container)
 - 2.2.4. Minimum weight of substance being tested – ¼ pound (113.5 grams)
 - 2.2.5. Maximum weight of substance being tested -- to be determined by the evaluator based on mission requirements and associated threat quantities
 - 2.2.6. Maximum height of hide – 8 ft
 - 2.2.7. Maximum depth of hide – 1 ft
 - 2.2.8. Minimum set time – 30 min or to be determined by the evaluator based on mission requirements and associated threat quantities
 - 2.2.9. The test shall include a variety of searches designed to evaluate the canine's ability to recognize the odor, respond to the odor and the handler's ability to recognize this response.
 - 2.2.10. Training aids shall not be placed in plain sight.
 - 2.2.11. The canine team shall meet the best accepted practice of 90% (see SC-2) as outlined in the SWGDOG General Guidelines.
 - 2.2.11.1. The components built into the certification standards include the following:
 - 2.2.11.1.1. Positive Indication
 - 2.2.11.1.2. False Indication
 - 2.2.11.1.3. Non Indication
 - 2.2.11.2. A team may fail as a result of excessive handler errors
 - 2.2.11.3. False response ratios shall not exceed 1 response per 10 items (i.e., bags, parcels) used in a certification. No more than 2 per operational search. (further refinement based on size of area)
- 2.3. Use of distracters
- 2.3.1. Natural distracters are normally present and vary depending on the area where the certification testing is done.
 - 2.3.2. Placement of distracters in the certification area is required when no natural distracters are present.
 - 2.3.3. Care must be taken not to place artificial distractions in a manner that causes contamination with the test substance odor.
- 2.4. Deliberate compromise of an evaluation will not be tolerated. Any communication (in person, by cell phone, two way pager, text messaging or by any other means) between handlers/department personnel participating in the evaluation, concerning specifics of an area still being evaluated, placement of explosives training aids or any information that could be regarded as a compromise prior to the termination (by the evaluator) will constitute a compromise of the evaluation. In the event a handler compromises the evaluation, the handler will not be allowed to continue and may be removed from the evaluation.

3. Maintenance Training

- 3.1. This type of training is meant to sustain and enhance the performance of the handler and canine and their ability to work together as a team.
- 3.2. In training, situations are purposely sought where the capabilities of the canine team are challenged within the operational environments for which the team may be deployed.
- 3.3. Training shall include:
 - 3.3.1. A variety of locations, environments and times of day
 - 3.3.2. A variety of training aid amounts and odors expected to be found within the operational environments
 - 3.3.3. A variety of heights, depths, containers and distraction odors
 - 3.3.4. A variety of types of searches (vehicles, building, parcels, luggage, open area)
 - 3.3.5. Variation in the duration of the searches
 - 3.3.6. A variety of blank searches
- 3.4. The canine team shall conduct regular objective-oriented training sessions sufficient to maintain operational proficiency.
 - 3.4.1. Routine training, conducted solely by the handler to maintain the canine team's proficiency and to reinforce odor recognition, is an acceptable form of training but must be combined with supervised training on a regular basis. Supervised training conducted by a qualified trainer other than the handler, in order to improve performance, identify and correct training deficiencies and perform proficiency assessments (refer to SC-1) is considered a best practice.
 - 3.4.2. A minimum of 4 hours per week shall be spent in routine training for a canine team in order to maintain mission readiness.
- 3.5. Maintenance training shall represent all conditions that could be encountered during a certification process.

4. Training Aids

- 4.1. Every effort shall be made to train on actual explosives and chemicals used in the making of explosives.
- 4.2. The training aids shall be stored in accordance with local, state and federal regulations.
- 4.3. Training aids shall be labeled and packaged in a manner safe for the handler and canine.
 - 4.3.1. Each Label shall contain at least the following information
 - 4.3.1.1. Training aid tracking codes - *not* actual aid names
 - 4.3.1.1.1. Training aid tracking codes shall be cross referenced to a reference log maintained within the respective agency.

- 4.3.1.1.2. Information contained within the log shall contain but not be limited to the following: description of aid, date acquired, quantity
- 4.3.1.2. Emergency Contact Information

- 4.4. The training aid shall be maintained and handled in such a manner to avoid loss, spillage, or destruction.
- 4.5. Storage of training aids shall be in a manner to prevent odor cross contamination or physical contamination, i.e., each training aid substance shall be stored in separate containers.
 - 4.5.1. To avoid contamination of training aids use:
 - 4.5.1.1. Special storage and handling for Nitroglycerine based dynamite
 - 4.5.1.2. Separate storage for bulk explosives and training aids
- 4.6. The source of the training aids shall be reliable and documented.
- 4.7. Disposal and or the destruction of the training aids shall follow federal, state and local regulations.
- 4.8. Transportation & vehicle storage of training aids shall follow local, state and federal guidelines.
- 4.9. Material Safety Data Sheets (MSDS) must be available for each material utilized.

5. Documentation

- 5.1. The handler, department, and organization shall maintain training records, training materials, proficiency assessments, seizure records, and/or deployment and utilization records.
- 5.2. Records shall contain discipline-related specifics.
- 5.3. Records shall be standardized within the department, agency and/or organization.
- 5.4. Documents shall be retained in accordance with federal, state and unit guidelines. Records shall contain but are not limited to the following:
 - 5.4.1. Training records shall include:
 - 5.4.1.1. Date and time training took place
 - 5.4.1.2. Name of trainer
 - 5.4.1.3. Type and amount of training aid used
 - 5.4.1.4. Length of training session
 - 5.4.1.5. Location of training
 - 5.4.1.6. Type of training (e.g., vehicle, luggage, building, open area)
 - 5.4.1.7. Searches and indications
 - 5.4.2. Certification records (kept by Certifying authority and Handler)
 - 5.4.2.1. Date certified

- 5.4.2.2. Certification authority i.e., agency, professional organization
- 5.4.2.3. Name of individual awarding certification
- 5.4.2.4. Type of materials for which certification granted
- 5.4.2.5. Location of certification
- 5.4.2.6. Name of canine and handler
- 5.4.3. Deployment/utilization
 - 5.4.3.1. Date and time
 - 5.4.3.2. Location of deployment
 - 5.4.3.3. Length of search
 - 5.4.3.4. Description of activity
 - 5.4.3.5. Results
 - 5.4.3.6. Other information required by the organization and/or agency

6. Use of records/documentation

- 6.1. Reliability of the canine team shall be based upon the results of certification and proficiency assessments.
- 6.2. Training records do not necessarily reflect reliability.
- 6.3. Training records are necessary to illustrate the type and amount of training that the team has experienced before and after certification.
- 6.4. Confirmed operational outcomes can be used to determine capability.
- 6.5. Unconfirmed operational outcomes shall not be used to determine capability in that they do not correctly evaluate a canine team's proficiency

TABLE 8.1 - Main chemical classes of explosives, categorized as mandatory and elective; including examples of commercial materials containing explosives

EXPLOSIVE CLASSES	MANDATORY		ELECTIVE ¹	
	MANDATORY EXPLOSIVES ²	COMMERCIAL TYPES OF MANDATORY EXPLOSIVE MATERIALS	ELECTIVE EXPLOSIVES	COMMERCIAL TYPES OF ELECTIVE EXPLOSIVE MATERIALS
NITRO ALKANES (C-NO ₂)	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Nitromethane (NM) 2,3-Ddimethyldinitrobutane (DMNB) 	<ul style="list-style-type: none"> Kine-Pak and Kine-Stick (AN+ NM) Tagged Plasticized explosives (DMNB)³
NITRO AROMATICS (Ar-NO ₂)	<ul style="list-style-type: none"> 2,4,6-trinitrotoluene (TNT) 	<ul style="list-style-type: none"> TNT "Flake" TNT Demilled Military "Flake" Nitropel (TNT) 	<ul style="list-style-type: none"> Dinitrotoluene (DNT) Picric acid (PA) Tetranitro-N-methylaniline (Tetryl) 	<ul style="list-style-type: none"> DNT in most TNT containing explosives and selected brands of smokeless powders PA and Tetryl in some cast explosives
NITRATE ESTER (C-O-NO ₂)	<ul style="list-style-type: none"> Pentaerythritol tetranitrate (PETN) 	<ul style="list-style-type: none"> PETN (Unadulterated)⁴ Detasheet A (85% PETN + binder) red commercial form PETN Detonating Cord (100% PETN) cross section usually White in color (<i>PIMALINE, PRIMACORD, PRIMASHEAR, OPTICORD, GEOSEIS, LOW FLEX, FIRELINE CORD</i>) Primasheet 1000 (PETN + Plasticizers) SEMTEX A (PETN + Plasticizers) 	<ul style="list-style-type: none"> Methyl nitrate (MN) Nitroglycerin (NG)⁵ Ethylene glycol dinitrate (EGDN) Diethylene glycol dinitrate (DEGN) Nitrocellulose (NC) Nitroguanidine. (GN) 	<ul style="list-style-type: none"> Dynamite (EGDN + NG) Single Based Smokeless powder (NC+DNT depending on brand) Double Based Smokeless Powder (NC + NG) Triple Based Smokeless powder (NC+NG+GN)
NITRAMINES (C-N-NO ₂)	<ul style="list-style-type: none"> Trinitro-triazacyclohexane (cyclonite or RDX) 	<ul style="list-style-type: none"> RDX (Unadulterated) RDX Det Cord Composition C-4 (RDX + Plasticizers) Datasheet (Flex-X) (RDX + Plasticizers) Demex 200 (RDX + plasticizer) PE-4 (RDX + Plasticizer) Primasheet 2000 (RDX + Plasticizers) 	<ul style="list-style-type: none"> Methylamine nitrate (MAN) Tetranitro-tetrazacycloctane (Octogen or HMX) Hexanitroisowurztitane (CL20). specialty military explosive. 	<ul style="list-style-type: none"> HMX Detonating Cord (Fireline 17/80 HMX LS Exposed, Fireline 8/40 HMX LS Ribbon) PAX11/PAX29 (79/77% CL20+Al+plasticizers, cellulose acetate butyrate) DLE-C038 (90% CL-20, 10% HTPB plasticizer)
ACID SALTS (NH ⁴⁺ , NO ³⁻)	<ul style="list-style-type: none"> Ammonium nitrate (AN) Potassium Nitrate (PN)¹ 	<ul style="list-style-type: none"> Black Powder (PN+charcoal+sulfur) PN (Pure) Procured from Chemical Supply Kine-Pak and Kine-Stick solid component (AN) 34-0-0 agricultural fertilizers (pure AN) 	<ul style="list-style-type: none"> Ammonium perchlorate (AP) Potassium chlorate (PC) Potassium perchlorate (PP) Urea nitrate (UN) 	<ul style="list-style-type: none"> AP, PC, PP procured from Chemical or Fireworks Supply UN must be prepared by qualified chemist
PEROXIDES ⁶ (C-O-O-C)	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Triacetone triperoxide (TATP) Hexamethylene triperoxide diamine (HMTD). 	<ul style="list-style-type: none"> TATP & HMTD must be prepared by a qualified chemist.

¹ Best practice is to select elective explosives from different chemical classes.

² The mandatory scents do not represent all six explosive chemical classes.

³ Plastic explosives manufactured in the U.S. after 1997 are tagged with DMNB..

⁴ "Unadulterated" is the near pure substance with minimal binders, plasticizers, etc

⁵ Highly volatile explosives such as NG and EGDN are prone to contaminate other explosives and should be stored separately (e.g. nylon bag, sealed paint can).

⁶ Training on explosives from the peroxide family (TATP and HMTD) should only be conducted under the proper supervision of a qualified chemist and trainer following a training objective.

TABLE 8.2 - Examples of products containing the explosive compounds listed in Table 8.1.

COMPOUNDS	ELECTIVE COMPOSITE MATERIALS CONTAINING THE EXPLOSIVE COMPOUNDS LISTED IN TABLE 8.1.	NOTES
AN - Ammonium nitrate:	<ul style="list-style-type: none"> • Amatol (Ammonium Nitrate + TNT) • Ammonal (Ammonium Nitrate + TNT + Al) • ANFO [Amex or Amite] (Ammonium Nitrate + Fuel Oil [Diesel]) • Kinopak [solid] (Ammonium Nitrate) • Water Gel / Slurry [powermex] (Ammonium Nitrate + Sodium Nitrate + EGMN) • Water Gel / Slurry [tovex] (Ammonium Nitrate + Sodium Nitrate + MMAN) • Emulsion (Ammonium Nitrate in water, Oil, Oleic Acid, Sodium Hydroxide) • Emulsion explosive DYN0 GOLD, TITAN1000 (AN+Sodium nitrate+calcium nitrate+fuel oil+mineral oil) • Emulsion explosive DYN0 AP, DYNOSPLIT (AN+Sodium nitrate+Aluminum+mineral oil) • Emulsion explosive BLASTEX, DYNOTEX (AN+sodium nitrate+Aluminum+mineral oil+kerosene) • Emulsion explosive BLASTGEL (AN+calcium nitrate+mineral oil) 	
AP - Ammonium perchlorate:	<ul style="list-style-type: none"> • 	
CL20 - Hexanitroisowurtzitane	<ul style="list-style-type: none"> • PAX11/PAX29 (79/77% CL20+Al+plasticizers, cellulose acetate butyrate) • DLE-C038 (90% CL-20, 10% HTPB plasticizer) 	
DMNB - 2,3-dimethyldinitrobutane:	<ul style="list-style-type: none"> • SEMTEX H (RDX + PETN + Plasticizers) • Common plasticizer chemical 2-ethyl-1-hexanol. 	
DEGN - Diethylene glycol dinitrate:	<ul style="list-style-type: none"> • 	
EGDN - Ethylene glycol dinitrate:	<ul style="list-style-type: none"> • Straight Dynamite (NG+EGDN) • Ammonia Dynamite (NG+EGDN+AN) • Ammonia Gelatin Dynamite (NG+EGDN+AN+NC) • Red Diamond (NG + EGDN + Sodium Nitrate + Ammonium Nitrate). 	
GN – Nitroguanidine:	<ul style="list-style-type: none"> • Triple based smokeless powder (NC + NG + Nitroguanidine / TNT) 	
HMX - Tetranitro-tetrazacylooctane:	<ul style="list-style-type: none"> • HMX Detonating Cord ((Fireline 17/80 HMX LS Exposed, Fireline 8/40 HMX LS Ribbon) 	
HMTD - Hexamethylene triperoxide diamine:	<ul style="list-style-type: none"> • prepared by qualified chemist/trainer 	
MAN - Methylamine nitrate:	<ul style="list-style-type: none"> • 	
MN - Methyl nitrate:	<ul style="list-style-type: none"> • 	
NB – Nitrobenzene:	<ul style="list-style-type: none"> • Many TNT explosive mixtures 	
NC - Nitrocellulose:	<ul style="list-style-type: none"> • single, double and triple based smokeless powders 	

NG - Nitroglycerine:	<ul style="list-style-type: none"> • Straight Dynamite (NG+EGDN) • Ammonia Dynamite (NG+EGDN+AN) • Ammonia Gelatin Dynamite (NG+EGDN+AN+NC) • Red Diamond (NG + EGDN + Sodium Nitrate + Ammonium Nitrate) • Double based smokeless powder (NC + NG) • Triple based smokeless powder (NC + NG + Nitroguanidine / TNT) • Water Gel / Slurry [aquaspeX] (NG) • Solid rocket propellant (NG+NC+stabilizers). 	
NM - nitromethane: "nitro" fuel	<ul style="list-style-type: none"> • 	
PA - Picric acid:	<ul style="list-style-type: none"> • Specialty chemical company 	
PC - Potassium chlorate:	<ul style="list-style-type: none"> • Potassium chlorate often mixed with petroleum jelly, paraffin. 	
PN - Potassium nitrate:	<ul style="list-style-type: none"> • Black powder (potassium nitrate + charcoal + sulfur) • Triple Seven muzzle loading propellant (charcoal + potassium nitrate + potassium perchlorate + graphite) • Pyrodex (Charcoal + Sulfur + Potassium Nitrate + Potassium Perchlorate + Graphite) • Black powder is commonly used in various pyrotechnics. 	
PP - Potassium perchlorate:	<ul style="list-style-type: none"> • Pyrotechnics/Flash powder (any oxidiser/metal fuel often with the addition of other chemicals to modify burn rate and sensitivity. • Standard mixture is 70% Potassium Perchlorate/30% Aluminum Powder. Other oxidizers may include <u>Barium Nitrate</u>, <u>Potassium Chlorate</u>, <u>Sodium Chlorate</u>, and <u>Potassium Permanganate</u>). 	
PETN - Pentaerythitol tetranitrate :	<ul style="list-style-type: none"> • Cast Booster (PETN and TNT) • Detasheet B (65% PETN or RDX) military variety in OD green • Detasheet C or Flex-X (PETN + NC + binder) OD green military form • SEMTEX H (RDX + PETN + Plasticizers) • Pentolite (PETN+TNT) • NONEL delay detonator (PETN+lead azide+silicon) 	
Pyrotechnics	<ul style="list-style-type: none"> • The chemical in Pyrotechnics include fuels, oxidizers, coloring agents, stabilizers and often smoke agents with common examples given below. • Fuels include Aluminum, Al, Antimony, Sb, Carbon black/Lampblack/Charcoal, Iron, Fe, Magnesium, Mg, Phosphorus, P; Potassium benzoate, C₆H₅CO₂K; Sulphur, S; and Titanium, Ti. Oxidizers include Ammonium Nitrate, NH₄NO₃, Ammonium perchlorate, NH₄ClO₄, Potassium chlorate, KClO₃ (being phased out due to its sensitivity), perchlorate, Potassium nitrate, KNO₃ and Potassium perchlorate, KClO₄. • Coloring Agents include barium salts (green), copper salts (green and blue), sodium salts (yellow/orange), strontium salts (red), cryolite, Na₃AlF₆, (yellow), lithium carbonate, Li₂CO₃ (red). • Stabilizers include boric acid, H₃BO₃, calcium carbonate, CaCO₃, linseed oil, petroleum jelly. • Binders including dextrin, gum Arabic and shellac. Smoke agents include anthracene, C₁₄H₁₀, hexachloroethane, C₂Cl₆, and Zinc, Zn. 	

RDX - Trinitro-triazacyclohexane (cyclonite, hexogen, T4)	<ul style="list-style-type: none"> • Composition C-4 (RDX + plasticizers) • Demex (RDX + plasticizers) • Detasheet B (65% PETN or RDX) military variety in OD green • PE-4 (RDX + plasticizers) • Primasheet 2000 (RDX + DMNB + plasticizers) • SEMTEX H (RDX + PETN + Plasticizers OR RDX + plasticizers) • RDX under the name of methenamine is used for the control of urinary tract infections • 	
Tetryl – Trinitrophenyl methylnitramine	<ul style="list-style-type: none"> • PA and Tetryl in some cast explosives 	
TATP – Tiacetone triperoxide	<ul style="list-style-type: none"> • Prepared by qualified chemist/trainer 	
TNB/NT/DNB/DNT – Trinitrobenzene/Nitrotoluene/Dinitrobenzene/Dinitrotoluene:	<ul style="list-style-type: none"> • Many TNT explosive mixtures. DNT (Dinitrotoluene) found in selected brands of double based smokeless powder 	
UN – Urea Nitrate	<ul style="list-style-type: none"> • prepared by qualified chemist/trainer 	
TNT - 2,4,6-trinitrotoluene:	<ul style="list-style-type: none"> • Amatol (Ammonium Nitrate + TNT) • Ammonal (Ammonium Nitrate + TNT + Al) • Composition B (RDX + TNT) • Composition C-2 (RDX + TNT + DNT + NC + MNT) • Composition C-3 (RDX + TNT + DNT + Tetryl + NC) • Composition D (RDX + TNT + Al + wax) • Cast Boosters (typically TNT+misc explosives) • Cyclotol (RDX + TNT) • DBX (TNT + RDX + Ammonium Nitrate + Al) • HBX-1 (RDX + TNT + Al) • HTA (HMX + TNT + Al) • Pentolite (PETN + TNT) • Picratol (TNT + Ammonium Picrate) • PTX-1 (RDX + TNT + Tetryl) • PTX-2 (RDX + TNT + PETN) • Tetratol (TNT + Tetryl) • Torpex (TNT + RDX + Al) • Tritonal (TNT + Al) • Military TNT Demolition Blocks used in most aircraft bombs, artillery projectiles, mines, grenades • Cast Boosters/Primers (various combinations of TNT+PETN+RDX+HMX+Al) • Composition B Boosters (RDX+TNT+wax) • Torpex Boosters (RDX+TNT+Al) • Amatol Booster (Pentolite or Composition B + ammonium nitrate) • Sodatol Booster (Pentolite or Composition B + sodium nitrate) 	