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Intelligence Section
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AMERICAN EXPEDITIONARY FORCES
HEADQUARTERS SERVICES OF SUPPLY
OFFICE CHIEF OF CHEMICAL WARFARE SERVICE

~~CANCELLED~~

CHEMICAL WARFARE SERVICE INTELLIGENCE BULLETIN

MAY 7 1971

TRANSLATION

NOTES ON TOXIC SHELLS

(On The Charging, Marking and Storing of Special Shell)

(French Ministry of Munitions and War Manufacturers, Service of Chemical Warfare Materials, Paris, December 20, 1917.)

(Note: This report cancels and replaces the report of March 23, 1917, concerning the filling, marking and storage of special shells.)

THE CLASSIFICATION OF TOXIC SHELLS.

All toxic projectiles may be divided, according to their properties and characteristics, into two general categories:

1. Shells filled with toxic products whose action is violent but temporary.
2. Shells filled with toxic substances whose action is persistent.

The following tables present the characteristic properties of all shells now in use:

I - Shells Filled with Non-persistent Toxic Products.

The Chemical filling of these shells is extremely volatile and vaporizes completely as the projectile explodes, forming a noxious cloud whose immediate action may be fatal, but whose efficiency is more or less rapidly lost by diffusion through the surrounding atmosphere:

Classification No.	Filling	Physiological Properties	Vapor density as compared to Air.	Efficiency
4	Quarter-nary(V 4) Vincen-nite	Violent poison	Light vapor	Immediately after formation, explosion cloud is fatal but dilution quickly decreases its efficiency.

11/26 (7/4/71)

Classi- fication No.	Filling	Physiolog- ical Prop- erties	Vapor Densi- ty as com- pared to Air	Efficiency
5	Collon- gite (C)	Suffocant poison	Very heavy vapor	Immediate or de- layed fatal ef- fects according to concentration. May penetrate subterranean shelters.
8	Papite (P)	Lachryma- tory poi- son. Ex- treme ir- ritant ac- tion on up- per respi- ratory tracts.	Heavy vapor	Immediate or de- layed fatal ef- fects accord- ing to concen- tration. May penetrate sub- terranean dug- outs.

II - Shells Filled with Persistent Toxic Products.

These shell fillings have a high boiling point and are only partially vaporized on explosion. The explosion cloud rarely produces fatal effects, but its vapor causes lachrymation, irritates the upper respiratory tracts and may have a caustic or vesicant action. The larger part of the projectile contents is vaporized and disseminated in the form of droplets which cover the ground or materials surrounding the point of burst, and which, by slow evaporation, prolong the action of the original cloud.

Classi- fication No.	Filling	Physiological Properties	Vapor density as compared to Air	Persistency under favor- able condi- tions.
<u>6</u>	Cipalite (Obsolete)	Lachrymator. Irritates up- per respira- tory tracts.	Heavy vapor	6 hours
7	Aquinite	"	Very heavy vapor	6 hours
9	Martonite	Violent lach- rymator. Ex- tremely irri- tant to the upper respi- ratory tracts. Violent poison.	"	2 days

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Classi- fication No.	Filling	Physiological Properties	Vapor density as compared to Air	Persistency Under favor- able condi- tions.
11	Cedenite (Obsolete)	Vesicant lach- rymator	Very heavy vapor	2 days
12	Fraissite (Obsolete)	Violent lach- rymator. Irri- tates upper respiratory tracts.	"	5 days
14	Cyclite (Obsolete)	Lachrymator	"	5 days
16	Ration- ite. (Obsolete)	Insidious poi- son caustic product.	"	6 hours

SHELL MARKINGS: STORAGE OF SPECIAL SHELLS.

MARKINGS:

In all calibers, the number painted on the shell corresponds to an aggressive chemical product, with which may be combined various smoke producing substances. The letters below shell numbers are the initials of the filling substances. The next line indicates the origin and date of filling, as for example: Aub.: Aubervilliers; Vis: Vincennes; P.Cx: Pont-de-Claix.

All toxic shells are painted green. Those containing non-persistent toxic substances bear one or two white bands: those having persistent toxic fillings bear one orange-yellow band.*

STORAGE:

Cartridges and shells should be arranged according to caliber and shell number, and so stored as to permit easy inspection.

Gas shells may be handled without danger as their small priming charge reduces the possibility of explosion due to shock.

*Shells filled with persistent toxic substances loaded prior to January 1, 1918, do not bear the orange-yellow band.

Warehouses in which special shells are stored should be well ventilated. A leaking shell may be detected by the escaping vapor. Any faulty shell discovered should be removed from the warehouse or caisson in which it is stored and either fired or destroyed. When facilities for firing are lacking, shells may be carried to any isolated open area where they may be detonated by the use of petards. The men engaged in the transportation and destruction of faulty shells should keep to leeward of the projectile. A defective shell may be temporarily cared for by burying or by immersion in water.

Men detailed for guard duty at shell storehouses should be provided with protective appliances for use against asphyxiating products. When entering a warehouse in which the odor of escaping toxic substances has been noticed or reported, such appliances should be worn. Inasmuch as the proportion of leaks tends to increase with storage, ammunition parks should supply batteries from the oldest lots on hand.

TOXIC SHELL FILLINGS.

Shell No.	Model	Filling	Priming	Special Marking	Remarks
<u>1. 75 mm. Shell.</u>					
4	Steel body as of explo- sive shell - Vincen- fuze hole provided with (V.N) metalo- plastic gas- ket for Gaine joint	Quarter- nary Vincen- nite. (V.N) 478 Grs.	1897-1904 Model tight jointGaine relay, 24/31 I Model 1914 percussion fuze or Schneider.	Two White bands "4" on ogive base and casing.	
5	"	2/1 mix- ture Col- longite Opacite 714 grs.	"	1 White band "5" on Ogive base and casing.	
6	Glass lined ex- plosive shell	Cipalite 517 grs. with Fu- migerite (F.M.) 76 gr. or Opacite 99 grams.	Elongated enamelled Gaine con- taining smoke pro- ducer; 24/ 31 I fuze.	1 Orange- Yellow band "6" on ogive base and shell cas- ing.	

Shell No.	Model	Filling	Priming	Special Marking	Remarks
7	Explo- sive shell	3/1 mix- ture Aqui- nite/ Opa- cite, 792 grams	1897-1914 model Re- lay Gaine; 24/31 I Fuze	1 Orange-Yel- low band "7" on ogive base and shell cas- ing.	
8	Explo- sive	Papite 305 grs. with Fu- migerite 75 grams, Opacite 99 grams.	Elongated relay Gaine containing smoke pro- ducer; 24/ 31 I fuze.	1 White band "8" on ogive base and cas- ing.	
9	Glass lined explo- sive shell	Martonite 507 grams with Opa- cite 99 grams	Elongated relay Gaine containing smoke pro- ducer; 24/ 31 I Fuze	1 Orange-Yel- low band "9"	
12	Glass lined explo- sive shell	Fraissite 384 grams, Fumigerite 76 or Opa- cite 99. (Obsolete)	"	1 Orange-Yel- low band "12"	
14	Glass lined explo- sive shell	Cyclite 490 grams, Fumigerite 76 grams (Obsolete)	"	1 Orange-Yel- low band "14"	
16	Explo- sive shell	Rationite 625 grams (Obsolete)	1897-1914 model re- lay Gaine 24/31 I Fuze	1 Orange-Yel- low band "16"	In prep- ration.

2. 120 m/m Shell.

4	120 mm. Quarter- semi- steel shell. With fuze hole modified for meta- lo-plastic gasket for Gaine pint.	Quarter- nary, Vin- cannite (V4) 1155 grams	1893 40- Gaine. 100 mm. relay cartridge with 24/30 ring; per- cussion detonator fuze; 24/31 I A.	2 White bands "4"	
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Shell No.	Model	Filling	Priming	Special Marking	Remarks
5	Semi- steel 120 mm. shell. With fuze hole modi- fied for metalo- plastic gasket.	2/1 mix- ture Col- longite Opacite 1740 Grs.	1895 40- Gaine 100 mm relay cartridge with 24/30 ring; per- cussion detonator fuze; 24/31 I A.	1 White band "5"	
7	"	3/1 mix- ture Aqu- nite Opa- cite 1950 grams	1895 40- Gaine 100 mm. relay cartridge with 24/30 ring; per- cussion detonator fuze 24/31 I A.	1 Orange-Yellow band "7"	
<u>3 - 145 mm. Shell</u>					
4	Semi- steel 145 mm. shell 1916 model. Fuze hole modi- fied for metalo- plastic gasket.	Quarter- nary Vin- cennite (V4) 2110 grams.	1895 40- Gaine 147 mm. relay cartridge with 24/30 ring; per- cussion detonator fuze 24/31 I A	2 White bands "4"	
5	"	2/1 mix- ture Col- longite, Opacite 3170 grs.	"	1 White band "5"	

Shell No.	Model	Filling	Priming	Special Marking	Remarks
7	145 mm. semi-steel 1896 model fuze hole modified for metalo-plastic gasket.	3/1 mixture Aquinite Opacite 3550 grs.	1895 40-Gaine 147mm relay cartridge with 24/30 ring; percussion detonator fuze 24/31 I A	1 Orange-yellow band "7"	
<u>4 - 155 mm. Shell.</u>					
4	Semi-steel shell, 1914 model modified for metalo-plastic gasket	Quarter-nary Vincennite (V4) 2860 Grams.	"	2 White bands "4"	
5	Semi-steel shell 1914 model modified for metalo-plastic gasket	2/1 mixture Col-longite/Opacite 4300 grs.	"	1 White band "5"	
6	Glass lined 1914 model shell	Cipalite 40-Gaine 3116 grs. cylindrical Fumiger-ite 302 grs. or Opacite 385 grs. (Obsolete)	40-Gaine head, elongated by enamelled tube containing smoke producer; priming system as above.	1 Orange-Yellow band "6"	
7	1914 model shell, modified fuze hole.	3/1 mixture Aquinite, Opacite 4820 grams.	AS No. 4	1 Orange-Yellow band "7"	

Shell No.	Model	Filling	Priming	Special Marking	Remarks
9	Glass lined 1914 model shell	Martonite 3055 grs. Fumigerite 302 grams or Opacite 385 grams	As No. 4	1 Orange-Yellow band "9"	
11	Glass lined 1914 model shell	Cedenite 2809 grams Opacite 885 grams. (Obsolete)	As No. 4	1 Orange-Yellow band "11"	Provisional model.
12	Glass lined 1914 model shell	Fraissite 2312 grs. Fumigerite 302, grs. or Opacite 385 grs. (Obsolete)	As No. 4	1 Orange-Yellow band "12"	"
16	1914 model shell modified fuse hole	Rationite 3645 grs. (Obsolete)	1895 model cylindrical head 45-Gaine	1 Orange-Yellow band "14"	In preparation.

Note: The 155 mm. shell, Nos. 4, 5 and 7 are equipped with two driving bands for use with the 155 G.P.F. (high power Fillows) or the 1917 model. A limited number of the 120, 145 and 155 steel shells may be loaded with the No. 4 and No. 6 fillings.

3. Bombs for Trench Artillery.

Shell No.	Model	Filling	Priming	Special Marking	Remarks
4	Reinforced 58 L.S. bomb 6 mm. sheet iron	Quarternary Vincennite 3805 grams	Cylindrical head 1895 Model 40-Gaine 147 mm. relay cartridge with 24/30 ring. 24/31 I T or R Y percuss-ion detonator fuze.	Painted Green, two White bands "4"	Average weight loaded 19.5 kgs.

Shell No.	Model	Filling	Priming	Special Marking	Remarks
5	Reinforced 58 L. S. bomb 6 mm. sheet iron	3/1 mixture Collongite Opacite 5.320 Kgs.	Cylindrical head 1895 Model 40- Gaine 147 mm. relay cartridge with 24/30 ring. 24/ 31 I T or R Y percus- sion deto- nator fuze.	1 White band "5"	Average weight loaded 20.8kgs.
8	Ordinary L.S. bomb 4 mm. sheet iron	Papite 2871 grams	Special 40- Gaine with smoke pro- ducer tube 50 mm. re- lay car- tridge. 1915 Model Gaine, Type A, 24/ 31 I T or R Y fuze.	1 White band "8"	Average weight loaded 17 kgs.

SUPPLEMENT:

Yperite is used in the 75 mm. and 155 mm. shells. The shells are painted green and may be recognized by the presence of two orange-yellow bands. Above the number "20", are seen the letters, "Yt" -- yperite dissolved in carbon tetrachloride --; or "Yc" -- yperite dissolved in monochlorobenzene. Yperite projectiles contain no smoke producing substance, hence, fire control is difficult.

French Designations and their Equivalents.

Aquinite	Chlorpicrin
Cedenite	Ortho-nitro benzyl bromide
Cipalite	Monochlor methyl chlorformate (Palite)
Collongite	Phosgene
Cyclite	Benzyl bromide
Fraissite	Benzyl iodide and Benzyl chloride
Fumigerite	Titanium tetrachloride
Martonite	Bromacetone 80% and Chloracetone 20%
Opacite	Stannic chloride
Papite	Acrolein (Allyl aldehyde)
Rationite	Methyl sulphate 75% Chloromethyl Sulphate 25%.
Vincennite	Arsenious chloride 30%; Stannic chloride 15%; Hydrocyanic acid 50%; Chloroform 5%.

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OJN:PAR
Supplement to G-13
T-32/Z-213
CHEMICAL WARFARE SERVICE
Intelligence Division
August 8, 1918
1346-13
9/3/18
Confidential

AMERICAN EXPEDITIONARY FORCES
HEADQUARTERS SERVICES OF SUPPLY
OFFICE CHIEF OF CHEMICAL WARFARE SERVICE

CHEMICAL WARFARE SERVICE INTELLIGENCE BULLETIN

TRANSLATION.

NOTES ON TOXIC SHELLS.

(On the Charging, Marking and Storing of Special Shell)

The following additions and omissions to Bulletin, G-13, are based on material contained in the June 30, 1918, edition of the French Pamphlet, "Note sur les Obus Toxique."

The Classification of Toxic Shell.

Toxic shell are divided into three general categories:

- (1) Shell filled with toxic products whose action is violent but temporary;
- (2) Shell filled with toxic products whose action is persistent and immediately aggressive;
- (3) Shell filled with toxic products whose action is persistent, but whose effects are latent.

I. Shell Filled with Non-persistent Products.

One filling has been added.

Classi- fication No.	Filling	Physiolog- ical prop- erties.	Vapor Densi- ty as com- pared to air.	Efficiency
4 B	Vitrite	Violant poison	Heavy vapor	Immediately after forma- tion, explo- sion cloud is fatal; under certain condi- tions, it may have a latent action.

II. Shell Filled with Persistent Products of
Immediate Aggressive Action.

One filling has been added, and two of the old fillings omitted.

Classi- fication No.	Filling	Physiolog- ical prop- erties.	Vapor Densi- ty as com- pared to air.	Efficiency
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5 Omitted

11 Omitted

21	Camite	Very violent lachrymator; irritates upper respiratory tracts.	Very heavy vapor	15 days
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Note: Shell, No. 21, contains no smoke producing substance.

III. Shell Filled with Persistent Products of Delayed Action.

This shell filling has a very high boiling point. At the moment of explosion, it vaporizes into tiny droplets which cover the ground and materials surrounding the point of burst. Its high degree of persistency is due to the high vapor pressure and resistance to the action of the components of the atmosphere.

The action of this product is not immediate, but is manifest after an interval of several hours or even several days. The mucous membranes of the conjunctiva and the larynx are affected, as is also the skin, even though protected by clothing. This skin becomes reddened, and may be burned or blistered. Food supplies contaminated by this product cannot be consumed.

Classi- fication No.	Filling	Physiolog- ical prop- erties.	Vapor densi- ty as com- pared to air.	Persistency under favor- able conditions.
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20	Yperite	Vesicant toxic product	Very heavy vapor	15 days
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Note: Shell, No. 20, contains no smoke producing substance.

Markings.

Yperite shell are painted green and may be recognized by the presence of two orange-yellow bands. Above the No. "20" are seen the letters "Yt" -- yperite dissolved in carbon tetrachloride; "Yc" -- yperite dissolved in monochlor benzene.

Special Directions for Storage of No. 20 Shell:

No. 20 shell which show traces of oozing fillings should be handled only by men who are protected with masks and special gloves. Men detailed for such work should likewise be equipped with protective clothing whenever, there is a possibility of the projectiles coming in contact with the clothes.

(a) As soon as the projectiles are received, they should be examined.[#] Any indication of leakage at the gaine joint is a danger sign. (Masks and gloves should be worn.)

(b) Whenever possible, cases containing projectiles should be stored in small piles in the open air.

(c) Near all such piles, a heap of loose earth should be provided for covering any shell that may be burst by enemy fire. All storage depots should be supplied with shovels, and with chloride of lime in airtight containers.

(d) If an ammunition dump is reached by enemy fire, all personnel should move off to windward and all men within 200 yards to leeward should be warned. Broken shell should be covered with a layer of chloride of lime on top of which ten centimeters of earth should be spread. During this work, masks and protective gloves should be worn.

[#] 75 shell are tested for tightness when the cases are opened for distribution of ammunition.

TOXIC SHELL FILLINGS.

The following omissions and additions are made:

Shell No.	Model	Filling	Priming	Special Marking	Remarks
4 B	1915 Mdl.	Vitrite 1	75 mm. Shell. 1897/1914	2 White bands "4	
	steel ex-	Mauguinite	Mdl relay	B" on	
	plosive	7, Marsite	gaine. 24/	ogive, base	
	shell.	3, 645 gr.	31 percus-	and shell	
			sion fuze,	case.	
			1914 Mdl.		
6	Omitted				
20	as above	Yperite	as above	2 Orange-	
		with		Yellow bands	
		T solvent		"20"	
		590 gr. or			
		C solvent			
		558 gr.			

Shell No.	Model	Filling	Priming	Special Marking	Remarks
21	1915 Mdl. steel shell glass lined	Camite 13 Aquinite 100, 685 gr.	1897/1914 Mdl enam-eled gaine without extension 1914 Mdl. 24/31 I persussion fuze.	1 Orange-Yellow band "21"	No smoke producer. In course of preparation.

105 mm. Shell.

(1914 Model Steel Shell, fuze hole modified for metalo-plastic gasket joint)

5	1914 Mdl. steel shell.	3/1 mixture Col-longite-Opacite 1750 gr.	1895 Mdl. cyl.head 40-gaine 100 mm. re-lay cartridge with 24/30 ring; 24/31 I A L de-tonator per-cussion fuze	1 white band "5" at top of ogive.	
7	1914 Mdl steel shell	3/1 mixture Aquinite Opacite 1920 gr.	As above	1 Orange-Yellow band "7" at top of ogive	
20	1914 Mdl. steel shell	Yperite with: T solvent 1430 gr. or C solvent, 1350 gr.	As above	2 Orange-Yellow bands "20" at top of ogive.	

155 mm. Shell.

4 B	1915 Mdl semi-steel shell	Vitrite 1 Mauguinite 7, Marsite 3, 3740 gr.	As the No. 4.	1 white band "4 B"	
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6 Omitted.

11 Omitted.

Shell No.	Model	Filling	Priming	Special Marking	Remarks
20	1915 Model semi-steel shell.	Yperite with: T solvent 3420 gr. or C solvent, 3240 gr.	As No. 20	2 Orange-Yellow bands "20" at top of ogive.	No smoke producer
21	1915 Model glass lined semi-steel shell	Camite 13 Aquinite 100, 3975 gr.	1895 Mdl. cyl. head 40-gaine but without extension for smoke producer. Primed as the No. 4.	1 Orange-Yellow band "21" at top of ogive.	No smoke producer. In course of preparation.

Additions to French Designations and their Equivalents.

Camite	Brombenzyl cyanide
Mauguinite	Cyanogen chloride
Vitrite	mixture of 70% Cyanogen chloride and 30% Arsenic trichloride.

x
 x x
 -x-x-
 x x
 x