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ORGANIZED CRIME CONTROL ACT OF 1970

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KANSAS STATE UNIVERSITY

HEARING

BEFORE THE

SUBCOMMITTEE ON CRIME

OF THE

COMMITTEE ON THE JUDICIARY
HOUSE OF REPRESENTATIVES

NINETY-THIRD CONGRESS

SECOND SESSION

ON

S. 1083

A BILL TO AMEND TITLE XI OF THE ORGANIZED CRIME CONTROL ACT OF 1970

NOVEMBER 26, 1974

Serial No. 54

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Printed for the use of the Committee on the Judiciary

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
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ORGANIZED CRIME CONTROL ACT OF 1970

TUESDAY, NOVEMBER 26, 1974

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON CRIME OF THE
COMMITTEE ON THE JUDICIARY,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:10 a.m., in room 2148, Rayburn House Office Building, Hon. John Conyers, Jr. [chairman of the subcommittee] presiding.

Present: Representatives Conyers, Fish, Cohen, and Froehlich.

Also present: Maurice A. Barboza, counsel; Timothy J. Hart, assistant counsel; Constantine J. Gekas, associate counsel; and Dorothy C. Wadley, assistant to counsel.

Mr. CONYERS. The subcommittee will come to order.

I have with me Congressman William Cohen of Maine, and Congressman Hamilton Fish, of New York, the only subcommittee members present. We meet this morning to consider a Senate-passed bill, S. 1083, and 11 related House bills that would amend title XI of the Organized Crime Control Act of 1970—specifically, section 845(a) of title 18 of the United States Code—to exempt "commercially-manufactured" black powder, percussion caps, fuzes, and certain igniters from current Federal purchasing and storage restrictions. As the law now stands, no one may buy more than five pounds of black powder without a license or user permit and all are subject to rather exacting storage requirements.

The Senate Judiciary Committee, under the leadership of Senator Bayh, built an extensive record on this legislation, which was the basis for its passage in the other body by a vote of 78–8 in July of last year. Our task here today is not to duplicate their record, but supplement it if we can.

On the basis of study of that record, study and research by the staff, and subcommittee correspondence, it is readily apparent that certain facts about issues arising from this legislation are incontrovertible:

First, black powder is a deflagratory, low explosive, sensitive to friction, heat, spark, ignition and concussion, and is composed of 75 parts potassium nitrate or saltpeter, 15 parts charcoal and 10 parts sulfur—common chemistry-set compounds. It requires extreme care in manufacture and transport, and must be securely stored. In short, it is an unstable compound, with about half the percussive force of TNT. The high quality, irregular grain black powder needed for sporting and recreational use cannot be safely or practically produced, except by a commercial manufacturer.

Second, the 5-pound limit on purchase, designed to deter criminal bombings, is questionable as a real deterrent, due to the ease with which materials for homemade black powder may be obtained. Furthermore, neither the Bureau of Alcohol, Tobacco and Firearms, nor the Department of Justice, who are responsible for the enforcement and prosecution of this law, have been able to produce reliable figures on the number of bombing incidents, accidental or intentional, in which commercially manufactured black powder was the bomb filler agent. Total bombings in the last recorded period have decreased, but it cannot be said with certainty that the decline is the direct result of title XI. Indeed, the percentage of black powder bombings has increased since the law became effective. As our guest, the Director of ATF, said in the Senate hearings:

"ATF does not keep statistics on the actual number of cases brought and convictions obtained under title XI which involve black powder because such statistics have little or no impact within the law enforcement area."

Third, black powder, of the granulation and quality needed for sport shooting, is scarce; there is only one commercial manufacturer in the United States, the Gearhart-Owen Co. of Fort Worth, Tex. A reply to questions submitted to the company forecasts fiscal 1975 production at 200,000–250,000 pounds—far below the estimates of some opponents. Giving reasons, the manufacturer says:

"Demand appears to be higher than this, but retail sales regulations restrict availability."

The cost is very high, due presumably to scarcity and unwillingness to handle the product, varying according to the company from 40 percent above wholesale, about $3 a pound to $6–$6.50 a pound in some areas.

Fourth, many say this law imposes an inconvenience, if not a hardship, upon the law abiding user. Representatives of eight sporting and recreational organizations have testified that 5 pounds of powder is insufficient for normal competitive use.

Fifth, the number of black powder shooters in the country, according to Senate testimony, is upwards of 200,000, and growing.

The only issue that remains to be addressed, in my opinion, is a simple but critical one—public safety. The question we have the duty to answer is: Does the desire of a relatively small percentage of the population to have made available to them in unrestricted quantities a potentially hazardous substance justify the removal of current laws and regulations restricting its purchase and governing storage? If so, how much danger will the public be exposed to by unregulated storage, transport, and handling?

That concludes my opening statement. And I would like now to recognize the subcommittee members for any opening remarks that they might wish to make at this point.

Mr. COHEN. Thank you, Mr. Chairman.

First, let me express my own appreciation to you for enabling these hearings to be held, and how pleased I am to take part in the consideration of whether commercially manufactured black powder should be exempted from the restrictions imposed by the Organized Crime Control Act of 1970.

I have a rather lengthy statement and I would ask unanimous consent to insert it in the record so that we will have time to hear testimony here by the people in opposition.

I will simply indicate that there are a number of inconsistencies with respect to the application of this law in its regulation of explosives. For example, I know there will be testimony taken indicating that gasoline and ammonium nitrate can also be used for explosive purposes. Gasoline, of course, can be used as an incendiary, and ammonium nitrate can be used as an explosive. But I would point out that when gasoline is used for a proper purpose, such as for motor fuel, it is unrestricted, but if one uses an incendiary device, it is prohibited under title XI. A similar situation exists with respect to ammonium nitrate: if it is purchased with the intent to be used as a fertilizer, it is unrestricted, but when used as an explosive it is prohibited.

It seems to me that the regulation of black powder suffers from the same inconsistency of treatment. We must be concerned with the rights and needs of sportsmen, those who engage in lawful recreational uses of black powder. To justify the strict regulation of black powder we have to demonstrate that its safety hazards as well as its potential criminal use outweigh the interests of these sportsmen. And I think the record is rather ample that these interests are not outweighed. But I do want to use this opportunity to allow the agencies who oppose the bill to present their case.

[Mr. Cohen's statement follows:]

OPENING STATEMENT OF CONGRESSMAN WILLIAM S. COHEN

Mr. Chairman, first let me express my appreciation to you for enabling these hearings to be held and to say how pleased I am to be here to take part in the consideration of whether commercially manufactured black powder should be exempted from the restrictions imposed by the Organized Crime Control Act of 1970.

As you know, I, along with other members of this Subcommittee have sponsored legislation to exempt commercially manufactured black powder and other explosive devices intended to be used solely for sporting, recreational or cultural purposes in antique firearms from the operation of the Organized Crime Control Act. Because of the strong objections that have been raised by the users of these firearms to the burdens placed on them by the Act, we felt it was important that this Committee carefully review the situation and determine whether it would be in the public interest to remedy these problems.

In the Second Congressional District of Maine, which I represent, black powder shooting is a very popular sport and numerous clubs and associations of those using muzzle-loading rifles have sprung up throughout the State. Besides target shooting and skirmishes, there is great interest in such sports as black powder deer hunting, which I understand leads to a relatively low deer kill but a great deal of enjoyment among its participants.

However, by reason of the restrictions imposed under title XI of the Organized Crime Control Act of 1970, commercially manufactured black powder has become increasingly difficult for these sportsmen to obtain. The regulations on the manufacture, transportation and storage of black powder in amounts over five pounds have greatly increased its cost and have caused many companies to cease its manufacture.

Where once it was available in Maine in most of the local stores which are the center of activity in our small, northern towns, Maine black powder shooters must now travel up to 350 miles to the single remaining distribution center in the state and then may only legally purchase five pounds, hardly enough for one or two days of a standard shooting match. Thus, the recreational and cultural

activities of sportsmen both in my district and throughout the country have been severely limited. As the statements submitted for the record by a number of these witnesses make clear, their activities are wholesome and should not be discouraged by federal legislation unless such legislation is truly necessary to protect other important interests.

The issue is simple: Do the needs of safety and the proper enforcement of the criminal law outweigh the needs of sportsmen? I submit, Mr. Chairman, that unless a real benefit can be demonstrated from the restrictions on black powder, those restrictions are improper insofar as they retard otherwise lawful activities of our citizens.

The justifications for the restrictions on black powder are two: (1) suppression of criminal misuse of black powder; and (2) assurance of safety in the manufacture, transportation, and storage of black powder. The two interested federal agencies—the Department of Justice, and the Bureau of Alcohol, Tobacco and Firearms of the Treasury Department—contended before the Senate Judiciary Committee that both interests are served by these restrictions. First, it was argued that the regulations governing black powder aid in the suppression of criminals who use black powder to construct explosive devices. Because the law contains record-keeping and storage requirements, the government supposedly is better able to keep the substance out of the hands of wrongdoers. Secondly, it was argued that the regulations ensure the safe handling and storage of black powder. The regulations are very strict in requiring certain types of containers and certain conditions of storage to ensure safety. Moreover, because of the licensing provisions in the law, the Treasury Department, by various investigatory techniques, can ensure that the safety regulations are observed.

On the other hand, critics of these regulations contend that both justifications are illusory. In response to the first justification, it is argued that government regulations have no effect—preventative or otherwise—on criminal misuse of explosives. If criminals desire black powder they can obtain it in quantities of less than five pounds. In addition, criminals are able to manufacture their own black powder from easily obtainable laboratory chemicals.

Critics of the regulations also argue that the justification of safety is illusory as well. The primary users of black powder are sportsmen and recreational enthusiasts. Such persons are expert in the storage and handling of black powder. It is difficult to understand how strict federal regulations encourage safe handling of black powder by those expert in its use, and well aware of its dangers.

Finally, Mr. Chairman, in considering the repeal of the 1970 law regulating black powder, it is important to understand where the burdens of that law fall. Since the regulations may not prevent misuse of black powder, criminals may not be deterred at all in their activities. Notwithstanding the failure of the law in deterring criminal acts, the regulations nevertheless make it impossible for lawful users of black powder to obtain it.

The hardship imposed by the difficulty in obtaining black powder is further compounded by the fact that sportsmen can only use commercially manufactured black powder in their activities. Only commercially manufactured black powder is of a sufficient quality and uniformity to allow sportsmen to use it safely. Thus, the regulations have the effect of increasing the difficulty by which sportsmen can obtain the substance which allows them to operate their weapons in the safest way.

During the hearings today, Mr. Chairman, it is my hope that the two government agencies address themselves to the paradox that I have described. I will be particularly interested in the statistical support which the Department of Justice can marshall to support their argument that current regulations have a beneficial effect. Since we have four years of experience under this law, surely the benefits—if such benefits exist—are easily demonstrable by the government agencies. I look forward to the testimony and presentation during today's hearings.

Mr. COHEN. And with that, I would yield to the gentleman from New York.

Mr. CONYERS. Let me recognize our other colleague who has expressed a great interest in this matter, Hamilton Fish of New York.

Mr. FISH. Thank you, Mr. Chairman, and Mr. Cohen.

Mr. Chairman, like the ranking member of the subcommittee, in the interest of time, I would like to submit my statement for the record and just express my pleasure, first of all, that the subcommittee is considering the Senate-passed S. 1083, relating to black powder. I might say, Mr. Chairman, that S. 1083 is identical to the measures introduced in the House by myself and Mr. Cohen and Mr. Froehlich—H.R. 14018, H.R. 14442, and H.R. 14549.

At the outset Mr. Chairman, I think it is important to understand what the House bills and the Senate-passed bill does and does not do. The bill would exempt black powder from the licensing and pertinent provisions of title XI of the Organized Crime Control Act of 1970. But the exemption would only cover commercially manufactured black powder. Black powders mixed by criminals from laboratory chemicals would not be exempted from the criminal prohibition of current law.

Moreover, in addition to the legitimate interests of sportsmen around the Nation, I think it is important to note that with the Nation's Bicentennial coming up very shortly, there is a renewed interest in the activities reminiscent of the Revolutionary times in which the muzzle loaders will be on display. And I think it would certainly be very dampening to the whole effort to relive the Revolutionary days if black powder was not available legitimately to these individuals.

And so with your permission, Mr. Chairman, I will just submit the balance of my statement.

[Mr. Fish's statement follows:]

STATEMENT OF CONGRESSMAN HAMILTON FISH, JR.

Mr. Chairman: I am delighted that the Subcommittee on Crime today begins consideration of the Senate passed S. 1083 which is identical to my bill, H.R. 14018, which would exempt commercially manufactured black powder and certain igniters from the operation of restrictions imposed by the Organized Crime Control Act of 1970. Specifically, my bill would exempt black powder and other explosives in part by inserting the following subsection (5) in the place of the existing subsection (5):

(5) Commercially manufactured black powder, percussion caps, safety and pyrotechnic fuses, quills, quick and slow matches, and friction primers, intended to be used solely for sporting, recreational, or cultural purposes in antique firearms * * *

The issue presented in these hearings is a simple one—whether the federal restrictions on black powder sufficiently justify the great burden on sportsmen and those involved in ceremonial use of antique or replica muzzle-loading cannons who rely on black powder for their recreational activities. It is important to note that these citizens can only use commercially manufactured black powder. Only commercially manufactured black powder is of a sufficiently high quality to be used in antique weapons. Thus any restrictions weigh heavily against legitimate users by increasing the difficulty by which black powder can be obtained.

The restrictions on black powder have been justified on two grounds: first, the elimination of its criminal misuses; and second, the maintenance of high safety standards in manufacture, storage, and transfer. Much attention will be focused in these hearings on those two points. It is not my purpose in this brief statement to discuss the countervailing policy considerations on those issues.

However, it is important to understand what my bill does and does not do. H.R. 14018 would exempt black powder from the licensing and permit provisions of title XI of the Organized Crime Control Act of 1970. But the exemption would only cover commercially manufactured black powder. Black powder mixed by criminals from laboratory chemicals—would not be exempted. Therefore, the appropriate storage provisions of the Act, and especially the appropriate criminal

penalties, would still apply to criminals found in possession of explosives other than those commercially manufactured. To repeat, my bill does not lessen the criminal penalties for criminal misuse of black powder.

Moreover, Occupational Safety and Health Administration regulations concerning storage in commercial establishments would also survive enactment of this legislation. The bill would only exempt the consumer from the provisions of the Act. The manufacturer, shipper, wholesaler and most retailers who are likely to handle large amounts of black powder would still be covered.

Only black powder intended for sporting, cultural, and recreational activities would be exempt from the Act. Powder intended for commercial use—for example in ammunition—would still be covered by the Act.

Furthermore, the restrictions on black powder under section 834 of title 18 (Regulations by the Interstate Commerce Commission) are not superseded by my amendment, nor is the storage regulation currently observed by explosive manufacturers necessarily superseded by my bill.

The above brief description of the operation of my bill on existing provisions of law is meant simply to clarify the purpose of this legislation. Hopefully, the Congress in enacting H.R. 14018 will recognize the legitimate rights of sportsmen without unnecessarily permitting misuse or careless use of an explosive substance.

Mr. Chairman, the greatest concern to me in the controversy over the regulation of black powder has always been the unnecessary restrictions that Title XI of the Organized Crime Control Act place on the law-abiding citizens of our land. There can be no question that the sportsmen have suffered by reason of the 1970 restrictions on the sale and use of black powder. The limitations in the present law on the purchase, possession, transportation and storage of black powder have prevented sportsmen from obtaining it without high cost and great hardship.

Because of the high cost and other burdens imposed by the law, the sources of supply of black powder have all but disappeared. Indeed, since 1971 the domestic manufacture of black powder had all but entirely ceased until 1973 when Gearhart-Owen Industries, Inc. began its manufacture in a plant previously owned by Dupont.

The hardship has been imposed on law-abiding citizens who are vitally interested in the preservation of much of our recreational and cultural heritage. As the statements submitted for the record clearly show, black powder is used by these sportsmen in a variety of events. Specifically, these sportsmen use black powder in antique and replica firearms. Such firearms are used in contests and demonstrations that combine the preservation of American history with the competition of precision target shooting. Thousands of such sportsmen, around the country have a vital interest in this sport which should be encouraged by federal legislation. Indeed, with the 1976 Bicentennial celebration of the birth of our nation fast approaching, it is incumbent upon us to ensure that the festivities include antique weaponry and associated ceremonies so that a rich and colorful part of our heritage is not lost.

Mr. Chairman, I look forward to these hearings, and it is my hope that by receiving all statements, and hearing all witnesses, the Subcommittee can make an informed judgment on the propriety of the Act.

Mr. CONYERS. Very good. Thank you very much.

We have for the record statements that have been submitted by the following people: Senator Birch Bayh, who may or may not join us this morning, and Senator Ted Stevens of Alaska; from our side of the Hill, Tom Bevil of Alabama; John Dingell of Michigan; George Goodling of Pennsylvania; Gilbert Gude of Maryland; Lee Hamilton of Indiana; James Hanley of New York; Earl Landgrebe of Indiana; and Thomas Morgan of Pennsylvania.

[The statements referred to follow:]

STATEMENT OF SENATOR BIRCH BAYH OF INDIANA

I want to thank the distinguished Chairman of this Subcommittee, Congressman Conyers, for giving me the opportunity to talk with you about S. 1083 which I introduced to eliminate serious hardships for the many thousands of

Americans who use commercially produced black powder for recreational, cultural and sporting purposes.

I am pleased that on July 13, 1973, my colleagues in the Senate by a vote of 78–8 sent this measure to this House. Likewise, I have been gratified by the interest and support for this measure by members of this body, particularly Congressman Lee Hamilton of Indiana, who introduced one of the first of more than a dozen bills to accomplish similar purposes.

Under present Federal law, the purchase, possession, storage and transportation of commercially produced black powder in amounts larger than 5 pounds as well as certain igniters are subject to extensive regulations. My bill exempts these items from federal regulations for recreational, cultural and sporting purposes. In removing these burdens, however, the bill does not alter in any way the strict criminal penalties for the misuse of explosives, including black powder and igniters. These penalties, adopted by the Congress in 1970, are designed to prevent unlawful damage of property, intimidation, personal injury, and loss of life through the use of explosives. I believe that these terrible crimes must be punished swiftly and severely, as provided by present law.

I believe it is also important to know that existing Department of Transportation and Occupational Safety and Health Administration regulations restricting black powder; title II of the National Firearms Act which prohibits possession of unregistered bombs; and State laws regulating the possession, purchase, storage and use of black powder will be unaffected by S. 1083.

The issue we are considering today, the regulation of black powder, is not a new one. In the 91st Congress, Senators McClellan and Hruska introduced a bill, S. 3650, to strengthen the Federal laws concerning the illegal use, transportation, and possession of explosives. During consideration of this measure, the Committee recognized the overly-broad scope of its provisions with regard to ammunition and materials used for sporting purposes. The Committee Report on S. 3650 notes that:

The broad scope of the bill as originally introduced would have resulted in needlessly penalizing law abiding sportsmen who, because of the expense involved in purchasing ammunition and as a hobby, hand load their own shells to be used for legitimate sporting purposes. In addition, over 10,000 of our citizens legitimately use black powder, smokeless powder, primers and percussion caps in connection with sporting activities involving muzzle loaded rifles and other guns. To meet this problem, Senator Schweiker (cosponsored by 27 other Senators) introduced amendment No. 728 to S. 3650 (See 116 Cong. Rec. S. 9559 (daily ed. June 23, 1970)), and others contacted the subcommittee. Consequently, language has been added to the bill that would exempt from its coverage these kinds of legitimate sporting activities. (Senate Report 91–1215, 91st Cong., 2d. Sess., pp. 8–9 (1970)).

While Senator Schweiker's amendment (No. 728) referred to in the Committee report provided an exemption for black powder in amounts not to exceed six pounds for use for lawful sporting purposes, the bill as reported by the Committee contained a complete exemption for black powder by excluding small arms ammunition and components intended for use therein from the definition of explosive.

The Senate accepted without debate the Committee amendments and adopted the bill by a vote of 68–0 on October 8, 1970. However, both Houses passed separate bills, with the Senate finally adopting the House version which did not give adequate recognition to the use of black powder for sporting purposes. Thus, despite the language of the explosives law as finally enacted, the legislative history of this important measure clearly indicates that the Senate thoroughly considered the issue of exempting black powder for sporting purposes and acted favorably upon such an exemption.

Title XI of the Organized Crime Control Act was enacted three years ago to meet an immediate, critical need to strengthen the Federal laws applicable to bomb explosions and bombing threats. The dangers posed by potential loss of life, destruction of property, intimidation, and the disruption of the daily activities of our people demanded strong, effective Congressional action to curtail these bombings. However, I am sure that these efforts to deter criminals from misusing explosives were not intended to penalize our law-abiding sportsmen.

Furthermore, experience has shown that the restrictions on black powder are not effective in curtailing bomb threats and bombing incidents. Studies con-

ducted by the National Bomb Data Center have found that black powder is used in an insignificant number of bombings. During the period July 1970 through June 1971, 2,352 bombings were recorded by the Center, of which only 96 contained black powder. Even more significant is the fact that a comparison of bombing reports for the eight-month period preceding the effective date of Title XI (July 1970–February 1971 inclusive) and the eight-month period following that date (March 1971–October 1971 inclusive) reveals that the number of black powder bombs actually increased, as did the total number of bombs. However, the number of black powder bombs as a percentage of total bombs remained constant at about 3.7 percent. Thus, the restrictions placed on commercially manufactured black powder propellant have not had any demonstrable effect in reducing the incidence of black powder use for illegal purposes.

The Center study on bombing, conducted by the Internal Association of Chiefs of Police, was based on newspaper reports and field reports from law enforcement agencies. Although no information was obtained on the type of black powder used in the small number of reported bombings, it is probably that a large percentage of the black powder incidents involved homemade black powder.

Commercially manufactured black powder has been extremely difficult to obtain, even for legitimate purposes, since the effective date of Title XI. As any school boy knows, black powder can easily be made from sulfur, saltpeter, and charcoal. However, as antique shooting sports enthusiasts know all too well, only the highest grade of propellant is suitable for muzzle-loading rifles and antique cannons.

The use of antique firearms and replicas of antique rifles and cannons is an integral part of the sporting, cultural, and recreational life of this country. Muzzle-loading rifles are used at meets throughout the nation by organizations such as the National Muzzle Loading Rifle Association and the North-South Skirmish Association. These include both team and individual competitions using various types of Civil War weapons and other antique firearms. Antique or replica muzzle-loading cannons are also used nationwide by various civic, Boy Scouts, and veterans groups in a variety of ceremonies, including flag-raising, centennial, sesquicentennial, and Fourth of July celebrations. Some 500,000 people are involved with the increasingly popular sport of muzzle-loading, collecting and shooting antique and replica firearms. Moreover, they are used by symphony orchestras in the performance of classical music, such as Tchaikovsky's *1812 Overture*. In addition, replicas are manufactured for historical groups and associations for use on historical restorative projects throughout the country.

Thousands gather at numerous competitive target shooting events all over the country. In my own State of Indiana, organized competitions using antique muzzle-loading weapons are an important part of our recreational and sporting tradition. In fact, Friendship, Indiana attracts over 15,000 participants and spectators each year at muzzle-loading events.

I have never shot an antique cannon in my life, but I am not about to say that there is not a place for antique cannons, particularly as we approach our 200th birthday. If someone is firing antique cannons, are we going to say he is not performing a useful, recreational or cultural purpose? I am not about to say that.

Mr. Chairman, the purpose of S. 1083 is relatively simple. First, it is designed to remove the rather significant burden which has been imposed on those sportsmen, on those symphony directors, on those community directors who are today utilizing black powder for wholesome recreational and cultural purposes. The second point I want to emphasize is that this bill is in no way designed to jeopardize law enforcement efforts to prevent illegal activity using any kind of explosive, and it is not designed to prevent punishing those terrible deeds which bring destruction, pain, suffering, and loss of life.

I respectfully urge the members of the House Judiciary Committee to expeditiously approve S. 1083 in order to allow the House of Representatives to consider this important measure in the 93d Congress.

STATEMENT BY SENATOR TED STEVENS OF ALASKA

I appreciate having the privilege of submitting a statement in favor of S. 1083, a bill which amends Title XI of the Organized Crime Control Act of 1970. Specifically, this legislation removes the licensing, permit, transportation, and

storage restrictions from commercially manufactured black powder and certain igniters intended to be used in antique firearms for sporting, cultural and recreational purposes. This measure is needed to permit the survival of antique shooting sports and of cultural and historical activities involving antique weapons.

Mr. Chairman, there are many sporting rifle enthusiasts in Alaska. Many are muzzleloader shooters. They utilize historical rifles and pursue a hobby that not only is rewarding in a personal sense but also has a unique historical significance. Unfortunately, excessive legal restrictions on the purchase and storage of domestically manufactured black powder propellant have severely hindered these individuals.

The United States is fast approaching its bicentennial birthday. I know that Alaskans' thoughts are turning increasingly to the past for a preservation of the historical ideals upon which this Nation was founded. Yet few people actively practice any sport in a manner calculated to be as authentically historical as possible. The exception is the muzzleloaders.

These people fire historical rifles under conditions similar to those in Civil War times and earlier. Throughout the United States associations such as the McKinley Mountainmen Muzzle Loading Rifle Club of Eagle River, Alaska, have been formed where enthusiasts gather to discuss the fascinating details of their unique hobby. They manufacture and load their own ammunition. Some reconstruct their rifles themselves. They and their wives manufacture authentic uniforms of the times. They shoot at targets under carefully supervised safety conditions with all the authentic pageantry possible.

One of their safety precautions precludes the use of modern smokeless powders. Modern smokeless powders cannot be used in their antique firearms for, unlike black powder, modern smokeless powder produces dangerously high levels of pressure. This pressure may explode the weapons and could cause serious injury. Therefore, the only propellant that they can use with any degree of safety is black powder. As a result of the unduly burdensome regulations imposed on the distribution of black powder under the 1970 Organized Crime Control Act, black powder has become virtually unobtainable.

I realize that some feel that the existing regulatory restrictions on commercially manufactured black powder are necessary to curtail bombings. However, all the evidence indicates that only a few of the reported bombings in the United States are of the black powder variety and they were made from home-made black powder. Further, S. 1083 would not affect in any way the strict criminal penalties for the misuse of explosives including black powder and igniters.

Thousands of law-abiding Americans engage in antique shooting sport activities. Antique or replica muzzle-loading cannons are used nationwide by various civic and veteran groups in historical ceremonies. S. 1083 will allow these Americans to continue in this antique hobby as well as preserve for all Americans the opportunity to see and experience a part of our Nation's history.

STATEMENT OF HON. TOM BEVILL OF ALABAMA

LET'S REPEAL THE RESTRICTIONS ON HOBBYISTS USING BLACK POWDER!

Mr. Chairman, I want to thank you for the opportunity to appear before your committee today on behalf of H.R. 5964, a bill which would eliminate the unnecessary restrictions now faced by hobbyists using black powder. If I may, I would like to explain why I feel this bill should be enacted into law.

In 1970, the Congress passed the Organized Crime Control Act (Public Law 91–452). As we all can remember, 1970 was a time when unrest was widespread in this country. In particular, a number of terrorist bombings, which received wide publicity in the media, caused a wave of revulsion among the vast majority of American citizens, and this feeling generated a great deal of pressure on the Congress to do something to combat the terrorist threat. Unfortunately, the kind of climate that existed at the time often makes for hasty and unwise legislation. I believe this to be the case with regard to portions of the Organized Crime Control Act of 1970. Now that four years have elapsed—now that we have the benefit of some sober second thoughts—I believe it is time to amend this legislation, to relieve some unnecessary burdens which certain of its provisions have placed on a large group of law-abiding citizens, the hobbyists who use black powder in firearms for recreation.

I refer particularly to Title Eleven of the Organized Crime Control Act. Under this title, any quantity of black powder over five pounds, no matter what its type or its intended use, is by definition "an explosive" and is subject to severe restrictions on purchase, possession, transportation, and storage. Title Eleven uses only the generic term "black powder", and does not differentiate between commercially manufactured black powder, which is the only kind suitable for firearms, and home-made black powder, which is the kind that has been used in terrorist bombs.

Let me explain the distinction between commercial and home-made black powder. Commercially made black powder is the only suitable propellant for use in antique firearms. No hobbyist would use home-made powder for recreational shooting, since the impurities in the non-commercially made product as well as its unpredictability would foul or ruin his rifle. Home-made black powder, on the other hand, is far more likely to be used for clandestine purposes, such as the making of bombs, than is commercial powder. This is so because the would-be bomber would much prefer to assemble his own chemicals, all of which are easily procured, and put them together himself, as opposed to buying commercial powder from a sporting goods dealer who might remember the transaction afterward. The Senate Judiciary Committee, in a study issued in June, 1973, concluded that "all evidence would indicate that the few black powder bombs reported are made from home-made black powder."

Given this distinction between commercially made and home-made black powder, it is obvious that Title Eleven, which makes no such distinction, was poorly drawn. In addition, the five-pound limit prescribed in Title Eleven has precisely the wrong effect. It presents an annoying nuisance to the many thousands of hobbyists who use antique firearms or reload their spent shells, since they are forced to buy their powder in five-pound batches which are inadequate for their needs. On the other hand, five pounds of black powder is a very large quantity indeed for a would-be bomber, and most terrorist bombs use less than that amount. Thus the five-pound limit harms the law-abiding citizen while causing no problem to the criminal bomber.

The bill which I have co-sponsored, H.R. 5964, would clear up this unfortunate situation, by drawing a sharp distinction between commercially made and home-made black powder. The commercially made powder would be exempted from all restrictions, and thus the burden on the hobbyist would be lifted. For the home-made powder, the five-pound limit would drop to zero, thus making its possession illegal and making it more difficult for the would-be bombers to operate. Thus the original purpose of the bill would be strengthened, while its unfortunate side-effects would be eliminated.

Mr. Chairman, I wish to call to your attention the fact that hundreds of thousands of Americans use black powder in antique firearms for recreational purposes (the National Rifle Association's estimate is ½ million black powder hobbyists). Black powder is used, not only for target shooting, but also for historical reenactments and demonstrations. In this connection we should keep in mind that the celebration of the Bicentennial, in 1976, will undoubtedly include a great number of historical reenactments, pageants, and the like, many of which will require that black powder be used. The law as it is now would greatly handicap the organizers and participants in these ceremonial events. Let us change the law, to eliminate the undue harassment of our law-abiding citizens, while tightening the restrictions against would-be bombers and terrorists. Let us do this by passing H.R. 5964. Thank you.

STATEMENT BY HON. JOHN D. DINGELL OF MICHIGAN

Mr. Chairman, I would like to thank you for this opportunity to express my support for H.R. 5964, of which I am a cosponsor, S. 1083, and similar House measures designed to provide relief for legitimate users of black powder propellant by amending existing Federal explosives laws.

As you know, Mr. Chairman, the intent of the Organized Crime Control Act of 1970 (P.L. 91-452) was to deter and punish terrorist bombers. However, in practical application, this law has imposed excessive controls on those law-abiding citizens who utilize black powder propellant in pursuing the sport of shooting antique firearms. In short, current restrictions on black powder propellant have burdened the honest citizen without placing any real corresponding burden on potential bombers.

Under prevailing standards, any quantity of black powder over five pounds, irrespective of its intended use, is termed "an explosive" and is subject to stringent restrictions on purchase, possession, transportation, and storage. Furthermore, current statutes make no differentiation between black powder shooting propellants and other substances commonly referred to as "black powder."

These restrictions prevent shooters of antique firearms from obtaining sufficient quantities of their only suitable propellant. Current restrictions hinder hundreds of thousands of Americans who use black powder for historically oriented recreation, including: formal and informal target shooting, hunting, historical reenactments and demonstrations.

I urge the Crime Subcommittee act favorably on H.R. 5964 and report this measure to the full Judiciary Committee and the Floor of the House of Representatives for action.

Thank you.

STATEMENT BY HON. GEORGE A. GOODLING OF PENNSYLVANIA

Mr. Chairman: I am co-sponsor to H.R. 5964, a bill that would lift the five-pound limitation now imposed by law on those who use commercial black powder propellant in antique muzzle-loading firearms.

We are all aware why stringent restrictions were placed on quantities of commercial black powder in excess of five pounds. They were directed toward controlling the making of terrorist bombs. Still, evidence obtained from the Bomb Data Center of the International Association of Chiefs of Police refutes this exaggerated assumption. In an eighteen-month study, these data show the use of black powder to be only 149 out of nearly 4,000 bomb devices.

Furthermore, the current law contains an exemption for "home-made black powder." The terrorist can use this home-made product to make bombs, but it is not suitable for use in antique muzzle-loading firearms. The legislation I have co-sponsored would remove this exemption on "home-made black powder." It would also eliminate the provision of present law which enables a "bomber" to possess as much black powder as a legitimate user of this propellant.

All of us know that hundreds of thousands of Americans use black powder firearms. There are those who use black powder firearms for historically oriented recreation, for formal and informal target shooting, and for mock warfare exercises. Others use black powder for various cultural events, such as plays and other dramas, and there are those who use this propellant for research and for life-saving purposes.

It is also significant to note that the problems faced by legitimate users of black powder shooting propellant will have a serious impact on historical reenactments, pageants, along with shooting matches to be held in conjunction with the forthcoming celebration of the Bi-Centennial of the American Revolution. This is a particular concern to me, because my State of Pennsylvania is developing comprehensive plans for participation in these Bi-Centennial proceedings.

In summary, then, H.R. 5964 would have a dual positive impact. It would remove the present unreasonable burdens that presently are pressing down upon those who use commercial black powder in antique muzzle-loading firearms. It would, at the same time, strengthen the present law toward the end of controlling the use of black powder by terrorist bombers.

Mr. Chairman, the Senate already has approved legislation companion to H.R. 5964. I respectfully urge that this Subcommittee on Crime extend its endorsement to H.R. 5964 or to legislation companion to it, thereby enabling the House of Representatives to work its will on the legislation.

Mr. Chairman, I deeply appreciate having the opportunity to present this statement to your Subcommittee on Crime.

STATEMENT BY HON. GILBERT GUDE OF MARYLAND

I am pleased to submit this statement in support of my bill, H.R. 10362, as well as several other bills which would exempt black powder, percussion caps, safety and pyrotechnic fuses, quills, quick and slow matches and friction primers from the provisions of Title XI of the Organized Crime Control Act of 1970. (P.L. 91-452.)

The purpose of Title XI, 18 U.S.C. chapter 40, is to regulate the transportation of explosives and other dangerous materials in interstate commerce. Section 1101 of the Act states:

The Congress hereby declares that the purpose of this title is to protect interstate and foreign commerce against interference and interruption by reducing the hazard to persons and property arising from misuse and unsafe or insecure storage of explosive materials. It is not the purpose of this title to place any undue or unnecessary Federal restrictions or burdens on law-abiding citizens with respect to the acquisition, possession, storage, or use of explosive materials for industrial, mining, agricultural, or other lawful purposes, or to provide for the imposition by Federal regulations of any procedures or requirements other than those reasonably necessary to implement and effectuate the provisions of this title.

This statement of intent is clear. The purpose of the legislation is to place under strict federal control the transportation of explosives which are hazardous and dangerous and which could be used for illegal purposes.

Specifically excluded from the general provisions of this chapter (but *not* from those provisions relating to intent to kill or injure individuals or damage or destroy property) are: explosive materials used in medicine, small arms ammunition, black powder in quantities under five pounds, and explosives for the use of federal, state, or local governments or the military.

The intent of these exclusions is also clear. Black powder in small quantities and small arms ammunition are judged non-hazardous except in the circumstances of intent to kill or injure mentioned above, and the government and the military are presumed to be responsible users of explosive materials.

H.R. 10362 would remove the black powder exemption and replace it with the following:

Commercially manufactured black powder, percussion caps, safety and pyrotechnic fuses, quills, quick and slow matches, and friction primers, intended to be used solely for sporting, recreational, or cultural purposes in antique firearms as defined in section 921(a)(16) of title 18 of the United States Code, or in antique devices as exempted from the term 'destructive device' in section 921(a)(4) of title 18 of the United States Code * * *

As the language indicates, the items mentioned are those intended to be used only for sporting, recreational, or cultural purposes in antique firearms. This language narrowly restricts both the articles exempted and the use to which such exempted articles can be put, insuring that there will be no additional hazard to public safety if this legislation is approved. The further fact that the entire section of this chapter applies only in cases where there is no intent to kill or injure or damage or destroy property makes it even clearer that this legislation would not in any way increase the danger to the public.

The last sentence of the statement of Congressional intent cited above makes clear that there is no intent to impose undue restrictions on the legitimate users of these articles, a category within which I would certainly place sportsmen and antique gun collectors.

While this is an important measure for those groups with a particular interest in the matter, we should not forget the other purposes for which guns and explosive materials can be used, and the danger they pose to society. My concern in recent years has centered particularly around handguns, and it stems from figures like these: in 1972 handguns accounted for 82 percent of all homicides using firearms; in 1967 (the latest year for which figures are available) handguns accounted for 86 percent of all serious assaults involving firearms and 96 percent of all robberies involving firearms; last year handguns were involved in 10,000 murders, 90,000 serious assaults, and 150,000 armed robberies. Moreover, experience has shown that handguns are more dangerous to the owner than to intruders. In Detroit, for example, more persons died in home firearms accidents in one year than were killed in home robberies and burglaries in four and one-half years.

As my support for H.R. 10362 indicates, I have no desire to impose unwarranted and unnecessary restraints on sportsmen and collectors. However, we should not assume that all guns are used for sport or lie in collections. With almost 600 gun crimes occurring every day and a daily average of 69 gun deaths, it is clear that guns do have other uses; they are being put to those other uses; and the danger to society has increased as a result. While I support H.R. 10362 for the reasons indicated above, I urge that it not be the only firearms bill considered by the committee this year—there is much more that needs to be done.

STATEMENT BY HON. LEE H. HAMILTON OF INDIANA

Mr. Chairman, I support H.R. 5964, a bill I have introduced with 16 co-sponsors to amend certain provisions of federal law relating to black powder explosives. This bill is nearly identical to S. 1083, which passed the Senate on July 13, 1973, by a vote of 78 to 8. Both bills exempt commercially manufactured black powder and certain ignition devices from the licensing and permit provisions of Title IX of the Organized Crime Control Act. These provisions severely curtail the use of black powder in quantities of more than five pounds.

The current law has had a very great adverse effect on the sport of shooting with muzzle loading guns. This form of weapon was used until the late 1800's, and these antiques or replicas of them are now used for competitive and recreational purposes by thousands of sportsmen throughout the nation. The National Muzzle Loading Rifle Association, with headquarters in my Congressional District, has about 17,000 members but this figure represents only a small fraction of the total number of users—estimated at more than 100,000—of these antiques and replicas.

Since the explosives law, which covers black powder, went into effect in early 1971, there have been severe and increasing shortages of this propellant. It has become up to four times as expensive to buy it, and the sole remaining American manufacturer of it, Gearhart-Owen Industries, finds its distribution of powder greatly hampered and curtailed by the law. Muzzle loading sportsmen often have had to rely on inferior quality powder imported from England, and existing domestic stocks are hoarded like gold.

In effect, Mr. Chairman, the purchase, shipment and storage restrictions imposed by the law are causing a popular and historic sport to die out. While not the intention of the drafters of the law, this will surely be the result if relief is not forthcoming. This would be most unfortunate, especially since black powder is a relatively weak explosive that should not be lumped in with such strong explosives as TNT and nitroglycerine for regulatory purposes, as it is under the current law.

The popular myth that black powder is widely used for the making of terrorist bombs prompted its inclusion in Title IX. Evidence obtained from the Bomb Data Center of the International Association of Chiefs of Police refutes this incorrect assumption. In an eighteen month study, its data show the use of black powder in only 149 out of nearly 4000 bomb devices. The date collectors did not differentiate between home-made black powder and scarce commercial propellants, but the Senate Judiciary Committee concluded in June 1973, that "all evidence would indicate" that the few black powder bombs reported were made from homemade powder. It is important to note that homemade black powder does not receive an exemption under H.R. 5964.

Safety is foremost in the minds of muzzle loading sportsmen. Participants in competitive matches use protective glasses and sound suppressors, and firing procedures are strictly controlled and supervised.

If safety is the watchword for these matches, authenticity is the key, and participants go to great lengths to insure that their outfits and equipment are historically accurate. Muzzle loading "regiments" or teams gave many colorful performances during the Civil War Centennial, and historic re-creations should be equally popular—should the powder supply permit them—during the American Revolution Bicentennial.

While H.R. 5964 would lift the restrictions on the lawful use of black powder, it would not affect the existing criminal penalties for the misuse of explosives. Those who would use black powder for illegitimate purposes would get absolutely no relief from the bill.

This legislation has been endorsed by many sportsmen's groups, including the National Rifle Association, the Indiana Sportsmen's Council, and the North-South Skirmish Association, as well as the N.M.L.R.A.

Muzzle loading shooting is a legitimate sport, and part of our national heritage. It deserves to stay alive, and can do so if prompt and affirmative action is taken to lift the severe restrictions now threatening it.

Mr. Chairman, I respectfully urge that such positive action be taken.

43-300—75——2

STATEMENT BY HON. JAMES M. HANLEY OF NEW YORK

Mr. Chairman and members of the committee: I believe that the House ought to have an opportunity to approve legislation to remove the restrictive five-pound limit on commercially produced gunpowder, and also make available percussion caps, safety and pyrotechnic fuses, quills, quick and slow matches, and friction primes.

Hundreds of thousands of Americans own and use antique firearms for various reasons, including sport, formal and informal target shooting, historical re-enactments, and cultural events. Under the present law, these citizens are being unduly restricted in their access to black powder.

Commercially manufactured black powder is the only propellant that can be used in antique firearms. Different amounts of propellant are required depending upon the type of firearm being used. The five-pound limit restricts those citizens who wish to make legitimate use of their antiques. Furthermore, an unknowing owner or salesman may try to use another propellant which oftentimes results in a dangerous accident.

Black powder propellant is also used in research and life-saving devices. It has been utilized in the space flights. The Coast Guard also used it in the Lyle gun which is a line-throwing device used in rescue attempts.

Thirdly, the myth that commercially manufactured black powder is used widely by terrorists in the making of bombs must be exploded. In a study conducted by the Bomb Data Center of the International Association of Chiefs of Police, the use of black powder in bombs was found to be only 149 out of nearly 4000 bomb devices. Furthermore, black powder bombs are often homemade with materials that can be obtained from a local drugstore. This study did not differentiate between homemade and commercially manufactured black powder. The Senate Judiciary Committee in 1973 concluded, "Indeed all evidence would indicate that the few black powder bombs reported are made from homemade black powder."

As a result, the present law is not fulfilling its intended purpose: restricting terrorists from obtaining quantities of black powder that can be used in bomb devices. The law is restricting only honest citizens who wish to make legitimate use of their antiques.

I urge this committee to pass H.R. 11643.

STATEMENT BY HON. EARL F. LANDGREBE OF INDIANA

Mr. Chairman, I sincerely appreciate the opportunity to present this statement regarding H.R. 9831, a bill to exempt antique ammunition components from the present restrictions in Title XI of the Organized Crime Control Act of 1970.

The purpose of Title XI was to deter terrorist bombers by placing restrictions on the sale, possession, transportation and storage of black powder. Experience has shown, however, that the act has had little or no effect on terrorists, but has severely affected those who use black powder solely for recreational, cultural, sporting and other legitimate but harmless activities.

For example, the supply of black powder to individuals interested in using it for these activities is largely dependent on an informal distribution system. Because the substance has never been easily available, distribution has always depended on "courtesy" dealers and friends supplying other friends engaged in those sports using antique firearms. This informal supply system often necessitates the transportation of black powder in amounts exceeding five pounds from state to state; and this activity is subject to the restrictions of the bill regardless of the intent of the individuals involved.

Sporting organizations are not the only groups affected by the present law. It also interferes with the use of antique firearms in such widely disparate activities as Tchaikovsky's "1812 Overture," historical re-enactments, and future Bicentennial programs.

Those who wish to use black powder in a bomb, on the other hand, can easily manufacture the substance at home. The Senate Judiciary Committee has found that "the few black powder bombs reported are made from homemade black powder." The North-South Skirmish Association, Inc., has stated "Home made black powder, easily made by anyone, is suitable for bombs but not for shooting" (in antique weapons).

The enactment of H.R. 9831 would correct this situation, allowing use of black powder for legitimate activities while still maintaining government control over its use for illegitimate purposes.

I strongly urge its adoption.

STATEMENT BY HON. THOMAS E. MORGAN OF PENNSYLVANIA

Mr. Chairman and distinguished Members of this Subcommittee, last year I introduced H.R. 6575, which would amend Title XI of the "Organized Crime Control Act of 1970" to provide an exemption for commmercially-manufactured black powder propellant for use in antique muzzle-loading firearms. I am pleased that the Subcommittee is now considering this measure which is similar to S. 1083, which passed the Senate on July 13, 1973 by a 78–8 vote.

Under Title XI of the "Organized Crime Control Act," any quality of black powder over five pounds, no matter what type or its intended use, is an explosive and is thus subject to restrictions on possession, purchase, transportation, and storage. The intent of this provision was to deter terrorist bombers from viciously destroying human life and property. Statistics supplied by the National Bomb Data Center, however, indicate that black powder was used in an insignificant number of bomb devices, and furthermore, the statistics do not distinguish between home-made and commercially-manufactured black powder. In addition, a comparison of the number of bombings preceeding the effective date of the Title XI regulatory provisions governing black powder (February 12, 1971) with the eight-month period following the effective date indicates that the number of black powder bombs increased, as did the total number of bombs.

Mr. Chairman, I believe that the use of explosives to damage property and injure or kill people must be punished severely, as provided by present law, and this bill will not alter the law in this regard. There are, however, legitimate sporting uses for commercially-manufactured black powder and igniters since these materials are used by law-abiding Americans in muzzle-loading rifles and other devices. Muzzle-loading rifles are used in competitions throughout the country, historical restorative projects, and even in the performance of classical music, the most notable being Tchaikovsky's "1812 Overture."

I should point out that commercially-manufactured black powder is the only propellant which can be used in firearms of antique design, and the present restrictions prevent shooters of antique firearms from obtaining sufficient quantities of their only suitable propellant.

Thus, I urge your favorable consideration of H.R. 6575 or a similar measure. Thank you very much for your attention to this legislation.

Mr. CONYERS. We also have the statements of: W. Vincent Rakestraw, Assistant Attorney General, Office of Legislative Affairs, Department of Justice; Deane Boddorff, Institute of Makers of Explosives; J. Paul Barnett, Indiana Sportsmen's Council; Vaughn K. Goodwin, National Muzzle Loading Rifle Association; C. R. Gutermuth, National Rifle Association of America; Dr. Alonzo H. Garcelan, National Rifle Association of America; and La Dow Johnston, Ohio Gun Collectors' Association, Inc.

[The statements referred to follow:]

STATEMENT OF W. VINCENT RAKESTRAW, ASSISTANT ATTORNEY GENERAL, OFFICE OF LEGISLATIVE AFFAIRS

Mr. Chairman and Members of the Committee, I am pleased to appear here today to present the views of the Department of Justice concerning S. 1083. This bill would amend the current Federal laws relating to explosives by exempting commercially manufactured black powder and certain igniters used in antique weapons or devices from the licensing and permit provisions of Title XI of the Organized Crime Control Act of 1970 (P.L. 91–452, 84 Stat. 958). The bill would also expand the exemption in the definition of "destructive device" in 18 U.S.C. 921 to include a device which the owner intends to use solely for recreational or cultural purposes.

The Department of Justice, both in a letter of April 19, 1973 to Chairman McClellan of the Senate Judiciary Subcommittee on Criminal Laws and Procedures and in testimony on June 12, 1973 before the Senate Judiciary Committee, opposed S. 1083. As I will explain today, the Department continues to oppose this measure.

It is understood that the purpose of S. 1083 is to remove the burdens which hamper persons who engage in many recreational, cultural and competitive activities using black powder. We appreciate that the present law does cause these lawful users some inconveniences. Nevertheless, we believe that current law strikes a proper balance between the needs of law enforcement agencies and the needs of legitimate users of black powder.

The Federal government has supported controls on the channels of commerce in black powder because this substance is a dangerous explosive and has often been used by bombers and anarchists. As you know, the rash of bombings in the late 1960's was a prominent cause for the enactment of Title XI of P.L. 91–452, which provides Federal regulations regarding explosive materials. Black powder, which has been often used in making bombs by filling a lead pipe with this substance, was one of the explosives so controlled.

The law today recognizes the needs for sportsmen and others who have lawful needs for black powder by exempting from the controls amounts of up to five pounds. Further, legitimate users may obtain greater amounts after first obtaining a low cost user-limited permit. The Congress, in enacting P.L. 91–452, stated that the purpose of Title XI was not "to place any undue or unnecessary Federal restrictions or burdens on law-abiding citizens with respect to the acquisition, possession, storage, or use of explosive materials for industrial, mining, agricultural or other lawful purposes, or to provide for the imposition by Federal regulations of any procedures or requirements other than those reasonably necessary to implement and effectuate the provisions of this title." We believe that the present black powder restrictions are compatible with this stated purpose and that the minimal restrictions on lawful users are justified.

We do not keep statistics in such a manner as would enable us to determine the number of investigations, prosecutions, or convictions for illegal possession or storage of black powder. It is likely that the number, if available, would be small. That does not mean, however, that the black powder controls do not play a significant role in the protection of our society.

During the period January 1, 1974 to July 1, 1974 the National Bomb Data Center received reports on 140 explosive devices in which the explosive filler was black powder. Of the 143 pipe bombs reported to the Center 37 utilized a filler of black powder. While it cannot be determined how these statistics would vary if there were a change in the black powder control law, I do believe that the completely unregulated availability of black powder in all amounts would result in a significant increase in the unlawful use of this substance.

A further goal of Title XI is to reduce the hazards inherent in the storage of potentially destructive explosive materials. Black powder is such a material and unsafe or insecure storage of large quantities of black powder could have dire consequences. S. 1083 would exempt black powder, in all quantities, from the reasonable storage requirements that have been developed under Title XI.

In summary, we acknowledge that some burdens are placed on lawful users of black powder, but believe that the existing controls are necessary and justified for the common good.

STATEMENT OF DEANE BODDORFF, CHAIRMAN, PUBLIC SAFETY COMMITTEE, INSTITUTE OF MAKERS OF EXPLOSIVES

My name is Deane Boddorf. I am Chairman of the Public Safety Committee of the Institute of Makers of Explosives. My appearance today is at the invitation of the Chairman of the Subcommittee on Crime, to give the views of the Institute of Makers of Explosives on S. 1083 and other proposed legislation insofar as drafted to exempt commercially manufactured black powder (and related ignition devices) from the provisions of the Organized Crime Control Act of 1970, under certain circumstances.

The institute is an association whose members include most of the United States manufacturers of commercial explosive materials. It was organized in 1913, and during its 62 years of existence has always promoted safety in the manufacture, transportation, storage, and use of commercial explosives. These prod-

ucts, properly employed, have been of tremendous value in construction, mining, road building, agriculture, and other uses requiring the high energy generated by a controlled explosion.

When improperly, or carelessly or negligently, transported or stored or used, explosive materials can cause personal injury or property damage if detonated at the wrong time or wrong place. When in the hands of the criminal or subversive element they pose a serious threat to public order and safety.

The institute has viewed the Organized Crime Control Act of 1970, the Regulations promulgated by the Treasury Department, and the enforcement activities of the Bureau of Alcohol, Tobacco, and Firearms as constructive measures in the effort to stem the misuse and abuse of commercial explosive materials. All of these are, of course, sources of inconvenience to our members. But, on balance, if injury and damage can thereby be avoided or minimized, and lives saved, the inconvenience becomes relatively unimportant.

Black powder, while no longer generally used as a commercial explosive except for particular quarry applications, is classified and regulated by the Department of Transportation and by the Bureau of Alcohol, Tobacco, and Firearms as an Explosive. It packs a powerful punch.

In a recent revision of its Safety Library Publication No. 3, "Suggested Code of Regulations" for State Governments, the Institute's recommendations of proper regulations for the transportation and storage of black powder are set forth in Article 8 in Secs. 8:011, 8:012, and 8:041 to 8:045 inclusive. Copies of this publication have been furnished to the Committee; these sections will be found on pages 40 and 41. Your particular attention is invited to the provisions with respect to storage. In summary, the Institute has recommended that no more than 5 pounds of black powder propellants be stored in a residence, and that commercial stocks in excess of 5 pounds shall be stored in magazines. These recommendations are consistent with current regulations of the Bureau of Alcohol, Tobacco and Firearms. We believe that these recommendations promote safety, for two reasons.

First, in the event of fire in a residence or commercial establishment the potential harm to neighbors and to fire fighting personnel, which an unexpected explosion could cause, is minimized. Second, the available quantity which may be stolen by criminals or radicals bent on making bombs is materially reduced. In our view, whether or not the storage or purchase of large stocks of black powder is solely for "sporting, recreational, or cultural purposes" is immaterial to the twin safety objectives of lessening the potential for harm from a fire or from criminal use. Unfortunately, a proper purpose will not prevent an improper result.

We believe that the lawful use of black powder will not be prevented by continuation of current law and regulations. It will merely continue to be inconvenient. The legitimate use of all explosive materials is inconvenienced by the same law and regulations. Nevertheless, regardless of cost or annoyance, we consider them desirable. In short, we suggest that the Committee not give favorable consideration to the proposed legislation which we feel is not in the best interests of public safety.

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INSTITUTE OF MAKERS OF EXPLOSIVES

SAFETY LIBRARY • PUBLICATION NO. 3

SUGGESTED CODE OF REGULATIONS

for the

MANUFACTURE
TRANSPORTATION
STORAGE
SALE
POSSESSION

and

USE
of EXPLOSIVE MATERIALS

August 1974

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Wilmington, Delaware 19899

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Cleveland, Ohio 44122

COAST FUSE
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Wilmington, Delaware 19899

IRECO CHEMICALS
Salt Lake City, Utah 84111

MONSANTO COMPANY
St. Louis, Missouri 63166

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Reno, Nevada 89502

TROJAN-U.S. POWDER
Division of Commercial Solvents Corporation
Allentown, Pennsylvania 18105

August 1974

SUGGESTED CODE OF REGULATIONS

FOR THE MANUFACTURE, TRANSPORTATION, STORAGE, SALE, POSSESSION AND USE OF EXPLOSIVE MATERIALS

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FOREWORD

A SUGGESTED CODE OF REGULATIONS FOR THE MANUFACTURE, TRANSPORTATION, STORAGE, SALE, POSSESSION AND USE OF EXPLOSIVE MATERIALS

Explosive materials are essential tools in our modern society. They play some part – direct or indirect – in practically everything that we build, make, use, and enjoy. Without them, available where and when they are needed, public works and private enterprises would be badly hampered. To facilitate their proper transportation, handling and use while providing safeguards for life and property is in the best interest of the whole community.

Modern explosives, thanks to extensive research and long experience, are safe enough to make unreasonable restrictions unnecessary. Standards and precautions are well known and can be incorporated into codes that are understandable, enforceable and effective. Many states and municipalities have enacted such regulations and their experience as well as the technical knowledge of the explosives industry and the regulations of the Federal government have entered into the development of the model code that follows.

Because this recommended code is both reasonable and effective and because uniformity in such regulations is desirable, the Institute of Makers of Explosives respectfully suggests that this model code be carefully considered for adoption by state and local regulatory bodies.

This material was first issued in March 1966 and was revised in each subsequent year. It was thoroughly reviewed in 1973 and 1974 and adopted by the Institute of Makers of Explosives on May 3, 1974 as a Suggested Code of Regulations having the support of the leading American producers of explosive materials intended for blasting and related legitimate purposes.

When a term defined in Sec. 1:03 *Definitions* is used elsewhere in its defined sense it is printed in **bold type**.

The Institute through its members can furnish a great deal of technical data and information based upon long experience with all phases of explosives. The Institute is always ready to provide assistance, cooperation, and advice to lawmaking and regulatory bodies and will welcome the opportunity to explain or amplify the Suggested Code and Uniform Model State Act. Address communications to IME's Public Safety Committee at the address shown below.

INSTITUTE OF MAKERS OF EXPLOSIVES
420 LEXINGTON AVENUE
NEW YORK, N.Y. 10017

ARTICLE 1. SCOPE AND DEFINITIONS

Sec. 1:01 *Scope*

§ 1:011 This Code shall apply to the manufacture, transportation, storage, sale, purchase, receipt, possession and use of **explosive materials.**

§ 1:012 This Code shall not apply to:

a) **explosive materials** while in the course of transportation via **railway**, water, **highway** or air when the **explosive materials** are moving under the jurisdiction of, and in conformity with, regulations adopted by any Federal department or agency.

b) the laboratories of schools, colleges and similar institutions when confined to the purpose of instruction or research, or to **explosives** in the forms prescribed by the official United States Pharmacopeia, or the National Formulary and used in medicines and medicinal agents.

c) the normal and emergency operations of any government, including all departments, agencies, and divisions thereof, provided they are acting in their official capacity and in the proper performance of their duties or functions.

d) **pyrotechnics** commonly known as fireworks, including signaling devices such as flares, fusees and torpedoes.

e) **small arms ammunition and components** therefor, which are subject to the Gun Control Act of 1968 (Title 18, Chapter 44, U.S. Code) and regulations promulgated thereunder, except for the provisions of Articles 3 and 8 herein.

Sec. 1:02. *Retroactivity*

[The authority having jurisdiction] may issue a permit for the continued use for 12 months of an existing plant, store, equipment, building structure, and installation for the storage, handling or use of **explosive materials** which is not in strict compliance with the terms of this Code in all cases in which continued use will not constitute a distinct hazard to life or adjoining property. In all cases where such permit is denied, *[the authority having jurisdiction]* shall notify the applicant and specify the reasons for denial in writing.

Sec. 1:03 ***Definitions (When a term defined in this section is used in its defined sense in the regulations, it is printed in*** **bold** ***type.)***

AMMONIUM NITRATE: Chemical compound represented by the formula NH_4NO_3.

AUTHORIZED, APPROVED or APPROVAL: The terms "authorized," "approved," or "approval" shall mean authorized, approved, or approval by *[the authority having jurisdiction]*.

BLASTER: That qualified person in charge of and responsible for the loading and firing of a blast.

BLASTING AGENT: Any material or mixture consisting of **fuel** and **oxidizer**, intended for blasting, not otherwise defined as an **explosive**: *Provided,* That the finished product, as mixed for use or shipment, cannot be detonated by means of a Number 8 Test Blasting Cap when unconfined. A Number 8 Test Blasting Cap is one containing 2 grams of a mixture of 80 per cent mercury fulminate and 20 per cent potassium chlorate, or a blasting cap of equivalent strength.

An equivalent strength cap comprises 0.32 ±0.02 grams (5 grains) of PETN base charge pressed in an aluminum shell with bottom thickness not to exceed 0.03", to a specific gravity of not less than 1.4 g/cc. and primed with standard weights of primer depending on the manufacturer.

BULK MIX: A mass of **explosive** or **blasting agent** prepared for use in bulk form without packaging.

BULK MIX DELIVERY EQUIPMENT: Equipment (usually a **motor vehicle** with or without a mechanical delivery device) that transports **explosive, blasting agents,** or ingredients for **explosive materials** in bulk form for mixing and/or loading directly into blast holes.

BULLET-RESISTANT: **Magazine** walls or doors of construction resistant to penetration of a bullet of 150-grain M2 ball ammunition having a nominal muzzle velocity of 2,700 feet per second fired from a .30 caliber rifle from a distance of 100 feet perpendicular to the wall or door.

When a **magazine** ceiling or roof is required to be bullet-resistant, the ceiling or roof shall be constructed of materials comparable to the side walls or of other materials which will withstand penetration of the bullet above described when fired at an angle of 45 degrees from the perpendicular.

Tests to determine bullet-resistance shall be conducted on test panels or empty **magazines** which shall resist penetration of 5 out of 5 shots placed independently of each other in an area at least 3 feet by 3 feet. If **Hardwood** or **Softwood** is used, water content of the wood must not exceed 15%.

Examples of construction that meet this definition are given in Article 3, Section 3:05.

BULLET-SENSITIVE EXPLOSIVE MATERIAL: **Explosive material** that can be detonated by 150-grain M2 ball ammunition having a nominal muzzle velocity of 2,700 feet per second when the bullet if fired from a .30 caliber rifle at a distance of 100 feet and the test material, at a temperature of 70° to 75°F, is placed against a backing material of 1/2 inch **steel** plate.

DETONATING CORD: A flexible cord containing a center core of

high explosives used to detonate other **explosives** with which it comes in contact.

DETONATING PRIMER: A name applied for transportation purposes to a device consisting of a **detonator** and an additional charge of **explosives** assembled as a unit.

DETONATOR: Any device containing a detonating charge that is used for initiating detonation is an **explosive**; the term includes electric blasting caps of instantaneous and delay types, blasting caps for use with **safety fuses** and detonating-cord delay connectors.

EXPLOSIVE MATERIALS: Includes **explosives**, **blasting agents** and **detonators**.

EXPLOSIVES: Means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion; the term includes, but is not limited to, dynamite and other **high explosives**, black powder, pellet powder, initiating **explosives**, **detonators**, **safety fuses**, squibs, **detonating cord**, igniter cord, and igniters. A list of **explosives** determined to be within the coverage of "18 U.S.C. Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Materials" is issued at least annually by the Director of the Bureau of Alcohol, Tobacco and Firearms of the Department of the Treasury.

The United States Department of Transportation classifications of Explosive Materials used in commercial blasting operations are not identical with the statutory definitions of the Organized Crime Control Act of 1970, Title 18 U.S.C., Section 841. To achieve uniformity in transportation the definitions of the United States Department of Transportation in Title 49 Transportation CFR Parts 1-199 sub-divides these materials into:

Class A Explosives – detonating or otherwise maximum hazard
Class B Explosives – flammable hazard
Class C Explosives – minimum hazard
Oxidizing materials – substances that yield oxygen readily to stimulate the combustion of organic matter.

FIRE EXTINGUISHER RATING: A rating set forth in the National Fire Code which may be identified on an extinguisher by a number (5, 20, 70, etc.) indicating extinguisher's relative effectiveness followed by a letter (A, B, etc.) indicating the class or classes of fires for which the extinguisher has been found to be effective.

FIRE-RESISTANT: As herein used, is intended to cover construction methods designed to offer reasonable protection against fire.

FLASH POINT: The lowest temperature at which vapors above a volatile combustible substance ignite in air when exposed to flame.

FORBIDDEN OR NOT ACCEPTABLE EXPLOSIVES: **Explosives** which are forbidden or not acceptable for transportation by common, contract or private carriers by rail freight, rail express, highway or water in accordance with the regulations of the U.S. Dept. of Transportation.

FUEL: A substance which may react with the oxygen in the air or the oxygen or other oxidizing substance yielded by an **oxidizer** to produce combustion.

HARDWOOD: Red Oak, White Oak, Hard Maple, Ash, or Hickory, free from loose knots, wind shakes or similar defects, having a moisture content not exceeding 15%.

HIGH EXPLOSIVES: **Explosives** which are characterized by a very high rate of reaction and high pressure development.

HIGHWAY: Any public street, public alley or public road.

INHABITED BUILDING: A building regularly occupied in whole or part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage, or use of **explosive materials.**

ISSUING AUTHORITY: The governmental agency, office or official vested with the authority to issue permits or licenses.

LOW EXPLOSIVES: **Explosives** which are characterized by deflagration or a low rate of reaction and the development of low pressures.

MAGAZINE: Any building or structure other than an **explosives** manufacturing building, designed and/or approved for the storage of **explosive materials.**

MASS DETONATION (Mass Explode): **Explosive materials** mass detonate (mass explode) when a unit or any part of a larger quantity of **explosive material** explodes and causes all or a substantial part of the remaining material to detonate or explode.

MOTOR VEHICLE: Any self-propelled vehicle, truck, tractor, semitrailer or full trailer used for the transportation of freight over public **highways.**

NITRO CARBO NITRATE: Any **blasting agent** which has been classified as nitro carbo nitrate under the U.S. Department of Transportation Regulations, and which is shipped in compliance with the regulations of the U.S. Department of Transportation.

NON-ELECTRIC DELAY DEVICE: A **detonator** with an integral delay element used in conjunction with, and capable of being initiated by a detonating impulse or signal from, **detonating cord.**

OXIDIZER or OXIDIZING MATERIAL: A substance, such as a nitrate, that readily yields oxygen or other oxidizing substances to stimulate the combustion of organic matter or other **fuel.**

PERSON: Any individual, corporation, company, association, firm, partnership, society or joint stock company.

PLACARDS: Signs placed on vehicles transporting **explosive materials** or **oxidizers,** indicating the nature of the cargo.

PLYWOOD: Means exterior construction grade plywood.

PRIMER: A cartridge or container of **explosives** into which a **detonator** or **detonating cord** is inserted or attached and whose purpose is to initiate the main explosive charge.

PROPELLANT: An **explosive** that normally functions by deflagration and is used for propulsion purposes. It may be a Class A or a Class B **explosive**, depending on its susceptibility to detonation. Black Powder includes black powder propellant.

PROPELLANT-ACTUATED POWER DEVICES: Any tool or special mechanized device or gas generator system which is actuated by a **propellant** or which releases and directs work through a **propellant** charge.

PUBLIC CONVEYANCE: Any railroad car, streetcar, ferry, cab, bus, aircraft or other vehicle which is carrying passengers for hire.

PYROTECHNICS: Any combustible or explosive compositions or manufactured articles designed and prepared for the purpose of producing audible or visible effects. Pyrotechnics are commonly referred to as fireworks.

RAILWAY: Any steam, electric, diesel electric or other railroad or railway which carries passengers for hire.

SAFETY FUSE: A flexible cord containing an internal burning medium by which fire or flame is conveyed at a continuous and uniform rate from the point of ignition to the point of use, usually a **detonator**.

SEMI-CONDUCTIVE HOSE: A hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels yet not so high as to prevent drainage of static electric charges to ground. Hose of not more than 2 megohms resistance over its entire length and of not less than 5,000 ohms per foot meets the requirement.

SENSITIVITY: A physical characteristic of an **explosive**, classifying its ability to detonate upon receiving an external impulse such as impact, shock, flame or other influences which can cause explosive decomposition.

SINGULAR AND PLURAL: Words used in the singular shall include the plural, and in the plural shall include the singular.

SMALL ARMS AMMUNITION: Any cartridge for shotgun, rifle, pistol, revolver, and cartridges for **propellant-actuated power devices** and industrial guns. Military-type ammunition containing explosive bursting charges, or any incendiary, tracer, spotting, or pyrotechnic projectile is excluded from this definition.

SMALL ARMS AMMUNITION PRIMERS: Small percussion-sensitive explosive charges encased in a cap, used to ignite **propellant** powder.

SMOKELESS PROPELLANTS: Solid **propellants**, commonly called smokeless powders in the trade, used in **small arms ammunition**, cannon, rockets, propellant-actuated power devices, etc.

SOFTWOOD: Douglas Fir or other wood equal in bullet-resistance free from loose knots, wind shakes or similar defects, having a moisture content not exceeding 15%.

STEEL: General purpose (hot or cold rolled) low carbon steel such as specification ASTM A366 or equivalent.

THEFT-RESISTANT: As herein used is intended to cover construction methods designed to offer reasonable protection against theft.

WATER GELS (Slurries): Comprise a wide variety of materials used for blasting. As manufactured, they have varying degrees of **sensitivity** to initiation. They usually contain substantial proportions of water and **ammonium nitrate**, some of which are in solution in the water. Some are sensitized by a material classified as an **explosive**, but some contain no ingredient classified as an **explosive** but may be sensitized with metals such as aluminum or with other **fuels**. Under the regulations of the U.S. Department of Transportation, these materials may be classified as Explosives Class A, or Propellant Explosives Class B, or **Oxidizing Materials**.

WEATHER-RESISTANT: As herein used, is intended to cover construction methods designed to offer reasonable protection against weather.

ARTICLE 2. LICENSES AND PERMITS

Sec. 2:01 *Foreword*

Safety of the public is a primary consideration in the manufacture, transportation, storage, sale, possession and use of **explosive materials.** An appropriate and thorough system of licensing or permitting is designed to promote this safety by assuring that these products come only into the hands of qualified **persons** who require them in their occupation.

§ 2:011 All **explosive materials** and any newly developed and unclassified **explosive materials** shall meet the license and permit requirements of this article.

§ 2:012 This article is intended to supplement existing Federal laws and regulations. Therefore, any **person** who possesses a license or permit under regulations promulgated by the Bureau of Alcohol, Tobacco and Firearms, properly covering the activities of such **person** shall not be required to obtain a permit under this article.

Sec. 2:02 *Exceptions*

§ 2:021 This shall not apply to handloading of **small arms ammunition** prepared for personal use and not for resale.

§ 2:022 The provisions of this Article shall not apply to **persons** or products covered by the provisions of the Gun Control Act of 1968 (Title 18, Chapter 44, U.S. Code) and any regulations promulgated thereunder.

Sec. 2:03 *Manufacturer*

§ 2:031 The manufacture of any **explosive materials** within *[name of city, county, state, or other area]* shall be limited to those having appropriate license.

§ 2:032 The manufacture of **explosive materials** within *[name of city, county, state, or other area]* shall be prohibited when such manufacture presents an undue hazard to life and property.

Sec. 2:04 *Importer*

§ 2:041 **Persons** intending to engage in business as an importer of **explosive materials** shall obtain a Federal license in accordance with Title XI, Regulation of Explosives, of the Organized Crime Control Act of 1970 (18 U.S.C., Chapter 40).

Sec. 2:05 *Dealer*

§ 2:051 **Persons** intending to engage in business as a dealer in

explosive materials shall obtain a Federal license in accordance with Title XI, Regulation of Explosives, of the Organized Crime Control Act of 1970 (18 U.S.C., Chapter 40).

§ 2:052 **Explosive materials** shall not be sold, given, delivered, or transferred to any **person** not in possession of a valid permit.

Sec. 2:06 *User*

§ 2:061 No **person** shall be in possession of **explosive materials** or conduct an operation or activity requiring the use of **explosive materials** or perform or supervise the loading and firing of **explosive materials** without first obtaining the proper permit which authorizes him to purchase, possess, store, and use such materials.

§ 2:062 Every **person** conducting an operation or activity requiring the use of **explosive materials** (1) shall obtain a permit to use **explosive materials** and shall be responsible for the results and any other consequences of any loading or firing of **explosive materials**; and (2) shall permit the loading and firing to be preformed or supervised only by an individual possessing a permit to blast.

Sec. 2:07 *Blaster's Permit*

§ 2:071 It shall be unlawful for any individual to load or fire, or supervise the loading or firing of, **explosive materials** unless such individual possesses a blaster's permit. The blaster's permit must conform to the class and use as provided in Section 2:077 and be carried on the person of each such individual during the use of the **explosive materials**.

Use of **explosive materials** shall include all applications of **explosives** for any purpose whatsoever, except that for purposes of this part use does not include any type of commercial manufacturing or research conducted in laboratories of commercial or educational institutions.

§ 2:072 The applicant for an initial blaster's permit to supervise and perform the loading and firing of **explosive materials** must demonstrate that he has had adequate training and experience in the use of **explosive materials** in any class authorized by the permit applied for, and must pass a qualifying examination prepared and administered *[by the issuing authority]*. The examination may be written, oral or by such other means as necessary to determine that the applicant is competent to conduct blasting operations and to perform the duties of a **blaster**.

§ 2:073 Applicant for certification must:

a) Be at least 21 years of age.

b) Be in adequate physical and mental condition to perform the work required.

c) Be able to understand and give written and oral orders in the English language.
d) Be not addicted to alcohol, or to narcotics and other dangerous drugs.
e) Be qualified by reason of training, knowledge, and experienced in the field of transporting, storing, handling, and use of **explosive materials** applicable to the class of permit.
f) Have a working knowledge of federal, state and local laws and regulations pertaining to **explosive materials**.

§ 2:074 When a holder of a blaster's permit is convicted of a violation of any law or regulation relating to **explosive materials**, the holder's permit shall be suspended.

§ 2:075 Any individual whose blaster's permit has been suspended or revoked shall be required to pass a qualifying examination before the permit is reinstated.

§ 2:076 Any individual whose permit has lapsed for a period of one year or more shall be required to pass a qualifying examination before renewal.

§ 2:077 *Classes of Blaster's Permits*

CLASS	CATEGORY	DESCRIPTION
A	Unlimited	All types of blasting
B	General Above Ground	All phases of blasting operations in quarries, open pit mines, above ground construction
C	General Underground	All phases of blasting operations in underground mines, shafts, tunnels, and drifts
D	Demolition	All phases of blasting in demolition projects
E	Seismic Prospecting	All phases of blasting in seismic prospecting
F	Agriculture	All phases of blasting in agriculture but limited to not more than 50 lbs. per blast
G	Special	Special blasting as described on the permit

Sec. 2:08 ***Permit Restrictions***

§ 2:081 No permit shall be assigned or transferred.

§ 2:082 Permits shall be dated, numbered, and be valid for no more than one year from the date of issue.

§ 2:083 A blaster's permit shall be issued only to an individual qualified in accordance with the requirements of Section 2:07 and shall bear his name, address, and photograph.

Sec. 2:09 *Denial Or Revocation Of Permits*

§ 2:091 A permit for the use of **explosive materials** or to blast, may be denied or revoked for any of the following reasons:

a) Non-compliance with any order of [the **issuing authority**].
b) Proof that the permit applicant or holder is under indictment for, or has been convicted of, a felony or a misdemeanor.
c) The applicant is a fugitive from justice.
d) The applicant is an unlawful user of, or is addicted to, alcohol, or to narcotics and other dangerous drugs.
e) The applicant has been adjudicated a mental defective.
f) Proof that the permit applicant or holder advocates, or knowingly belongs to any organization or group that advocates violent overthrow of or violent action against any federal, state or local government.
g) Proof that the permit applicant or holder suffers from a mental or physical defect that would interfere with the applicant's safe handling of **explosives**.
h) Violation by the permit applicant or holder of any provision of any explosives law or regulation, or proof that false information was willfully given or a misrepresentation was willfully made to obtain the permit.

§ 2:092 In any case where [the **issuing authority**] denies, revokes, or suspends a permit, it shall promptly notify the applicant or permit holder. Said notice will set forth the specific basis for the denial, revocation, or suspension and state that upon written request a hearing before [the **issuing authority**] will be held within ten days after the date of the request.

§ 2:093 Promptly after such hearing [the **issuing authority**] shall state its findings and conclusions in writing and transmit a copy to the applicant or former permit holder.

§ 2:094 Upon notice of the revocation or suspension of any permit, the former permit holder shall immediately surrender to [the **issuing authority**] the permit and all copies thereof.

Sec. 2:10 *Posting Of Licenses And Permits*

§ 2:101 Licenses (or copies thereof) to manufacture, import, or deal

in **explosive materials** shall be posted and kept available for inspection at each place of operation.

§ 2:102 Permit to Use. A copy shall be posted at each place of operation.

§ 2:103 Permit to Blast. Shall be carried by the permit holder during blasting operations.

§ 2:104 Permit holders shall take every reasonable precaution to protect their permits from loss, theft, defacement, destruction or unauthorized duplication, and any such occurrence shall be reported immediately to [the **issuing authority**].

Sec. 2:11 *Record Keeping And Reporting*

§ 2:111 A holder of a permit to manufacture, import, deal in, or use **explosive materials** shall make a record of all transactions or operations involving **explosive materials**. Such record shall be made available to [the **issuing authority**] upon request, and shall be retained for five years.

§ 2:112 An accumulation of invoices, sales slips, delivery tickets, receipts, or similar papers representing individual transactions will satisfy the requirements for records provided they include the signature of any receiver of the **explosive materials**.

§ 2:113 An individual holding a blaster's permit shall make a daily record of all **explosive materials** received, fired, or otherwise disposed of by him. These records shall be retained for five years.

§ 2:114 [The **issuing authority**] shall be notified promptly by any permit holder of a change in business or home address.

§ 2:115 The theft or loss of **explosive materials** shall be reported within 24 hours to the Regional Director of the Bureau of Alcohol, Tobacco and Firearms of the appropriate district, to [the **issuing authority**], and to the local law enforcement authority.

§ 2:116 The making and keeping of records pursuant to the regulations promulgated by the Bureau of Alcohol, Tobacco and Firearms shall satisfy the requirements of this section.

Sec. 2:12 *Applications And Renewals*

§ 2:121 Application for a permit or its renewal shall be made to [the **issuing authority**] on forms provided by it and shall contain such information as may be required.

§ 2:122 If an application for renewal is filed with [the **issuing authority**] before the expiration of the old permit, the renewal will

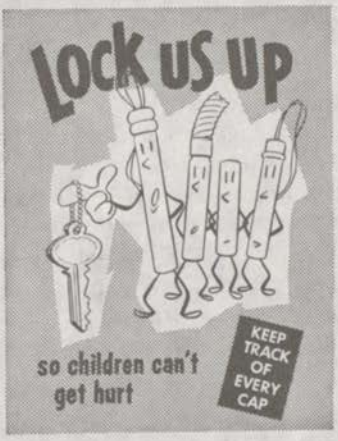
become effective when the old permit expires. No renewal permit shall be issued more than thirty days before the expiration date of the current permit.

§ 2:123 If an application for renewal is filed after the expiration of the old permit, it shall be considered as an application for a new permit.

§ 2:124 Permit Fees – Permit fees shall be paid at the time of application in the amount of [$].

Sec. 2:13 *Authority To Purchase In Contiguous States*

Any **person** who is a resident of this State and who uses **explosive materials** in the conduct of business or occupation may lawfully purchase **explosive materials** from a seller located or residing in a state contiguous to this State, provided such user holds a proper permit under these regulations.



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ARTICLE 3. SURFACE STORAGE OF EXPLOSIVE MATERIALS

Sec. 3:01 *General Provisions*

§ 3:011 **Explosive materials** shall be stored in **magazines** which meet the requirements of this Article. This shall not be construed as applying to stocks of **small arms ammunition, propellant-actuated power cartridges, small arms ammunition primers** in quantities of 750,000 or less, and **smokeless propellant** in quantities of 800 pounds or less (see Article 8).

§ 3:012 All **explosive materials** shall be stored in **magazines** unless they are:

a. in process of manufacture
b. being used
c. being loaded or unloaded into or from transportation vehicles or while in the course of transportation

§ 3:013 **Ammonium nitrate, blasting agents,** and **explosives** may be stored in the same **magazine** under the following conditions:

a. When **ammonium nitrate** is stored in the same **magazine** with **blasting agents,** the **magazine** shall be suitable for storage of **blasting agents.**

b. When **ammonium nitrate** is stored in the same **magazine** with **explosives** or **explosives** and **blasting agents,** the **magazine** shall be suitable for storage of **explosives.**

c. In applying the American Table of Distances or the Separation Table, one-half the weight of **ammonium nitrate** shall be added to the weight of **explosive materials** (See Appendices A & B).

§ 3:014 **Detonators** such as blasting caps, electric blasting caps, non-electric delay devices or detonating **primers** shall not be stored in the same **magazine** with other **explosive materials.**

§ 3:015 **Explosive materials** which are classified as **High Explosives** and are **bullet-sensitive** shall be stored in Types 1, 2, or 3 **magazines. Explosive materials** which are classified as **Low Explosives** which are not **bullet-sensitive** may be stored in Types 1, 2, 3, or 4 **magazines. Explosive materials** which are classified as **Blasting Agents** may be stored in Types 1, 2, 3, 4, or 5 **magazines.**

§ 3:016 **Detonators** shall be stored in Types 1, 2, or 3 **magazines,** except that electric blasting caps having leg wires at least four feet long (provided they are in the configuration as supplied by the manufacturer) may be stored in a Type 4 **magazine.**

§ 3:017 **Detonating cord** shall be stored in either a Type 1, 2, or 3 **magazine** and may be stored in these same type **magazines** with other **explosive materials**, except **detonators**.

In a situation of practical necessity, with the approval of the Regional Director of the Bureau of Alcohol, Tobacco, and Firearms, **detonating cord** and **detonators** may be stored in the same **magazine** provided the **magazine** is **bullet-resistant** and account is taken of the total explosive content in figuring compliance with separation distance requirements.

Sec. 3:02 *Classifications Of Magazines*

§ 3:021 **Type 1 Magazine.** A permanent **magazine** for the storage of **explosive materials** that are **bullet-sensitive** such as dynamite and **detonators** which will **mass detonate** (See Section 3:024 for storage restrictions for electric blasting caps and other non-mass exploding detonators).

§ 3:022 **Type 2 Magazine.** A portable or mobile **magazine** for outdoor or indoor storage of **explosive materials** that are **bullet-sensitive** such as dynamite and **detonators** which will **mass detonate** (See Section 3:024 for storage for electric blasting caps and other non-mass detonating explosive devices).

§ 3:023 **Type 3 Magazine.** A portable **magazine** for the temporary storage of **explosive materials** while attended. An example is a "day box" at the site of blasting operations.

§ 3:024 **Type 4 Magazine.** A permanent, portable or mobile **magazine** for the storage of **low explosives, explosive materials** that are not **bullet-sensitive**, or **explosive materials** that will not **mass detonate**, such as electric blasting caps as provided in Section 3:016.

§ 3:025 **Type 5 Magazine.** A permanent, portable or mobile **magazine** for the storage of **explosive materials** that are not **bullet-sensitive**. **Type 5 magazines** include tanks, tank trailers, tank trucks, semi-trailers, bulk trailers, bulk trucks and bins.

Sec. 3:03 *Location Of Magazines*

§ 3:031 All outdoor **magazines** except Type 3 shall be located in compliance with the "American Table of Distances for Storage of Explosives" (Appendix A) when determining minimum distances to **inhabited buildings**, passenger **railways**, and public **highways**.

§ 3:032 Separation Distances in Appendix A, B or both shall be used determining minimum separation of storage facilities for **explosives, blasting agents**, and **ammonium nitrate**. The Tables to be applied

when determining separation distances for specific materials shall be as follows:

Stored Materials	Use Appendix
Explosive, explosives	A
Ammonium nitrate, explosives	A,B
Ammonium nitrate, blasting agents	B
Blasting agents, explosives	A,B*
Ammonium nitrate, blasting agents, explosives	A,B*

§ 3:033 Type 2, Type 4, and Type 5 indoor **magazines** shall, subject to approval by [*the authority having jurisdiction*], be used for the storage of 50 pounds or less of **explosive materials** in warehouses and in wholesale and retail establishments. They shall be located on a floor which has an entrance at or ramp to exterior grade level. They shall be located not more than 10 feet from such an entrance. Two **magazines** may be located in the same building when one is used for **detonators** only, in quantities not in excess of 5,000, and when a distance of 10 feet is maintained between **magazines**. The local fire department shall be notified of the location of the **magazines** and of any change in location.

§ 3:034 A Type 3 magazine shall be located as far away as practicable from neighboring **inhabited buildings, railways, highways,** and any other **magazines.**

§ 3:035 A Type 3 magazine containing **explosive materials** shall be attended. At the end of the work day, all **explosive materials** shall be transferred to a Type 1, 2, 4, or 5 **magazine**, as appropriate. Two Type 3 magazines may be located at the site of blasting operations when one **magazine** is used for **detonators.**

Sec. 3:04 ***Construction Of Magazines – General***

§ 3:041 **Magazines** shall be constructed in conformity with the provisions of this Article, or in a manner substantially equivalent to the standards of security and safety contained herein. The construction provisions of this Article do not apply to storage magazines at an active manufacturing plant that has security gates and fencing, or at a magazine area that is operated continuously, or at a magazine area that is patrolled so that entry by intruders is unlikely.

§ 3:042 The ground around a **magazine** shall be graded in such a manner that water will not drain into the **magazine.**

§ 3:043 **Magazines** requiring heat shall be heated by either hot water radiant heating within the **magazine** building, or air directed into the

*See Note 2 of Appendix B.

magazine building over either hot water or low pressure steam (not more than 15 psig) coils located outside the **magazine** building.

§ 3:044 **Magazine** heating systems shall meet the following requirements:

a. Radiant heating coils within the **magazine** shall be installed in such a manner that the **explosive materials** or their containers cannot contact the coils and air is free to circulate between the coils and the **explosive materials** or their containers.

b. Heating ducts shall be installed in such a manner that the hot air discharge from the duct is not directed against the **explosive materials** or their containers.

c. Heating devices used in connection with a **magazine** shall have controls which prevent the ambient temperature in the **magazine** from exceeding 120°F.

d. Electric fans or pumps used in a heating system for a **magazine** shall be mounted outside and separate from the wall of the **magazine** and shall be grounded.

e. Electric fan or pump motors and controls for electrical heating devices used in heating water or steam shall have overloads and disconnects which comply with the National Electrical Code. All electrical switching devices shall be located outside and separate from the wall of the **magazine** and shall be grounded.

f. The heating source for water or steam shall be separated from the **magazine** by a distance of not less than 25 feet when electrical and 50 feet when fuel-fired. The area between the heating unit and the **magazine** shall be cleared of all combustible materials.

g. **Explosive materials** shall be stored in a manner which will allow air circulation so as to promote temperature uniformity throughout the **magazine**.

§ 3:045 When lights are necessary inside the **magazine**, electric safety flashlights or electric safety lanterns shall be used. The [*authority having jurisdiction*] may authorize interior lighting of special design for **magazines**.

§ 3:046 When ventilation is required in a **magazine**, sufficient ventilation shall be provided for the geographical location of the **magazine**. **Explosive materials** shall be stored within a **magazine** so as not to interfere with required ventilation.

§ 3:047 **Explosive materials** shall be stored within a Type 1, 2, 3, or 4 **magazine** so as to prevent contact with masonry walls or with any ferrous metal by means of a non-sparking lattice, paint, mastic, or equivalent lining.

§ 3:048 In a Type 5 **magazine**, ferrous metal may be exposed on the interior of the **magazine** provided it cannot rupture the packages of **explosive materials.**

Sec. 3:05 *Construction of Magazines*

Magazines constructed according to the following minimum specifications are approved as **bullet-resistant** as defined by Section 1:03 (all **steel** and wood dimensions are actual thicknesses; all concrete block and brick dimensions are nominal thicknesses):

a. Exterior of **steel**:
   1. 5/8-inch **steel** with an interior lining of any type of non-sparking material.
   2. 1/2-inch **steel** with an interior lining of not less than 3/8-inch **plywood**.
   3. 3/8-inch **steel** with an interior lining of:
      (i) 2 inches of **hardwood**, or
      (ii) 3 inches of **softwood**, or
      (iii) 2-1/4 inches of **plywood**.
   4. 1/4-inch **steel** with an interior lining of:
      (i) 3 inches of **hardwood**, or
      (ii) 5 inches of **softwood**, or
      (iii) 5-1/4 inches of **plywood**, or
      (iv) 1-1/2 inches of **plywood** with an intermediate layer of 2 inches of **hardwood**.
   5. 3/16-inch **steel** with an interior lining of:
      (i) 4 inches of **hardwood**, or
      (ii) 7 inches of **softwood**, or
      (iii) 6-3/4 inches of **plywood**, or
      (iv) 3/4 inches of **plywood** with an intermediate layer of 3 inches of **hardwood**.
   6. 1/8-inch **steel** with an interior lining of:
      (i) 5 inches of **hardwood**, or
      (ii) 9 inches of **softwood**, or
      (iii) 3/4 inches of **plywood** with an intermediate layer of 4 inches of **hardwood**, or
      (iv) 3/4 inches of **plywood** with a first intermediate layer of 3/4-inch **plywood** and a second intermediate layer of 3-5/8 inches of well-tamped dry sand or sand and cement mixture.

b. Exterior of any type of **fire-resistant** material which is structurally sound with:
   1. An interior lining of 1/2-inch **plywood** placed securely against an intermediate layer of:

(i) 4 inches solid concrete block, or
(ii) 4 inches solid brick, or
(iii) 4 inches solid concrete.

2. An interior lining of 3/4 inches of **plywood** and a first intermediate layer of 3/4-inch **plywood**, a second intermediate layer of 3-5/8-inch well-tamped dry sand or sand and cement mixture, a third intermediate layer of 3/4-inch **plywood**, and a fourth intermediate layer of 2 inches of **hardwood** or 14-gauge **steel**.
3. An intermediate 6-inch space filled with well-tamped dry sand or well-tamped sand and cement mixture.

c. Masonry construction of:
1. Standard 8-inch concrete block with voids filled with well-tamped dry sand or well-tamped sand and cement mixture, or
2. Standard 8-inch solid brick, or
3. 8-inch thick solid concrete.

§ 3:051 Type I Magazine

A Type I magazine shall be a permanent structure such as a building or an igloo that is **bullet-resistant, fire-resistant, theft-resistant, weather-resistant**, and ventilated.

a. Walls. The walls may be constructed according to any of the specifications listed in Section 3:05.

b. Doors. The doors may be constructed according to any of the specifications listed in Section 3:05.

c. Roof. The roof may be constructed of any type of structurally sound materials which are or have been made **fire-resistant** on the exterior.

d. Roof or Ceiling. Where the natural terrain around a Type I magazine makes it possible to shoot a bullet through the ceiling or roof at such an angle that a bullet could strike the **explosive materials** stored in the **magazine**, then either the roof or ceiling shall be of **bullet-resistant** construction. A **bullet-resistant** roof may be constructed according to any of the specifications listed in Section 3:05. A **bullet-resistant** ceiling may be constructed at the eave line, covering the entire area of the **magazine** except the space necessary for ventilation. Examples of ceiling construction that are considered **bullet-resistant** are:
1. A sand tray having a depth of not less than 4 inches of sand.
2. Any construction meeting specifications of Section 3:05.

e. Foundation. The foundation may be of masonry, wood, or metal and shall be completely enclosed except for openings to provide cross-ventilation. A wooden foundation enclosure shall be covered on the exterior with a **fire-resistant** material.

f. Floor. The floor may be constructed of wood or other suitable materials. Floors constructed of materials that may cause sparks shall be covered with a surface of non-sparking material or the packages of **explosive materials** shall be placed on pallets of non-sparking materials.

g. Ventilation. Ventilation shall be provided to prevent dampness and heating of stored **explosive materials**. Ventilating openings shall be screened to prevent the entrance of sparks. Ventilation openings in side walls and foundations shall be offset or shielded for **bullet-resistant** purposes. **Magazines** having foundation and roof ventilators with the air circulating between the side walls and the floors and between the side walls and the ceiling shall have a wooden lattice lining or equivalent to prevent the packages of **explosive materials** from being stacked against the side walls and blocking the air circulation.

h. Locks. Each door shall be equipped with two mortise locks; or with two padlocks fastened in separate hasps and staples; or with a combination of a mortise lock and a padlock; or with a mortise lock that requires two keys to open; or a three-point lock, or equivalent type of lock that secures a door to the frame at more than one point. Padlocks shall be steel having at least five tumblers and at least a 7/16-inch diameter case-hardened shackle. All padlocks shall be protected by **steel** hoods that are installed in such a manner as to discourage insertion of bolt cutters, saws, files, or levering devices. Doors that are secured by at least two substantial internal bolts or bars do not require additional locking devices. Hinges and hasps and all locking hardware shall be rigidly secured and fastened by welding or by through bolts which cannot be removed when the door is locked.

§ 3:052 Type 2 Magazine.

A Type 2 magazine shall be a portable or mobile structure, such as a box, skid-magazine, trailer or semi-trailer, that is **bullet-resistant, fire-resistant, theft-resistant, weather-resistant**, and ventilated, except that Type 2 indoor magazines need not be **bullet** or **weather-resistant** or ventilated. Any construction specified for a Type 1 magazine is acceptable for a Type 2 magazine.

a. Type 2 Outdoor Magazines.

Outdoor **magazines** shall be constructed according to any of the specifications listed in Section 3:05

1. Floors constructed of ferrous metal shall be covered with a surface of non-sparking material. **Magazines** with top openings shall have a lid that overlaps the sides by at least one inch when in closed position.

2. The **magazine** shall be supported in such a manner as to prevent the floor from having direct contact with the ground. **Magazines** less

than one cubic yard in size shall be securely fastened to a fixed object to prevent theft of the entire **magazine**.

3. Hinges, hasps, locks, and locking hardware shall conform to the provisions for Type 1 magazines as specified in paragraph 3:05 (h) except that padlocks on vehicular **magazines** need not be protected by **steel** hoods. When unattended, a vehicular **magazine** shall have wheels removed, or be locked with a kingpin locking device, or otherwise be effectively immobilized.

b. Type 2 Indoor Magazine

1. Type 2 indoor magazines constructed of wood shall have sides, bottoms, and lids or doors constructed of two-inch wood and shall be well braced at corners. The **magazines** shall be covered with sheet metal of not less than 26 gauge. Nails exposed to the interior of such **magazines** shall be countersunk.

2. Type 2 indoor magazines constructed of metal shall have sides, bottoms, and lids or doors constructed of 12-gauge metal and shall be lined inside with a non-sparking material. Edges of metal lids shall overlap sides at least one inch.

3. Type 2 indoor magazines shall be provided with substantial wheels or casters to facilitate removal from a building in an emergency. The lid for such **magazines** shall have substantial strap hinges and a means for locking with at least a five-tumbler steel padlock having at least a 7/16-inch diameter case-hardened shackle. The **magazines** shall be kept locked except during the placement or removal of **explosive materials**.

4. Type 2 indoor magazines shall be painted red and shall bear lettering in white, on top, at least three inches high, "Explosives – Keep Fire Away."

§ 3:053 Type 3 Magazine.

A Type 3 magazine shall be a portable structure that is **bullet-resistant, fire-resistant, theft-resistant, weather-resistant**, and ventilated.

a. Type 3 magazines shall be constructed according to any of the specifications listed in Section 3:05 which is practical.

b. Type 3 magazines shall be equipped with at least a five-tumbler steel padlock having at least a 7/16-inch-diameter case-hardened shackle.

§ 3:054 Type 4 Magazine.

A type 4 magazine shall be a permanent, portable, or mobile structure such as a building, igloo, box, semi-trailer or other mobile container that is **fire-resistant, theft-resistant, weather-resistant**, and ventilated, except that over-the-road trucks or semi-trailers used for temporary storage need not be ventilated or **fire-resistant**.

a. Type 4 Outdoor Magazine

A Type 4 outdoor magazine shall be constructed of masonry, wood covered with metal, fabricated metal or a combination of these materials. The doors shall be metal or wood covered with metal. Permanent **magazines** shall be constructed in accordance with those provisions for Type 1 magazines pertaining to foundations (Paragraph 3:051 [e]), floors (Paragraph 3:051 [f]), ventilation (Paragraph 3:051 [g]), and locks, hinges, hasps and locking hardware (Paragraph 3:051 [h]). Vehicular **magazines** shall be immobilized when unattended (Paragraph 3:052 [a] [3]).

b. Type 4 Indoor Magazine

A Type 4 indoor magazine shall be constructed in accordance with the provisions for a Type 2 indoor magazine (Paragraph 3:052 [b]).

§ 3:055 Type 5 Magazine.

A Type 5 magazine shall be a permanent, portable, or mobile structure such as a building, igloo, box, bin, tank, semi-trailer, bulk trailer, tank trailer, bulk truck, tank truck or other mobile container that is **fire-resistant**, **theft-resistant**, **weather-resistant**, and ventilated except that over-the road trucks or semi-trailers used for temporary storage need not be **fire-resistant** or ventilated and indoor **magazines** need not be **weather-resistant** or ventilated. Interior of Type 5 magazines need not be covered with non-sparking material.

a. A Type 5 magazine shall be locked with at least one steel case five-tumbler padlock having at least a 7/16-inch diameter case-hardened shackle. A hood for the padlock is not required. Hinges and hasps and all locking hardware shall be regidly secured and fastened by welding or by through bolts which cannot be removed when the door is locked.

b. A vehicular Type 5 magazine when unattended shall be immobilized in accordance with the provisions for a Type 2 vehicular magazine (Paragraph 3:052 [a] [3]).

Sec. 3:06 ***Magazine Operations***

§ 3:061 Storage Within **Magazines**.

a. **Magazines** shall at all times be in charge of a competent **person** who shall be at least 21 years of age, and who shall be conversant with and be responsible for the enforcement of all safety precautions.

b. All **magazines** containing **explosive materials** shall be opened and inspected at intervals of not greater than three days to determine whether there has been an unauthorized entry or attempted entry into the **magazines**; or to determine whether there has been unauthorized removal of the **magazines** or their contents.

c. **Magazine** doors shall be kept locked, except during the time of placement or removal of **explosive materials**, or during inspection.

d. Safety rules covering the operations of **magazines** shall be posted on the interior of the **magazine** door.

e. When **explosive material** is removed from a **magazine** for use, the oldest stocks shall be removed first.

f. Corresponding grades and brands shall be stored together and in such a manner that brand and grade marks are visible. All stocks shall be stored so as to be easily counted and checked.

g. Containers of **explosive materials** shall be stacked in a stable manner.

h. Rigid containers of **explosive materials** shall be laid flat, and cases with top side up.

i. Black powder, when stored in the same **magazine** with other **explosive materials**, shall be stacked separately.

j. Containers of **explosive materials** which have been opened shall be securely closed before being placed in a **magazine**. Only fiberboard containers may be opened in the **magazine**.

k. Containers of damaged **explosive materials** shall not be unpacked or repacked in, or within 50 feet of, a **magazine** or in close proximity to other **explosive materials**.

l. Tools used for opening containers of **explosive materials** shall be constructed of non-sparking material, except that metal slitters may be used for opening fiberboard containers provided that the metal slitter does not come into contact with any metallic fasteners which may be in or part of the case. Only a wooden wedge and a fiber, rubber, or wooden mallet shall be used for opening or closing wood containers of **explosive materials**.

m. **Magazines** shall be used exclusively for the storage of **explosive materials** and blasting accessories. No metal tools other than non-ferrous conveying equipment shall be stored in any **magazine** containing **explosive materials**. Ferrous metal conveying equipment may be stored in the **magazine** when protected by a coat of paint.

n. **Magazine** floors shall be regularly swept, kept clean, dry, free of grit, paper and rubbish. Brooms and other cleaning utensils shall not have any spark-producing metal parts. Sweepings from floors of **magazines** shall be disposed of in accordance with the instructions of the manufacturer.

o. When **explosive materials** have deteriorated to an extent that they are in an unstable or dangerous condition, or any liquid leaks from any **explosive material**, then the **person** in possession of such **explosive material** shall immediately proceed to deal with such **explosive material** in accordance with the instructions of the manufacturer. Only experienced **persons** shall direct the work of destroying **explosive materials**.

p. **Magazine** floors stained with liquid shall be dealt with according to instructions of the manufacturer.

q. When **magazines** need interior repairs, all **explosive materials** shall be removed therefrom and the floors cleaned before and after making repairs.

r. In making exterior **magazine** repairs, when there is a possibility of causing sparks or fire, all **explosive materials** shall first be removed from the **magazine**.

s. **Explosive materials** removed from a **magazine** under repair shall either be placed in another **magazine** or placed a safe distance from the **magazine**, where they shall be properly guarded and protected until repairs have been completed. Upon completion of repairs, the **explosive materials** shall be promptly returned to the magazine.

t. Smoking, matches, open flames, spark-producing devices, and firearms shall not be permitted inside of or within 50 feet of **magazines**, except that authorized **persons** may carry firearms within 50 feet of but not inside a **magazine**.

u. The land within 25 feet of any **magazine** shall be kept clear of rubbish, brush, dried grass, leaves, dead trees, and all live trees less than ten feet high.

v. Combustible materials shall not be stored within 50 feet of **magazines**.

w. **Explosive materials** recovered from blasting misfires shall be placed in a separate **magazine** until a competent **person** has determined from the manufacturer the method of disposal.

x. The premises upon which all outdoor **magazines** except Type 3 are located shall be posted with signs reading "Explosives – Keep Off." All signs shall be located so that a bullet passing through the sign will not strike a **magazine**.

ARTICLE 4. TRANSPORTATION OF EXPLOSIVE MATERIALS ON HIGHWAYS

Sec. 4:01 *General Provisions*

§ 4:011 In addition to all other applicable requirements set forth in this Code, the transportation of **explosive materials** over all **highways** shall be in accordance with U.S. Department of Transportation and other applicable state and local regulations.

§ 4:012 **Explosive materials** shall not be transported through any prohibited vehicular tunnel, or subway, or over any prohibited bridge, roadway, or elevated **highway**.

§ 4:013 No **person** shall smoke, carry matches or any other flame-producing device, or carry any unauthorized firearms or ammunition while in or near a vehicle transporting **explosive materials**. No vehicle shall be equipped with any type cigarette, cigar or pipe lighter.

§ 4:014 No **person** shall drive, load, or unload a vehicle transporting **explosive materials** in a careless or reckless manner.

§ 4:015 **Explosive materials** shall not be carried or transported in or upon a public conveyance or vehicle carrying passengers for hire.

§ 4:016 **Explosive materials** shall not be transferred from one vehicle to another within the [*name of city, county, state, or other area*] without informing the fire and police departments thereof. In the event of breakdown or collision, the local fire and police departments shall be promptly notified of the location and type of cargo. **Explosive materials** shall be transferred from the disabled vehicle to another vehicle only under proper and qualified supervision.

§ 4:017 **Detonators** may be transported with other **explosives** in the same motor vehicle only in accordance with Title 49 of the Code of Federal Regulation.

§ 4:018 This article does not apply to the transportation of **small arms ammunition** and components (see Article 8).

Sec. 4:02 *Transportation Vehicles*

§ 4:021 Vehicles used for transporting **explosive materials** shall be strong enough to carry the load and be in good mechanical condition. When **explosive materials** are transported by a vehicle with an open body, a portable **magazine** or closed container should be securely mounted on the bed to contain the cargo. All vehicles used for the transportation of **explosive materials** shall have tight floors and any exposed spark-producing metal on the inside of the body, portable **magazine**, or closed container, shall be covered with wood or other

non-sparking material to prevent contact with the **explosive materials**, except that exposed spark-producing metal need not be covered in vehicles transporting **blasting agents** or **oxidizing materials**.

§ 4:022 **Motor vehicles**, when used for transporting any quantity of **explosive materials** shall be marked with placards and lettering as specified in U.S. Dept. of Transportation, Hazardous Materials Regulations.

§ 4:023 Each **motor vehicle** used for transporting **explosive materials** shall be equipped with fire extinguishers as follows:

Trucks of less than 14,000 pounds GVW rating: Minimum of two extinguishers with total **fire extinguisher rating** of at least 20 B:C.

Trucks over 14,000 pounds GVW rating: Two or more extinguishers with total **fire extinguisher rating** of at least 70 B:C.

Tractor semi-trailer unit: Two or more extinguishers with total **fire extinguisher rating** of at least 70 B:C.

a. Only extinguishers listed or approved by a nationally recognized fire equipment testing laboratory shall be deemed suitable for use on vehicles carrying **explosive materials**. They shall be equipped with a device permitting visual determination of charged condition.

b. Extinguishers shall be located where they will be convenient and ready for immediate use. Extinguishers shall be examined and recharged periodically in accordance with the manufacturer's recommendations.

c. Where trucks are operated in sub-zero temperatures, dry powder extinguishers should be pressurized with nitrogen gas in lieu of carbon dioxide.

§ 4:024 A **motor vehicle** used for transporting **explosive materials** shall be inspected each day before use to determine that it is in proper condition for safe transportation, including:

a. The fire extinguishers are fully charged and ready for use.

b. All electrical wiring is completely protected and securely fastened to prevent short-circuiting.

c. Chassis, motor, pan and underside of body is reasonably clean and free of excess oil and grease.

d. Fuel tanks, feed lines, and cross-over lines are secure and have no leaks.

e. Brakes, lights, horns, windshield wipers and defrosters, and steering apparatus are functioning properly.

f. Tires have proper inflation and are free of defects.

Sec. 4:03 ***Operation Of Transportation Vehicles***

§ 4:031 Vehicles transporting **explosive materials** shall be driven only by, and be in the charge of, a properly licensed driver not less than

21 years of age. The driver must be physically fit, careful, capable, reliable, and able to read and write the English language. The driver must not be addicted to the use, or under the influence, of intoxicants, narcotics, or dangerous drugs. The driver shall be familiar with applicable local, state, and federal laws and regulations governing the transportation of **explosive materials**.

§ 4:032 Except under emergency conditions, no vehicle transporting **explosive materials** shall be parked before reaching its destination, even though attended, on any public street adjacent to or in proximity to any bridge, tunnel, dwelling, building, or place where people work, congregate, or assemble.

§ 4:033 Every **motor vehicle** transporting any quantity of Class A or Class B **explosives** or **blasting agents** shall, at all times, be attended by a driver or other **person** employed by the motor carrier. Such attendant shall have been:

a. Made aware of the class of **explosive material** in the vehicle and of its inherent dangers;

b. Instructed in the measures and procedures to be followed in order to protect the public from such inherent dangers;

c. Familiarized with the vehicle he is assigned to attend; and

d. Trained, authorized, and enabled to move the vehicle when required.

For the purpose of this section, a **motor vehicle** shall be deemed "attended" only when such attendant:

1. Is physically on or in the vehicle, or has it within his field of vision and can reach it quickly without any interference; and

2. Is awake and alert and not engaged in other duties or activities which may divert his attention from the vehicle.

Provided, however:

(a) That if there is a single attendant he may be absent from the vehicle for a brief period (i) for necessary communication with public officers, or representatives of the carrier, shipper or consignee, or (ii) when necessary to obtain food or to provide for physical comfort; and

(b) An **explosives** laden vehicle may be left unattended if parked within a securely fenced or walled area with all gates or entrances locked where parking of such vehicle is otherwise permissible, or at a **magazine** site or other location established solely for the purpose of storing **explosive materials** and approved for such storage [*by the authority having jurisdiction*].

§ 4:034 Tires shall be checked for proper inflation and general condition at every rest stop but, in any event, after each two hours or 100 miles of travel, whichever occurs first. Flat or overheated tires shall

be immediately removed from the vehicle. After removal the tire shall be placed far enough from the vehicle so that a spontaneous ignition of the tire will not endanger the vehicle or its cargo. The tire shall not be replaced on the vehicle until it has been cooled below the danger of ignition, nor shall it be used until the cause has been corrected.

§ 4:035 No spark-producing metal, spark-producing metal tools, oils, matches, firearms, electric storage batteries, flammable substances, acids, **oxidizing materials** or corrosive compounds shall be carried in the body of any **motor vehicle** transporting **explosive materials** unless the loading of hazardous materials complies with U.S. Department of Transportation Regulations.

§ 4:036 Vehicles transporting **explosing materials** shall avoid congested areas and heavy traffic and shall follow routes when designated by local authorities.

§ 4:037 Delivery shall only be made to authorized **persons** and into authorized **magazines** or approved temporary storage or handling areas.

§ 4:038 Motor vehicles transporting **explosive materials** must come to a full stop before crossing any **railway** track or main **highway**, and must not proceed until it is known that the way is clear.

§ 4:039 Unauthorized **persons** or passengers are not permitted on a **motor vehicle** transporting **explosive materials.**

ARTICLE 5. USE OF EXPLOSIVE MATERIALS FOR BLASTING

Sec. 5:01 *General Provisions*

§ 5:011 **Persons** handling **explosive materials** must be at least 21 years of age, possess a permit, or be supervised by a holder of either a use or blaster's permit (See Sec. 2:07 and 5:05).

§ 5:012 While **explosive materials** are being handled or used, smoking shall not be permitted and no one near the **explosive materials** shall possess matches, open light, or fire or flame-producing devices, except for the specific purpose of igniting **safety fuse**. No **person** shall handle **explosive materials** while under the influence of intoxicating liquors, narcotics, or dangerous drugs.

§ 5:013 Original containers or Type 3 Magazines shall be used for transporting **detonators** and other **explosives** from storage **magazines** to the blasting area.

§ 5:014 When blasting is done in a congested area or in close proximity to a structure, **railway**, or **highway**, or any other installation that may be affected, special precautions shall be exercised to prevent damage and to minimize earth vibrations, air blasts, and thrown fragments.

§ 5:015 When preparing explosive charges or conducting blasting operations, the holder of the Blaster's Permit shall use reasonable precautions, including but not limited to warning signals, flags, barricades or mats as may be required or appropriate, to insure the safety of the general public and workmen.

§ 5:016 Surface blasting operations shall be conducted during daylight hours whenever possible.

§ 5:017 Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph, or steam utilities, the **blaster** shall notify the appropriate representatives of such utilities at least 24 hours in advance of blasting, specifying the location and intended time of such blasting. Oral notice shall be confirmed with written notice. In an emergency, this time limit may be waived by [*the authority having jurisdiction*].

§ 5:018 Precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms or other sources of extraneous electricity. These precautions shall include:

a) The suspension of all blasting operations and removal of **persons**

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from the blasting area during the approach and progress of electrical storms.

b) The posting of signs on all roads warning against the use of mobile radio transmitters within 350 feet of the blasting operations.

c) Compliance with the latest requirements of [*the designated authority*] with regard to blasting in the vicinity of radio transmitters or power lines.

§ 5:019 Empty single-trip containers and paper and fiber packing materials which have previously contained **explosive materials**, other than **detonators**, shall not be used again for any purpose, but shall be destroyed by burning at an isolated location out of doors, and no **person** shall be nearer than 100 feet after the burning has started.

§ 5:0110 Containers of **explosive materials** shall not be opened in any **magazine** or within 50 feet of any **magazine**, except as provided for in Article 3, Section 3:061.

§ 5:0111 **Explosive materials** or blasting equipment that are obviously deteriorated or damaged shall not be used.

§ 5:0112 No **explosive materials** shall be abandoned, in any location, for any reason. Never leave **explosives** lying around where children or unauthorized **persons** can get them.

Sec. 5:02 ***Loading of Explosive Materials (Blasting)***

§ 5:021 All drill holes shall be of sufficient size to permit the free insertion of cartridges of **explosive materials**.

§ 5:022 Tamping shall be done with wooden rods without exposed metal parts, but non-sparking metal connectors may be used for jointed poles. Approved plastic tamping poles may be used. Violent tamping shall be avoided. The **primer** shall never be tamped.

§ 5:023 Pneumatic loading of **blasting agents** into blast holes primed with electric blasting caps or other static-sensitive systems shall conform to the following requirements:

(a) A positive grounding device shall be used to prevent the accumulation of static electricity.

(b) A **semi-conductive** discharge **hose** shall be used.

(c) A qualified **person** shall evaluate all systems to assure that they will adequately dissipate static under potential field conditions.

§ 5:024 The surface or face materials shall be carefully examined before drilling to determine the possible presence of unfired **explosive materials**.

§ 5:025 Drilling into **explosive materials** or any portion of a hole which at one time has contained **explosive materials** is prohibited.

§ 5:026 After loading for a blast is completed, all excess **explosive materials** shall be removed from the area and returned to **magazines.**

Sec. 5:03 *Initiating Blasts*

§ 5:031 Only electric blasting caps, non-electric delay **detonators** and **detonating cord** or a combination thereof, shall be used for blasting operations in congested districts, or on **highways**, or adjacent to **highways** open to traffic, except where sources of extraneous electricity make such use dangerous.

§ 5:032 When **safety fuse** is used, the blasting cap shall be securely attached to the fuse only with an approved cap crimper.

§ 5:033 No **detonator** shall be inserted in **explosive materials** which do not have a cap well without first making a hole in the cartridge with a wooden or non-sparking metal punch of proper size, or the appropriate pointed handle of an approved cap crimper. No **primers** shall be assembled closer than 50 feet from any **magazine. Primers** shall be made up only when and as required for immediate needs.

§ 5:034 **Explosive materials** shall not be extracted from a hole that has once been charged or has misfired unless it is impossible or hazardous to detonate the unexploded charge by insertion of an additional **primer.**

§ 5:035 If there are any misfires, all **persons** shall remain at a safe distance from the charge for at least one hour. Misfires shall be handled under the direction of the **blaster** in charge and all wires shall be carefully traced and search made for unexploded charges.

§ 5:036 **Blasters**, when testing circuits to charged holes, shall use only blasting galvanometers or other instruments which have been designed and approved for this purpose.

§ 5:037 Only the **person** making leading wire connections in electrical firing shall fire the shot. All connections shall be made progressively from bore hole back to the source of firing current, and the leading wires shall remain shorted and not be connected to the blasting machine or other source of current until the charge is to be fired.

Sec. 5:04 *Warning Required*

No blast shall be fired until the **blaster** in charge has made certain that all surplus **explosive materials** are in a safe place, all **persons** and equipment are at a safe distance or under sufficient cover, and that an adequate warning signal has been given.

Sec. 5:05 *Supervision of Blasting*

Loading and firing shall be performed or supervised only by a **person** possessing an appropriate blaster's permit (See Article 2).

ARTICLE 6. BLASTING AGENTS

Sec. 6:01 *General Provisions*

§ 6:011 Unless otherwise set forth in this article, **blasting agents** shall be transported, stored, and used in the same manner as other **explosive materials** as provided in Articles 4, 3, and 2 and 5 respectively. Provisions for **water gels** are in Article 7.

Sec. 6:02 *Fixed Location Mixing*

§ 6:021 Buildings or other facilities used for mixing **blasting agents** shall be located, with respect to **inhabited buildings**, passenger **railways** and public **highways**, in accordance with the American Table of Distances (See Appendix A). In addition, the mixing facility shall be separated from permanent storage facilities in accordance with the "Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents" (See Appendix B).

§ 6:022 Buildings or other facilities used for the mixing of **blasting agents** shall conform to the following requirements, unless otherwise specifically approved by [*the authority having jurisdiction*]:

a. Construction shall be either of non-combustible materials or sheet metal on wood studs.

b. Floors shall be of concrete or other non-absorbent material.

c. All **fuel** oil storage facilities shall be separated from the mixing plant, and located in such a manner that in case of tank rupture the oil will drain away from the mixing plant.

d. The plant shall be well ventilated.

e. Heating units which do not depend on combustion processes, when properly designed and located, may be used in the plant. All direct sources of heat shall be provided exclusively from units located outside the mixing plant.

f. All internal-combustion engines used for electric power generation shall be located outside the mixing plant, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

§ 6:023 Equipment used for mixing **blasting agents** shall conform to the following requirements:

a. The design of the mixer shall minimize the possibility of frictional heating, compaction, and confinement. All bearings and drive assemblies shall be mounted outside the mixer and protected against the accumulation of dust. All surfaces shall be accessible for cleaning.

b. Mixing and packaging equipment shall be constructed of materials compatible with the **fuel, ammonium nitrate**, or mixed composition.

c. Suitable means shall be provided to prevent the flow of **fuel** oil to the mixer in case of fire. In gravity flow systems an automatic spring-loaded shut-off valve with fusible link shall be installed.

§ 6:024 **Blasting Agent** compositions shall conform to the following requirements.

a. **Sensitivity** shall be determined by means of a Number 8 Test Blasting Cap, or a cap of equivalent strength, at regular intervals and after every change in formulation, or as may be requested by [*the authority having jurisdiction*].

b. **Oxidizers** of small particle size, such as crushed **ammonium nitrate** prills or fines, may be more sensitive than coarser products and shall, therefore, be handled accordingly.

c. No hydrocarbon liquid **fuel** with **flash point** lower than that of No. 2 diesel **fuel** oil (125°F. minimum or legal) shall be used.

d. Crude oil and crankcase oil shall not be used, except with approval of [*the authority having jurisdiction*] when tests demonstrate that the **flash point** is no lower than 125°F. and the resulting **blasting agent** composition is not cap-sensitive.

e. Metal powders, such as aluminum, shall be kept dry and shall be stored in containers or bins which are moisture-resistant. Solid **fuels** shall be used in such manner as to minimize dust explosion hazards.

f. Peroxides and chlorates shall not be used.

g. The requirements of Paragraphs c, d and f do not apply to compositions made under the supervision of qualified personnel capable of determining the overall hazards of the resulting product in its manufacture, transportation, storage and use.

§ 6:025 Unless all electrical switches, controls, motors, and lights located in the mixing room conform to the requirements of the National Electrical Code for Class II, Division 2 locations, they shall be located outside the mixing room. The frame of the mixer and all other equipment that may be used shall be electrically bonded and be provided with a continuous path to the ground.

§ 6:026 Safety precautions at mixing plants shall include the following requirements:

a. Floors shall be constructed without open floor drains and piping into which molten materials could flow and be confined in case of fire.

b. The floors and equipment of the mixing and packaging room shall be cleaned regularly and thoroughly to prevent accumulation of **oxidizers** or **fuels** and other sensitizers.

c. The entire mixing and packaging plant shall be cleaned regularly and thoroughly to prevent excessive accumulation of dust.

d. Smoking, matches, open flames, spark-producing devices, and firearms shall not be permitted inside of or within 50 feet of any building or facility used for the mixing of **blasting agents** (except firearms when carried by authorized **persons**).

e. The land within 25 feet of any mixing plant shall be kept clear of rubbish, brush, dried grass, leaves, dead trees, and all live trees less than ten feet high.

f. Empty **ammonium nitrate** bags shall be disposed of daily in a safe manner.

g. No welding shall be permitted nor open flames allowed in or around the mixing or storage area of the plant unless the equipment or area has been completely washed down and all **fuels** and **oxidizing material** removed.

h. Before welding or making repairs to hollow shafts, all **fuels** and **oxidizing material** shall be removed from the outside and inside of the shaft by a thorough washing and the shaft vented with an opening of at least 1/2-inch diameter.

i. Other **explosive materials** shall not be stored in any building or facility used for the mixing of **blasting agents**.

Sec. 6:03 ***Bulk Delivery And Mixing Vehicles***

§ 6:031 The provisions of this Section shall apply to off-highway private operations as well as all public **highway** transportation.

§ 6:032 A bulk vehicle body for delivering and mixing **blasting agents** shall conform to the following construction requirements:

a. The body shall be constructed of non-combustible materials.

b. Vehicles used to transport bulk pre-mixed **blasting agents** on public **highways** under special approval of the U.S. Department of Transportation shall have closed bodies.

c. All moving parts of the mixing system shall be designed so as to prevent a heat build-up. Shafts or axles which contact the product shall have outboard bearings with one-inch minimum clearance between the bearings and the outside of the product container.

d. A bulk delivery vehicle shall be strong enough to carry the load without difficulty and be in good mechanical condition.

§ 6:033 Operation of bulk delivery vehicles shall conform to the following requirements:

a. The hauling of **blasting agents** over public **highways** shall conform to local, state, and federal transportation regulations.

b. Vehicles transporting **blasting agents** shall be driven only by, and be in the charge of, a properly licensed driver not less than 21 years of age. The driver must be physically fit, careful, capable, reliable, and able to read and write the English language. The driver must not be addicted to the use, or under the influence, of intoxicants, narcotics or dangerous drugs. The driver shall be familiar with applicable local, state, and federal laws and regulations governing the transportation of **explosive materials**.

c. The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. He shall be familiar with the commodities being delivered and the general procedure for handling emergency situations.

d. No **person** shall be permitted to ride on, or load or unload, a vehicle containing **blasting agents** while under the influence of intoxicants, narcotics, or dangerous drugs.

e. No **person** shall smoke, carry matches or any other flame-producing device, or carry any unauthorized firearms while in or near bulk vehicles effecting the mixing, transfer or down-the-hole loading of **blasting agents** at or near the blasting site. No vehicle shall be equipped with any type cigarette, cigar or pipe lighter.

f. Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, **detonator** wires, or **explosive materials**. The driver in moving the vehicle shall obtain the assistance of a second **person** to guide his movements.

g. No in-transit mixing of **blasting agents** shall be performed.

h. Vehicles transporting **blasting agents** shall be in safe operating condition at all times.

i. The hauling of **detonators** or other **explosive materials** shall be permitted on bulk trucks provided a separate wood or non-ferrous lined container meeting Regulations of the U.S. Department of Transportation is installed on the vehicle for hauling each of these materials separately.

§ 6:034 Pneumatic loading from bulk delivery vehicles into blast holes primed with electric blasting caps or other static-sensitive systems shall conform to the following:

a. A positive grounding device shall be used to prevent the accumulation of static electricity.

b. A **semi-conductive** discharge **hose** shall be used.

c. A qualified **person** shall evaluate all systems to insure that they will adequately dissipate static electricity under potential field conditions.

§ 6:035 Repairs to bulk delivery vehicles shall conform to the following:

a. No welding shall be permitted nor open flames allowed on or around any part of delivery equipment unless all mixing materials have been removed and the delivery equipment has been completely washed down.

b. Before welding or making repairs to hollow shafts, all **fuels** and **oxidizing materials** shall be removed from the outside and inside of the shaft by a thorough washing, and the shaft vented with an opening of at least 1/2-inch diameter.

Sec. 6:04 ***Bulk Storage Bins For Blasting Agents***

§ 6:041 A bin for bulk storage of **blasting agents** shall conform to the requirements for a Type 5 magazine.

§ 6:042 The bin, including supports, shall be constructed of chemically compatible materials to minimize the effect of the corrosive and reactive properties of **ammonium nitrate** and adequately supported or braced to withstand the combination of all loads, including impact forces arising from product movement within the bin or accidental vehicle contact with the support legs.

§ 6:043 The bin discharge gate shall be designed to provide a closure tight enough to prevent leakage of the stored product.

§ 6:044 Bin-loading manways, access hatches, and discharge gates shall be designed to permit locking.

§ 6:045 Any electrically driven conveyors for loading or unloading bins shall conform to the requirements of the National Electrical Code. They shall be designed to minimize damage from corrosion.

§ 6:046 Bins containing **blasting agents** shall be located, with respect to **inhabited buildings**, passenger **railways** and public **highways** in accordance with the "American Table of Distances for Storage of Explosives" (See Appendix A).

§ 6:047 Bins containing **blasting agents** shall be located, with respect to **ammonium nitrate** storage, **blasting agent** storage, and **explosive** storage, in conformity with the "Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents," and the "American Table of Distances for Storage of Explosives" (See Appendices A and B; Section 3:032).

§ 6:048 The area within 25 feet of any bin containing **blasting agents** shall be kept free of rubbish, brush, dried grass, leaves and other combustible materials. Spilled product shall not be allowed to accumulate on the ground.

ARTICLE 7. WATER GELS (Slurries)

Sec. 7:01 *General Provisions*

§ 7:011 Unless otherwise set forth in this Article, **water gels** shall be transported, stored and used in the same manner as other **explosive materials** in accordance with the classification of the product and as provided in Articles 4, 3, and 2 and 5, respectively.

Sec. 7:02 *Types Of Classifications*

§ 7:021 **Water gels** shall be classified as **explosives** when they can be detonated by a Number 8 Test Blasting Cap (See Section 1:03-BLASTING AGENT), and shall be manufactured, transported, stored and used as specified for "**explosives**" in this Code.

§ 7:022 **Water gels** shall be classified as **blasting agents** when they cannot be detonated by a Number 8 Test Blasting Cap (See Section 1:03-BLASTING AGENT) and shall be manufactured, transported, stored and used as specified for "**blasting agents**" in this Code.

Sec. 7:03 *Fixed Location Mixing*

§ 7:031 Buildings or other facilities used for mixing **water gels** shall be located with respect to **inhabited buildings**, passenger **railways** and public **highways**, in accordance with the "American Table of Distances for Storage of Explosives" (See Appendix A). The mixing facility shall be separated from permanent storage facilities in accordance with "Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents," and the "American Table of Distances for Storage of Explosives" (See Appendices A and B; Section 3:032).

§ 7:032 Buildings or other facilities used for the mixing of **water gels** shall conform to the following requirements unless otherwise specifically approved by [*the authority having jurisdiction*]:

a. Construction shall be either of non-combustible materials or sheet metal on wood studs.

b. Floors shall be of concrete or of other non-absorbent material.

c. All storage facilities for heating oil shall be separated from the mixing plant, and located in such a manner that in case of tank rupture the oil will drain away from the mixing plant.

d. The plant shall be well ventilated.

e. Heating units which do not depend on combustion processes, when properly designed and located, may be used in the plant. All direct sources of heat shall be provided exclusively from units located outside the mixing plant.

f. All internal-combustion engines used for electric power generation shall be located outside the mixing plant, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

§ 7:033 Ingredients of **water gels** shall conform to the following:

a. Ingredients classified as **explosives** shall be stored in conformity with Article 3, Surface Storage of Explosive Materials.

b. Nitrate water solutions may be stored in tank cars, tank trucks, or fixed tanks without quantity or distance limitations. Spills or leaks shall be cleaned up immediately.

c. Metal powders such as aluminum shall be kept dry and shall be stored in containers or bins which are moisture-resistant. Solid **fuels** shall be used in such manner as to minimize dust explosion hazards.

d. Ingredients shall not be stored with incompatible materials.

e. Peroxides and chlorates shall not be used.

§ 7:034 Mixing equipment shall comply with the following:

a. The design of the processing equipment, including mixing and conveying equipment, shall be compatible with the relative **sensitivity** of the materials being handled. Equipment shall be designed to minimize the possibility of frictional heating, compaction, overloading, and confinement.

b. Both equipment and handling procedures shall be designed to prevent the introduction of foreign objects or materials.

c. Mixers, pumps, valves and related equipment shall be designed to permit regular and periodic flushing, cleaning, dismantling and inspection.

d. All electrical equipment including wiring, switches, controls, motors and lights, shall conform to the requirements of the National Electrical Code for Class II, Division 2 locations.

e. All electric motors and generators shall be provided with suitable overload protection devices. Electrical generators, motors, proportioning devices, and all other electrical enclosures shall be electrically bonded. The grounding conductor to all such electrical equipment shall be effectively bonded to the service-entrance ground connection and to all equipment ground connections in a manner so as to provide a continuous path to ground.

§ 7:035 Mixing facilities shall comply with the following fire prevention requirements:

a. The mixing, loading, and ingredient transfer areas where residues or spilled materials may accumulate shall be cleaned periodically. A cleaning and collection system for dangerous residues shall be provided.

b. A daily visual inspection shall be made of the mixing, conveying and electrical equipment to determine that such equipment is in good operating condition. A program of systematic maintenance shall be conducted on a regular schedule.

c. Heaters which are not dependent on a combustion process within the heating unit may be used within the confines of processing buildings or compartments when equipped with temperature and safety controls which are located away from combustible materials and the finished product.

Sec. 7:04 *Bulk Delivery And Mixing Vehicles*

§ 7:041 The design of vehicles shall comply with the following requirements.

a. Vehicles used over public **highways** for the bulk transportation of **water gels** or of ingredients classified as Hazardous Materials by the U.S. Department of Transportation shall meet the requirements of that Department and Articles 4 and 6 of this Code.

b. When electric power is supplied by a self-contained motor generator located on the vehicle, the motor generator shall be separated from the **water gel** discharge.

c. Processing equipment and facilities shall conform to the provisions of Sec. 7:034 and Sec. 7:035.

d. A positive action parking brake which will set the wheel brakes on at least one axle shall be provided on vehicles when equipped with air brakes and shall be used during bulk delivery operations. Wheel chocks shall supplement parking brakes whenever conditions may require.

§ 7:042 Operation of bulk delivery and mixing vehicles shall comply with the following:

a. The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. He shall be familiar with the commodities being delivered and the general procedure for handling emergency situations. He shall meet the qualification requirements of Section 4:031.

b. The hauling of **detonators** or other **explosive materials** shall be permitted on bulk trucks provided a separate wood or non-ferrous-lined container meeting Regulations of the U.S. Department of Transportation is installed on the vehicle for hauling each of these materials separately.

c. No **person** shall smoke, carry matches or any other flame-producing device, or carry any unauthorized firearms while in or near bulk vehicles effecting the mixing, transfer or down-the-hole loading of **water gels** at or near the blasting site. No vehicle shall be equipped with any type cigarette, cigar or pipe lighter.

d. Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, **detonator** wires, or **explosive materials**. The driver in moving the vehicle shall obtain the assistance of a second **person** to guide his movements.

e. No in-transit mixing of **water gels** shall be performed.

f. The location chosen for **water gel** or ingredient transfer from a support vehicle into the borehole loading vehicle shall be away from the blast hole site when the boreholes are loaded or in the process of being loaded.



ARTICLE 8. SMALL ARMS AMMUNITION AND COMPONENTS

Sec. 8:01 *General Provisions*

§ 8:011 The transportation of **small arms ammunition, small arms ammunition primers, smokeless propellants** and black powder **propellants** shall be in accordance with U.S. Department of Transportation regulations.

§ 8:012 The provisions of this Article apply to the distributors and users of **small arms ammunition, small arms ammunition primers, smokeless propellants** and black powder **propellants.**

§ 8:013 This Article is not intended to cover safety procedures in the use of **small arms ammunition** and components nor in-process storage and intra-plant transportation during manufacture.

Sec. 8:02 *Small Arms Ammunition*

§ 8:021 No quantity limitation shall be imposed on storage of **small arms ammunition** in warehouses, retail stores and other general occupancies.

§ 8:022 **Small arms ammunition** shall be separated from flammable liquids, flammable solids (as classified by the U.S. Department of Transportation) and **oxidizing materials** by a **fire-resistant** wall of one-hour rating or by a distance of 25 feet.

§ 8:023 **Small arms ammunition** shall not be stored with **explosive materials** that are **bullet-sensitive.**

Sec. 8:03 *Smokeless Propellants*

§ 8:031 All **smokeless propellants** shall be stored in shipping containers specified by the U.S. Department of Transportation except as hereinafter provided.

§ 8:032 **Smokeless propellants** intended for personal use in quantities not to exceed 20 pounds may be stored in original containers in residences; quantities over 20 pounds but not to exceed 50 pounds may be stored in original containers in residences inside a wooden box or cabinet having walls of at least one-inch nominal thickness.

§ 8:033 Not more than 20 pounds of **smokeless propellants,** in containers of one-pound maximum capacity, shall be displayed in commercial establishments.

§ 8:034 Commercial stocks of **smokeless propellants** shall be stored as follows:

a. Quantities over 20 pounds and not more than 100 pounds shall be stored in portable wooden boxes having walls of at least one-inch nominal thickness.

b. Quantities over 100 pounds and not more than 800 pounds shall be stored in storage cabinets having wooden walls of at least one-inch nominal thickness. Not more than 400 pounds shall be permitted in any one cabinet.

c. Quantities in excess of 800 pounds shall be stored in **magazines** constructed and located as specified in Article 3 of this Code.

Sec. 8:04 *Black Powder Propellants*

§ 8:041 All black powder **propellants** shall be stored in shipping containers approved by the U.S. Department of Transportation except as hereinafter provided.

§ 8:042 Black powder **propellants** intended for personal use in quantities not to exceed five pounds may be stored in residences in original containers in a wooden box or cabinet having walls of at least one-inch nominal thickness.

§ 8:043 Not more than one pound of black powder **propellant** shall be displayed in commercial establishments.

§ 8:044 Commercial stocks in quantities exceeding 5 pounds shall be stored in **magazines** constructed and located as specified in Article 3 of this Code.

§ 8:045 When **smokeless propellants** are stored with black powder **propellants**, the total quantity shall not exceed that permitted for black powder **propellants**.

Sec. 8:05 *Small Arms Ammunition Primers*

§ 8:051 **Small arms ammunition primers** shall be stored in the original shipping containers approved by the U.S. Department of Transportation.

§ 8:052 Not more than 10,000 **small arms ammunition primers** may be stored in residences.

§ 8:053 Not more than 10,000 **small arms ammunition primers** may be displayed in commercial establishments.

§ 8:054 **Small arms ammunition primers** shall be separated from flammable liquids, flammable solids (as classified by the U.S. Depart-

ment of Transportation), and **oxidizing materials** by a **fire-resistant** wall of one-hour rating or by a distance of 25 feet.

§ 8:055 Quantities up to 750,000 **small arms ammunition primers** may be stored in any one commercial establishment provided that not more than 100,000 are stored in any one stack and stacks are at least 15 feet apart.

§ 8:056 Quantities in excess of 750,000 **small arms ammunition primers** shall be stored in **magazines** constructed and located in accordance with Article 3 of this Code.





Lying in the grass, a blasting cap can be as deadly as a rattler. But while people know enough to avoid snakes, blasting caps are another story. To a youngster, a blasting cap may look perfectly harmless . . . even inviting. • A continuing nationwide safety program alerts the public to the hazards of blasting caps, but there's no substitute for what you can do to maintain tight security on caps. To keep blasting caps out of the hands of children takes planning, proper storage, tough surveillance, strict accountability . . . and a good lock. • It's up to you to keep blasting caps "out of the grass." Lock 'em up. • For free blasting cap safety material, write to:

INSTITUTE OF
MAKERS OF
EXPLOSIVES

420 LEXINGTON AVENUE
NEW YORK, N.Y. 10017

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AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES

As Revised and Approved by The Institute of Makers of Explosives — November 5, 1971

QUANTITY OF EXPLOSIVES		DISTANCES IN FEET							
		Inhabited Buildings		Public Highways Class A to D		Passenger Railways — Public Highways with Traffic Volume of more than 3,000 Vehicles/Day		Separation of Magazines	
Pounds Over	Pounds Not Over	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded	Barricaded	Unbarricaded
2	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	532	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	35	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	948	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130

APPENDIX A (Cont'd.)

QUANTITY OF EXPLOSIVES		DISTANCES IN FEET							
6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	540	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,965	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	1,990	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,010	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,030	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,782	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000	2,275	2,275	690	1,380	2,000	2,000	385	770

APPENDIX A (Cont'd.)

EXPLANATORY NOTES ESSENTIAL TO THE APPLICATION OF THE AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES

NOTE 1 – "Explosive materials" means explosives, blasting agents, and detonators.

NOTE 2 – "Explosives" means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion: A list of explosives determined to be within the coverage of "18 U.S.C. Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Materials" is issued at least annually by the Director of the Bureau of Alcohol, Tobacco, and Firearms of the of the Internal Revenue Service of the Department of Treasury.

NOTE 3 – "Blasting agents" means any material or mixture consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive: Provided, That the finished product, as mixed for use or shipment, cannot be detonated by means of a Number 8 Test Blasting Cap when unconfined.

NOTE 4 – "Detonator" means any device containing a detonating charge that is used for initiating detonation in an explosive; the term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses and detonating-cord delay connectors.

NOTE 5 – "Magazine" means any building or structure, other than an explosives manufacturing building used for the permanent storage of explosive materials.*

NOTE 6 – "Natural Barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine when the trees are bare of leaves.

NOTE 7 – "Artificial Barricade" means an artificial mound or revetted wall of earth of a minimum thickness of three feet.

NOTE 8 – "Barricaded" means that a building containing explosives is effectually screened from a magazine, building, railway, or highway, either by a natural barricade, or by an artificial barricade of such height that a straight line from the top of any sidewall of the building containing explosives to the eave line of any magazine, or building, or to a point twelve feet above the center of a railway or highway, will pass through such intervening natural or artificial barricade.

*Explosives manufacturing buildings and magazines within the confines of an explosives manufacturing plant shall be separated from each other according to the Intra Plant Distance Table (See Appendix C).

APPENDIX A (Cont'd.)

NOTE 9 – "Inhabited Building" means a building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage or use of explosives.

NOTE 10 – "Railway" means any steam, electric, or other railroad or railway which carries passengers for hire.

NOTE 11 – "Highway" means any street or public road. "Public Highways Class A to D" are highways with average traffic volume of 3,000 or less vehicles per day as specified in "American Civil Engineering Practice" (Abbett, Vol. 1, Table 46, Sec. 3-74, 1956 Edition, John Wiley and Sons).

NOTE 12 – When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and, in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

NOTE 13 – Storage in excess of 300,000 lbs. of explosives in one magazine is generally not required for commercial enterprises; however, IME will provide recommendations for quantities greater than 300,000 lbs. in one magazine upon inquiry.

NOTE 14 – This Table applies only to the manufacture and permanent storage of commercial explosives. It is not applicable to transportation of explosives or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

For transportation purposes, the Department of Transportation in Title 49 Transportation CFR Parts 1-199 subdivides explosives into three classes:

Class A – Maximum Hazard
Class B – Flammable Hazard
Class C – Minimum Hazard

NOTE 15 – All types of blasting caps in strengths through No. 8 cap should be rated at 1½ lbs. of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.

NOTE 16 – For quantity and distance purposes, detonating cord of 50 to 60 grains per foot should be calculated as equivalent to 9 lbs of high explosives per 1,000 feet. Heavier or lighter core loads should be rated proportionately.

APPENDIX B

Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents[1,6]

References — NFPA No. 492 & NFPA No. 495

Donor Weight		Minimum Separation Distance of Receptor when Barricaded[2] (ft.)		Minimum Thickness of Artificial Barricades[5] (in.)
Pounds Over	Pounds Not Over	Ammonium Nitrate[3]	Blasting Agent[4]	
	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	43	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

APPENDIX B (Cont.)

NOTES TO TABLE OF RECOMMENDED SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS

NOTE 1 – Recommended separation distances to prevent explosion of ammonium nitrate and ammonium nitrate-based blasting agents by propagation from nearby stores of high explosives or blasting agents referred to in the Table as the "donor." Ammonium nitrate, by itself, is not considered to be a donor when applying this Table. Ammonium nitrate, ammonium nitrate-fuel oil or combinations thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distances of explosives or blasting agents, one-half the mass of the ammonium nitrate should be included in the mass of the donor.

These distances apply to the separation of stores only. The American Table of Distances shall be used in determining separation distances from inhabited buildings, passenger railways and public highways.

NOTE 2 – When the ammonium nitrate and/or blasting agent is not barricaded the distances shown in the Table shall be multiplied by six. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like which may enclose the "donor." Where storage is in bullet-resistant magazines* recommended for explosives or where the storage is protected by a bullet-resistant wall, distances and barricade thicknesses in excess of those prescribed in the American Table of Distances are not required.

NOTE 3 – The distances in the Table apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer promulgated by the National Plant Food Institute;† and ammonium nitrate failing to pass said test shall be stored at separation distances determined by competent persons and approved by the authority having jurisdiction.

NOTE 4 – These distances apply to nitro-carbo-nitrates and blasting agents which pass the insensitivity test prescribed in the U.S. Department of Transportation (DOT) regulations.

NOTE 5 – Earth, or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves, are also acceptable.

NOTE 6 – When the ammonium nitrate must be counted in determining the distances to be maintained from inhabited buildings, passenger railways and public highways, it may be counted at ½ its actual weight because its blast effect is lower.

*For construction of bullet-resistant magazines see IME Publication No. 1.

†Definition and Test Procedures for Ammonium Nitrate Fertilizer, Fertilizer Institute, May 7, 1971.

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APPENDIX C
INTRA PLANT DISTANCE TABLE

FOR USE ONLY WITHIN CONFINES OF EXPLOSIVES MANUFACTURING PLANTS

Pounds Over	Pounds not Over	Distance in Feet When Building is Barricaded*	Pounds Over	Pounds not Over	Distance in Feet When Building is Barricaded*
2	5	16	12,000	14,000	220
5	10	20	14,000	16,000	230
10	20	25	16,000	18,000	238
20	30	28	18,000	20,000	245
30	40	31	20,000	25,000	265
40	50	34	25,000	30,000	280
50	75	38	30,000	35,000	295
75	100	42	35,000	40,000	310
100	125	45	40,000	45,000	320
125	150	48	45,000	50,000	330
150	200	53	50,000	55,000	340
200	250	57	55,000	60,000	350
250	300	60	60,000	65,000	360
300	400	66	65,000	70,000	370
400	500	71	70,000	75,000	380
500	600	76	75,000	80,000	390
600	700	80	80,000	85,000	395
700	800	84	85,000	90,000	400
800	900	87	90,000	95,000	410
900	1,000	90	95,000	100,000	420
1,000	1,200	96	100,000	110,000	430
1,200	1,400	101	110,000	120,000	445
1,400	1,600	106	120,000	130,000	455
1,600	1,800	110	130,000	140,000	465
1,800	2,000	113	140,000	150,000	475
2,000	2,500	122	150,000	160,000	485
2,500	3,000	130	160,000	170,000	495
3,000	4,000	143	170,000	180,000	505
4,000	5,000	154	180,000	190,000	515
5,000	6,000	164	190,000	200,000	525
6,000	7,000	172	200,000	210,000	535
7,000	8,000	180	210,000	230,000	555
8,000	9,000	190	230,000	250,000	575
9,000	10,000	200	250,000	275,000	600
10,000	12,000	210	275,000	300,000	635

*When a building or magazine containing explosives is not barricaded, the distances shown in this Table should be doubled.

APPENDIX D
UNIFORM MODEL STATE ACT
FOR THE CONTROL OF EXPLOSIVE MATERIALS

Section 1. SCOPE

This Act is intended to supplement the requirements of any Federal Laws and Regulations promulgated by any Federal Department or Agency. The Act shall apply to the sale, purchase, possession, receipt, use and transportation of explosive materials as provided herein, but shall not apply to:

(a) explosive materials while in the course of transportation via railroad, water, highway or air when the explosive materials are moving under the jurisdiction of, and in conformity with, regulations adopted by any Federal Department or Agency.

(b) the laboratories of schools, colleges and similar institutions when confined to the purpose of instruction or research, or to explosive materials in the forms prescribed by the official United States Pharmacopeia or the National Formulary and used in medicines and medicinal agents.

(c) the normal and emergency operations of any government, including all departments, agencies, and divisions thereof, provided they are acting in their official capacity and in the proper performance of their duties or functions.

(d) explosive materials for delivery to any government or any departments, agencies, and divisions thereof.

(e) pyrotechnics commonly known as fireworks, including signaling devices such as flares, fusees, and torpedoes.

(f) small arms ammunition and components therefore, which are subject to the Gun Control Act of 1968 (Title 18, Chapter 44, U.S.C.) and regulations promulgated thereunder.

(g) gasoline, fertilizers and propellant-actuated power devices or tools.

(h) any type of black powder in quantities not to exceed five (5) pounds.

COMMENTS

The provisions of this Act are intended to supplement the provisions of the Organized Crime Control Act of 1970 and the regulations thereunder. Activities adequately covered by that Federal law have not been further regulated.

The Act will apply to law-abiding citizens and businesses but will function solely as a crime control and safety measure without infringing on their rights.

Section 2. DEFINITIONS

As used in this Act:

(a) "Person" means any individual, corporation, company, association, firm, partnership, society or joint stock company.

(b) "Explosive materials" means explosives, blasting agents, and detonators as follows:

(i) "Explosives" means any chemical com-

It is of obvious benefit to law enforcement agencies and businessmen to standardize definitions in Federal, State and local laws relating to explosive materials whenever possible. These definitions are consistent with those in the Organized Crime Control Act of 1970.

COMMENTS

pound mixture, or device, the primary or common purpose of which is to function by explosion; the term includes, but is not limited to, dynamite and other high explosives, black powder, pellet powder, initating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters, and those materials included in the list published annually in the Federal Register by the Secretary of the Treasury pursuant to the Organized Crime Control Act of 1970, Title 18 U.S.C., Section 841.

(ii) "Blasting agent" means any material or mixture consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive: *Provided*, That the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 Test Blasting Cap when unconfined, or a blasting cap of equivalent strength.

(iii) "Detonator" means any device containing a detonating charge that is used for initiating detonation in an explosive; the term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses and detonating-cord delay connectors.

(c) "Felony or misdemeanor" shall not mean (i) any Federal or State offenses pertaining to antitrust violations, unfair trade practices, restraints of trade, or other similar offenses relating to the regulation of business practices or (ii) any State offense (other than one involving a firearm or explosive material) classified by the laws of any State as a traffic offense or punishable by a term of imprisonment of six months or less.

(d) "Issuing authority" shall mean the

(name of authority)

The issuing authority might be the State Bureau of Mines, State Police, Fire Marshal, etc.

(e) "Fugitive from justice" shall mean any person who has fled from the jurisdiction of any court of record to avoid prosecution for any crime or to avoid giving testimony in any criminal proceeding. The term shall also include any person who has been convicted of any crime and has fled to avoid imprisonment.

(f) "Propellant-actuated power devices or tools" shall mean any tool or special mechanized device or gas generator system which is actuated by smokeless propellant or which releases and directs work through a smokeless propellant charge. It does not include explosive-acutated devices.

(g) "Distribute" shall mean to issue, give, transfer, or otherwise dispose of.

(h) "Explosive-actuated devices" shall mean

any tool or special mechanized device which is actuated by explosives, other than smokeless propellants.

Section 3. PURCHASE, RECEIPT AND POSSESSION

3.1 PERMIT – It shall be unlawful for any person to purchase, receive or possess explosive materials in this State without obtaining a permit from the issuing authority.

3.2 FEDERAL LICENSE OR PERMIT – Any person who possesses a license or permit under Title XI of the Organized Crime Control Act (18 U.S.C., Chapter 40) properly covering the activities of such person shall not be required to obtain a permit under this section.

Section 4. SALE

It shall be unlawful for any person to sell or distribute explosive materials to any person without first obtaining a copy of the license or permit which authorizes the distributee to purchase, receive or possess explosive materials as provided in this Act; Provided that such person shall not be required to again obtain a copy of said license or permit during the effective term shown on said license or permit.

Section 5. BLASTER'S PERMIT

5.1 PERMIT – It shall be unlawful for any person to use explosive materials unless such person or, if such person is a business entity, an employee of such person possesses a blaster's permit. The blaster's permit must conform to the class and use as provided in section 5.5 and be carried on the person of each such individual during the use of the explosive materials.

5.2 USE – Use of explosive materials shall include all applications of explosives for any purpose whatsoever, unless specifically exempted by section 5.3.

5.3 USE DOES NOT INCLUDE – For purposes of this part, use does not include any type of commercial manufacturing or research conducted in laboratories of commercial or educational institutions.

5.4 QUALIFICATIONS – Blaster's permits will be issued only to a natural person and shall

COMMENTS

Possession of a permit and record keeping are required for local buyers and users who purchase solely within a single State. These persons are not covered by the Federal law, therefore, are not covered by the Federal regulations. No person will be required to obtain both Federal and State permits or licenses.

Persons selling or manufacturing explosives are not required to possess a permit because they are adequately licensed by Federal law.

Storage of explosive materials has been regulated by Federal law and consistent provisions are included in the regulations proposed by the Institute of Makers of Explosives (IME).

This is intended to assist law enforcement agencies and the sellers of explosive materials by requiring the purchaser to qualify as the receiver of explosives by obtaining a permit or license.

Safeguarding life and property is in the best interests of the whole community. Requiring proper qualifications for those using explosive materials promotes safety. This is similar to the driver's license requirements for cars and trucks.

bear his name, address and photograph. In addition to the qualifications specified in section 6 hereof, such person must satisfy each of the following qualifications:

(a) Present evidence of training, knowledge and experience in the transporting, storing, handling and use of explosive materials.

(b) Be able to understand and give written and oral orders.

(c) Be knowledgeable of Federal, State and local laws and regulations pertaining to explosive materials.

(d) Be able to pass a qualifying written or oral examination as required by the issuing authority.

(e) Be physically and mentally fit for the work required.

(f) Such other requirements as the issuing authority may prescribe by regulations.

5.5 CLASSES OF PERMITS – Blaster's permits shall be issued by the issuing authority and shall include the following classes of permits:

Class	Category	Description
A	Unlimited	All types of blasting.
B	General Above Ground	All phases of blasting operations in quarries, open pit mines, above ground construction.
C	General Under-Ground	All phases of blasting operations, in underground mines, shafts, tunnels and drifts.
D	Demolition	All phases of blasting in demolition projects.
E	Seismic prospecting	All phases of blasting in seismic prospecting.
F	Agriculture	All phases of blasting in agriculture but limited to not more than 50 lbs. per blast.
G	Special	Special blasting as described on the permit.

Section 6. ADMINISTRATION

6.1 APPLICATION – Applications for a permit hereunder shall be made to the issuing authority on forms and as prescribed in regulations issued by the issuing authority.

6.2 PERMIT FEES – Permit fees shall be paid at the time of application in the amount of $10.00.

6.3 QUALIFICATIONS – The issuing authority shall not issue any permit to any person unless:

(a) The applicant is at least 21 years of age, or if a business entity, properly qualified to do business in this State.

COMMENTS

It is expected that the licensing procedures will be easily administered. Applicants are given opportunity for a hearing in order to protect the interest of the law-abiding person against any possible misuse of administrative powers on the part of the issuing authority.

Permit fees are intended to be nominal and no person should be prevented from obtaining a permit because of inability to pay.

Objective and clearly defined

(b) The applicant has not been convicted of a willful violation of any provisions of this Act.

(c) The applicant has not knowingly withheld information or has not made any false or fictitious statement intended or likely to deceive, in connection with the application.

(d) The applicant has certified in writing familiarity and understanding of all published Federal, State and local laws relating to explosive materials at the location of the applicant's activities.

(e) The applicant has not been convicted in any court of a felony or disdemeanor.

(f) The applicant is not a fugitive from justice.

(g) The applicant is not an unlawful user of or addicted to marijuana [as defined in section 4761 of the Internal Revenue Code of 1954 (26 U.S.C. 4761)] or any depressant or stimulant drug [as defined in section 201 (2) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. 321 (2)], or narcotic drug [as defined in section 4731 (a) of the Internal Revenue Code of 1954, 26 U.S.C. 4731 (a)], or alcohol.

6.4 POSTING AND POSSESSION OF PERMITS – Permits issued under the provisions of this Act, except as otherwise provided with respect to the blaster's permit, shall be kept posted on premises or on the person of the permittee and be available for inspection.

6.5 LOCATIONS AND ACTIVITIES – Each permit issued under the provisions of this Act shall specify the permittee, the permitted activity, its effective date, and its expiration date. Such permit shall cover all such activities for that person anywhere in this State and such person shall not be required to obtain additional permits for additional locations in the State.

6.6 REGULATIONS AND FORMS – The administration of this Act shall be vested in the issuing authority who is authorized to:

(a) Prescribe such rules and regulations as are deemed reasonably necessary to carry out the provisions of this Act. The issuing authority shall give reasonable public notice, and afford to interested parties opportunity for hearing, prior to prescribing such regulations.

(b) Prescribe forms required for the administration of this Act.

6.7 RIGHT OF INSPECTION AND DISCLOSURE – The authorized authority may enter during business hours the premises (including places of storage) of any permittee, for the purpose of inspecting or examining (a) any rec-

COMMENTS

qualifications eliminate discretionary powers for the issuing authority and enhance the efficiency of administering the Act and prevent misuse of administrative powers.

ords or documents kept by such permittee, and (b) any explosive materials kept or stored by such permittee. Upon the request of any Federal Agency, the issuing authority shall make available any information which it may obtain by reason of the provisions of this section with respect to the identification of persons within this State, who have purchased or received explosive materials, together with a description of such explosive materials.

6.8 DENIAL OR REVOCATION OF PERMIT – A permit under this Act may be denied or revoked for failure to comply with or satisfy the requirements of any provision of this Act, and for any of the following reasons:

(a) Non-compliance with any order of the issuing authority.

(b) Proof that the applicant or permittee has been convicted of a felony or misdemeanor.

(c) Proof that the applicant or permittee advocates, or knowingly belongs to any organization or group which advocates violent overthrow or violent action against any Federal, State or local government, or any individuals therein.

(d) Proof that the applicant or permittee suffers from a mental or physical defect.

(e) Violation by the applicant or permittee of any provision of any law or regulation relating to explosive materials; or proof that false information was willfully given or misrepresentation willfully made to obtain the permit.

(f) Failure by the applicant or permittee to advise the issuing authority of any change in a material fact supplied in the application.

In any case, where the issuing authority denies or revokes a permit, it promptly will notify the applicant or permittee of the basis for the revocation or denial and afford the applicant or permittee an opportunity for a hearing in the manner prescribed by the regulations of the issuing authority.

6.9 RENEWAL – Permits issued under provisions of this Act shall be effective for not more than two (2) years and may be renewed as the issuing authority may prescribe by regulations.

COMMENTS

Section 7. AUTHORITY TO PURCHASE IN CONTIGUOUS STATES

Any person who is a resident of this State and who uses explosive materials in the conduct of business or occupation may lawfully purchase explosive materials from a seller located or residing in a state contiguous to this State; provided such person possesses a proper permit or is properly licensed under this Act.

COMMENTS

Existing Federal law and regulations allow transactions involving persons located in contiguous states to be treated as an intra-state transaction if authorized by the states. Such transactions would be largely outside Federal regulation, but, adequately covered by this bill.

Section 8. RECORDS

8.1 RECORDS REQUIRED – It shall be unlawful for any person willfully to purchase, possess, receive, sell or distribute explosive materials in this State without making and keeping records as specified in this section.

8.2 RECORDS – Records of purchases, possession, and receipts of explosive materials shall be maintained by the persons purchasing, possessing and receiving the explosive materials and shall include the date of the transaction, the name, address and license or permit number of the person from whom received, the name of the manufacturer and importer (if any), the manufacturer's marks of identification (if any), and the quantity and description of explosive materials. With respect to explosive materials sold or distributed, the seller or distributor shall record the name, address, and license or permit number of the distributee, the date of transaction, the name of the manufacturer and importer (if any), the manufacturer's marks of identification (if any), and the quantity and description of the explosive materials. Records made and kept pursuant to regulations promulgated by the Bureau of Alcohol, Tobacco and Firearms shall satisfy the requirements of this section.

8.3 FALSE ENTRY – It shall be unlawful for any licensee or permittee knowingly to make any false entry in any record which he is required to keep pursuant to this section or regulations promulgated under section 6.6 of this Act.

8.4 RECORD RETENTION – Any record required by this Act or regulations promulgated under its provisions shall be retained by the licensee or permittee for not less than five years from the date of the transaction recorded.

The record keeping requirements impose on the local and intra-state transactions the same record keeping requirements that are required with respect to interstate transactions by the Federal regulations. This uniformity is beneficial to businessmen as compliance is accomplished by a single set of records.

Section 9. SAFETY

The issuing authority is authorized to issue such safety regulations as are not inconsistant with any safety regulations promulgated by any Federal Department or Agency.

COMMENTS

This will avoid inconsistency with Department of Labor and HEW regulations.

Section 10. TRANSPORTATION

It shall be unlawful for any person to transport explosive materials in violation of the regulations relating to the transportation of explosive materials. The issuing authority is authorized to issue regulations covering the transportation of explosive materials in this State. Compliance with the applicable regulations of the United States Department of Transportation issued pursuant to Title 18, Sections 831 through 835 of the United States Code, and such other Federal Regulations as exist or as are adopted from time to time, shall be deemed compliance with this Act and the regulations issued hereunder.

This supplements Federal regulation of the transportation of explosive materials by regulating intra-state and local transportation. Uniformity is assured by reference to the U.S. Department of Transportation regulations.

Section 11. VIOLATION AND PENALTY

Any person violating any of the provisions of this Act or any rules or regulations made thereunder: (a) shall be guilty of a misdemeanor and shall be punished by a fine of not more than $1,000 or by imprisonment for not more than one (1) year, or by both such fine and imprisonment, and any permit issued under this Act shall be subject to revocation for such period as the issuing authority deems appropriate; (b) and, if such violation was committed with the knowledge or intent that any explosive material involved was to be used to kill, injure or intimidate any person or unlawfully to damage any real or personal property, the person committing such violation shall be guilty of a felony and fined not more than $10,000, or imprisoned for not more than ten (10) years, or both; (c) and if personal injury results, shall be guilty of a felony and imprisoned for not more than twenty (20) years or fined not more than $20,000, or both; (d) and if death results, shall be guilty of a felony and subject to imprisonment for any term of years or for life.

These penalty provisions are similar to those in the Organized Crime Control Act.

Section 12. LIMITATION ON LEGISLATION

This Act is intended to and shall preempt and supersede all existing and future county, town, city or municipal ordinances or regulations respecting the subjects covered by this Act.

This makes it clear the State is pre-empting the field. Without such pre-emption by the State, the numerous local laws will make it difficult for the law-abiding person to transact business or use explosive materials.

Section 13. EFFECTIVE DATE

13.1 EFFECTIVE DATE – This Act shall become effective upon enactment. Any person purchasing, possessing, receiving, or using explosive materials on the effective date of this Act shall have ninety (90) days after such effective date to obtain a permit.

13.2 EMERGENCY VARIATIONS – The issuing authority may approve variations from the requirements of this Act when he finds that an emergency exists and that the proposed variations from the specific requirements (a) are necessary, (b) will not hinder the effective administration of this Act, and (c) will not be contrary to any provisions of any other applicable law, either State or Federal.

Section 14. SEPARABILITY

If any provision of this Act, or regulations promulgated thereunder, is held invalid by a court of competent jurisdiction, the remaining provisions or regulations shall continue to be valid and enforceable.

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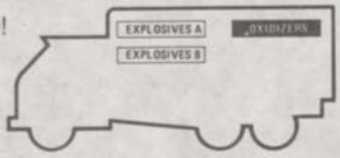
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DON'T FIGHT EXPLOSIVES FIRES!

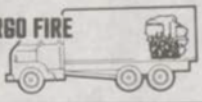
(But you can prevent fire from reaching the explosives... and save lives)

1 IDENTIFY THE CARGO!
Look for these signs on the truck or trailer

2 ACT FAST!
Take the right action . . . use proper extinguishers on tires, engine, cab or body



CARGO FIRE



- STOP ALL TRAFFIC AND CLEAR THE AREA FOR 2000 FEET IN ALL DIRECTIONS.
- DON'T FIGHT FIRE! (CARGO MAY EXPLODE).
- WHEN TRACTOR-TRAILER IS INVOLVED, SEPARATE TRACTOR FROM TRAILER IF POSSIBLE.

TIRE FIRE



- WHEN TRACTOR-TRAILER IS INVOLVED, SEPARATE TRACTOR FROM TRAILER IF POSSIBLE.
- USE PLENTY OF WATER—DOUSE IT. IF WATER IS NOT AVAILABLE USE DRY CHEMICAL FIRE EXTINGUISHER OR DIRT.
- CAUTION: FIRE MAY START AGAIN. STAND BY WITH EXTINGUISHER READY.
- CONSERVE DRY CHEMICAL—USE IN SHORT BURSTS.
- GET TIRE OFF AND AWAY FROM VEHICLE.

ENGINE OR CAB FIRE



- WHEN TRACTOR-TRAILER IS INVOLVED, SEPARATE TRACTOR FROM TRAILER IF POSSIBLE.
- USE DRY CHEMICAL FIRE EXTINGUISHER, WATER OR FOAM.
- DISCONNECT ONE BATTERY CABLE.

BODY FIRE



- CLEAR AREA BEFORE FIRE REACHES CARGO.
- WHEN TRACTOR-TRAILER IS INVOLVED, SEPARATE TRACTOR FROM TRAILER IF POSSIBLE.
- USE DRY CHEMICAL EXTINGUISHER, WATER OR FOAM.
- DO NOT FIGHT FIRE WHEN IT REACHES CARGO.

A Safety Message to Law Enforcement and Fire Protection Personnel from...

INSTITUTE OF MAKERS OF EXPLOSIVES
420 LEXINGTON AVENUE
NEW YORK, N.Y. 10017

Full-size, three-color Emergency Procedure Cards, as illustrated above, are available in packs of 25 at $1 (postpaid) by writing to the

INSTITUTE OF MAKERS OF EXPLOSIVES
420 LEXINGTON AVENUE
NEW YORK, N.Y. 10017

NEPCO–874–10M



THE UNKNOWN CAN BE UNSAFE...

if it is a lost, strayed or stolen blasting cap in the hands of someone who can't identify it or who does not recognize its potential danger.

Safety education materials like this poster are available **free** to contractors and others engaged in essential, legitimate blasting operations. They illustrate blasting caps in full-color, life-sized and tell of the hazards they can pose.

Law enforcement agencies, youth service organizations and schools will often assist putting these materials to work in the cause of blasting cap accident prevention. For free supplies write to:

EXPLOSIVES SAFETY
420 Lexington Ave. (Rm. 2449)
New York, NY 10017

INSTITUTE OF MAKERS OF EXPLOSIVES

TELEPHONE
212-689-3237


LOCK 'EM UP!
SO CHILDREN CAN'T GET HURT
BLASTING CAPS ARE NOT TOYS!
For free blasting cap safety education materials designed for display and distribution by users of explosives and related supplies, write to . . .
INSTITUTE OF MAKERS OF EXPLOSIVES
420 LEXINGTON AVENUE
NEW YORK, N.Y. 10017

STATEMENT OF J. PAUL BARNETT, NORTHERN VICE-PRESIDENT OF THE INDIANA SPORTSMEN'S COUNCIL

Gentlemen, many participants in the historical shooting sports have asked me to convey their thanks for the present opportunity for their experienced and practical views to be heard by this committee. I am here expressly on behalf of the Indiana Sportsmen's Council and the River Valley Muzzle Loaders, of Saint Joseph County, Indiana, and by virtue of letters you will see, also on the behalf of others concerned with preserving the sporting, recreational, and cultural use of black powder.

By way of personal introduction, I am a former Indiana state trooper, later a public high school teacher who after eight years of service left the field in order to devote full time attention to the historical shooting sports and related matters of craft, research, writing, and other similar endeavors.

By occupation, I am president of a small company which manufactures replicas of antique ordnance by authentic methods, for the most part using salvaged and restored machinery dating well back to the 19th century. As such, my company has built the gun barrels for the reconstructed 18th century ship HMS *Rose*, and has many times been of various service to state, federal, and private restorations of historical sites in this country and others. My consultatory services have been sought and donated toward the making of a feature film, parts of which require practical insights into 18th century gunmaking processes, and on other occasions I have variously been called to assist the Department of the Army, the Department of the Navy, the United States Coast Guard, the National Park Service, and many state counterparts of the latter.

My company's services have many times been sought by prominent symphony orchestras, including Cincinnati, St. Louis, Cleveland, the New York Philharmonic, and others, in their performances of Tchaikovsky's "1812 Overture," which for historical and artistic accuracy requires punctuation by 16 precisely timed cannon shots, fired electrically from that number of guns in accordance with the composer's 1880 specifications. Each of those performances has been a major civic event: in Cincinnati, for example, drawing park audiences of up to 40,000 persons, and for several consecutive years setting new records for concert attendance in that city.

I am a member of the Smithsonian Associates, the Nautical Research Guild, the American Heritage Round Table, the Northern Indiana Historical Society, the Northern Indiana Gun Collectors Association, the River Valley Muzzle Loaders, the National Muzzle Loading Rifle Association, the NRA, the Cannon Hunters Association of Seattle, the Company of Military Historians, and other organizations of related interest.

As a student of the history of antique firearms and ordnance, I have recently completed six years of original research in the preparation of a book soon to be published, on the history of lifesaving ordnance, especially Lyle guns but also including other appliances used since 1791 for projecting lifelines to persons stranded by shipwreck or other disaster.

One result of that research—the first of its kind undertaken since 1878—is that a "missing" area of American history has become available for study; another is that I have been able to locate and identify heretofore unrecognized factors relating to Lyle gun performance, thereby making significant contributions to the future safety of United States Merchant Marine personnel, and park and museum personnel who demonstrate lifesaving procedures in their history programs.

In most of those things and related others, the common denominator is black powder. As presently worded, Title XI of the Organized Crime Control Act of 1970 (PL 91–452) greatly impedes legitimate acquisition and use of black powder, and at the same time, provides an easy and legal loophole for clandestine acquisition, thus having the overall effect of providing persons of ill intent a far more useful exemption than has been allowed historical sportsmen, in direct conflict with the law's expressed purposes.

As written, PL 91–452 exempts "black powder in quantities not to exceed five pounds." Since the present exemption makes no distinction between *commercially manufactured* and *home made* black powder, it applies to both equally, a condition many times acknowledged by legislators and enforcement personnel.

Participants in the antique shooting sports must have *commercial* uniformity and granulation options provided by commercial production, for reasons involv-

ing safety, consistency, and suitability to specific purpose. Thus, *home made* black powder is virtually useless to persons intending legitimate application.

At the same time, it is typically easier to acquire black powder through the simple expedient of home manufacture from exempt ingredients than it is to locate and buy scarce commercial grades, which normally flow through sparse and esoteric channels. In home manufacture, less equipment than an ordinary kitchen blender can be used to create black powder wholly suitable for clandestine purposes, but for lack of controlled uniformity, wholly unsuitable for use as a propellant.

Commercially manufactured black powder, bearing the scarcity of obsolescence, is expensive and difficult to acquire under the best of circumstances. Home made black powder contrived of ingredients as exempt as charcoal briquets, is cheap and simple to acquire under even the worst of circumstances.

So in addition to the more useful exemption, persons of ill intent also have the privilege of better prices, should they elect to use black powder instead of the host of higher choices open to them by yet commoner means, some of which appear in exhibits attending this statement.

(It should of course be borne in mind that since passage of PL 91–452, at which time it was just assumed that black powder was a major factor in domestic bombings, a later study subsidized by the Justice Department revealed it to be actually a very minor factor. Even of the three per cent or so figure given, it should be emphatically noted that many substances *other* than black powder are routinely misidentified in news reports, and so forth, as "black powder," by persons not knowing the limits of the term. I have myself seen it so, on many occasions, including some where initial reports were right, with subsequent reports turning wrong.

(Long after the above statistics were published, a later study purported to reveal an astonishing frequency of 18 per cent, until it was in turn revealed that according to *definitions* in the second study, a gasoline massacre is not a bombing! The first report came from the National Bomb Data Center. The second came from the Treasury Department, whose agents do investigate gasoline bombings but were instructed, according to ATF statements, to exclude them from statistics being compiled.)

A second basic reason that the present exemption impedes legitimate access without placing corresponding burdens on persons of ill intent is that the term "five pounds" is unattached in time and space, giving rise to limitless confusing interpretations about its applicability.

Three sportsmen together, each possessng five pounds: are they individually exempt, or are they in collective violation? If they are in collective violation, how do they legally associate? Travel? Or if they are individually exempt, then are not three—or five or a dozen—bombers with five pounds each equally exempt? Attorneys advise that they would seem to be. Who is more greatly impeded?

The legitimate person who must fear the very appearance of evil and its attendant entanglements, even if later resolved in his favor, finds himself disallowed to make the simplest judgments, having instead to rely on opinions far removed from his situation, and often made by persons less expert in the same matters than himself. The frequent difficulty and delays in obtaining such opinions are well known. So is the sometimes unusefulness of them when received, and sometimes the validity of them warrants question in itself.

On one occasion, for instance, I was myself informed by a Treasury official that people had "even been caught" doing what a higher official had expressly *approved* earlier, and which therefore was my own custom. Another midwestern gentleman asked permission to build an expensive underground magazine to exact Treasury specifications but in three-quarter size, full size being too large for his needs, and was denied permission. A midwestern supplier reports being told that he could "get in serious trouble" if he releases a second five pounds to a person who has not yet used up his prior five. A presently licensed dealer reports being told that a legally inventoried pre-1970 25 pound keg can be transferred intact to another licensed dealer, but cannot be divided into five pound units for sale to sportsmen.[1]

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[1] In a somewhat related instance described by Indiana State Representative Gary L. Butler, a "spin-off" version of Title XI was submitted to the Indiana legislature soon after the federal version went into effect. The bill's author chaired a hearing at which Mr. Butler testified. On hearing objections, the author withdrew the bill, saying that his only reason for introducing it was that *ATF agents had asked him to*, and had assured him that it was not objectionable.

Once in a very congenial conversation with a Treasury official, I asked what a reasonable person is to do on finding himself thus stranded between a questionable opinion and good judgment. His sympathetic reply: "Sweat."

Many such tripwires and barricades of impracticability leave the honorable user of black powder in an obstacle course to be negotiated in the dim light of ambiguity, imperfect applicability, pages of legalese, and the conflicting interpretations that accompany all of those things. And however charitable the overall attitudes in such matters, a prudent person is compelled to worry about them. Yet the person of ill intent, by nature fearing no such entanglements, has to do nothing but choose among his many options and go right on.

If commercially manufactured black powder were as plentiful and close as a sack of flour—or the ingredients of home made black powder, or explosive fertilizer mix—a five pound exemption would not be so debilitating as it is. But commercially manufactured black powder has for generations been scarce.

For many years, common carrier shipment of black powder in quantities under several tons has been economically infeasible. Very few suppliers are equipped to handle such quantities, even when it is available from plant sources, of which there are currently two: Moosic, Pennsylvania; and Scotland.

From the few major depots downward under company, and finally personal, cartage, the distribution of black powder for sporting purposes becomes less and less a matter of business, and more and more a matter of courtesy, often at minimal or no profit.

Distribution at field level is almost totally dependent on courtesy dealers and friends supplying other friends within the sports. Of necessity, many state lines are involved.

Under the present limit, friends can no longer cross state lines to pick up quantities sufficient to supply sporting acquaintances with whom they have gotten together an order, or if long distances are involved, even themselves. Intra-state searches frequently yield no powder from formerly consistent sources, and even if found, opinions on legal purchase rights vary. Storage restrictions contain discouraging excesses, being drafted—with significant oversights—to meet military and industrial, rather than sporting, needs. Permits portrayed as simple are not simple, and aside from difficulty of acquisition and unsuitability to sporting use, pose absurdly far-reaching conditions of qualification: e.g., water pollution control certification; 45 day advance application for a one-time permit. Who knows details of his avocational schedule 45 days in advance?

To the person who cannot find an ounce of powder within practical reach, the five pound limit is a hollow concession. The law has crushed the lame but workable system of supply on which antique sportsmen have had to depend for more than a generation. There are many honorable people now out of supplies, or facing vastly multiplied prices in order to obtain bare amounts. There are no such bombers.

This is the way the old system worked. In 1970, the Cincinnati Symphony Orchestra asked if my company could participate in a park concert ten days hence. Having just loaned my last case of powder to a Michigan dealer, just over the line, I said we could participate if we could find powder. A friend near Detroit, a historian, had earlier mentioned soon making a trip through South Bend.

Calling him, I asked if he could pick me up a case from a depot in his area. He did, and delivered it to me at cost, and in time for the concert. The concert consumed about half the case. The surplus supplied some of my own area friends.

Shortly after, the Michigan dealer to whom I had loaned the original case called to say that he had been able to replenish somewhat from his ordinary source, but only in a granulation useless to me. No matter: with the money instead, I could always locate the right granulation at Friendship on an upcoming trip there, which I did. The only profit was access, and nobody had been stranded without powder.

The following year, each of those innocent, beneficial, and financially profitless transactions had become illegal.

This is typical of the way the system works now. Under a circuitous arrangement declared legal, site or orchestra personnel *wholly* unfamiliar with such matters are to find and purchase powder locally, and give it to us in five pound increments on arrival. As we prepared for a 1971 lakeside concert in Cincinnati, after much explanatory correspondence, the powder did not appear at the

proper time. Orchestra personnel, approaching panic, left their regular full time duties and frantically tried to reach the dealer, who by then was out of town for the weekend.

After all reasonable deadlines for loading had passed, it was discovered that the dealer had come early, leaving the powder with a guard who had failed to mention the delivery. By the time we finished loading, the concert had begun.

At another performance, in Riverfront Stadium, the guns required lighter charges. More than five pounds of powder was left over. In order to be certain of coming home "legal," the precious surplus was poured down a toilet. In principle, the days of correspondence and procedural concern were much the same—if the issue was crime.

In the summer of 1973, at the Southern Illinois campus at Edwardsville, university officials found themselves required to obtain an expensive ATF-approved magazine (not required at Cincinnati), for which they have no other use whatever. Nor did they have any use for it that day: one of its splendidly engineered cased locks malfunctioned, rendering it useless when needed. Fortunately, the powder had not yet been put in it.

At a St. Louis concert for the National Park Service, we left South Bend not knowing whether suitable powder had been located or not. With the New York Philharmonic at Madison, Wisconsin—where the Army Math Center was demolished with fertilizer—civic authorities, not finding powder locally, sent a special truck to Moline, Illinois, after it, at great costs in time, attention, and expense. At another concert, a lapse of understanding by a secretary resulted in our being presented with a bulk fifteen pound increment: a felony we evaded by refusing to assume direct custody of the powder. One orchestra manager searched long and hard to try to meet our requirement for "five pound increments," worriedly reporting that all he had found was "one pound increments," not understanding that one-pound cans, in fives, were just fine. Some site officials are told to get federal permits; some aren't. Most express amazement at the law.

Those are some of the things that *one small company* has encountered. There are hundreds of the other groups, and uncounted thousands of individual antique sportsmen, all in various measure encountering comparable difficulties ranging from annoying to impassable, and none substantially related to crime.

In the South Bend area, friends used to supply each other with powder, as was the general custom before Title XI of PL 91–452, and there were three other sources: one, a "courtesy" sporting goods store that sometimes kept a few pounds for a few of its customers, a more complete supplier 20 miles west, and another—when he could get powder—ten miles north in Michigan. The friends can no longer get enough powder to supply each other, even if doing so were legal. The sporting goods store quit flat after Title XI, along with most other courtesy dealers. The elderly dealer 20 miles west gets sporadic limited quantities with no choice of granulation. The dealer in Michigan hardly gets any at all, and the few pounds he does get are usually gone the day they arrive. The next nearest dealer is 50 miles north into Michigan, and a hundred miles is a long round trip for five pounds of powder, especially considering the present fuel situation.

I am told by a man in another part of the country that his plea for "any granulation at all" turned up four pounds of flintlock priming powder: about as useful to him as a case of lighter fluid would be to a person interested in running an outboard motor.

Prices have of course left reason far behind. In 1970, typical case prices from courtesy dealers were about $1.35 a pound, more or less depending on supply in any given area at the time. Single-pound prices centered around $2.00 a pound from courtesy dealers, or about $2.50 a pound from commercial outlets. It was to everybody's interest to help one another stay supplied at minimal prices, the effect of which was twofold: (1) distribution kept manufacturers willing to supply the market, and (2) low courtesy-dealer prices prevented any cornering of the market by a few large interests, however good the intentions involved. And there were plain fraternal considerations.

Now, a Virginia gentleman reports finding two pounds, at $7.50 per pound. A Nebraska gentleman reports prices of $5.00 per pound with a two pound limit, and with sales only to customers who have purchased muzzleloading firearms at the same store. A Maine gentleman says if he wanted to be a criminal, he could make his own powder overnight for criminal purposes for 50¢ a pound, but that

he has just refused to buy a pound of commercial powder for $8.00, and can find no other. A gentleman in a northwestern state reports $4.75 a pound when available. A government official asks where a fort can find powder with which to continue its history program. Some staff historians elsewhere turn up a few pounds of one granulation wrong for their purpose, and ask if they dare use it. The answer: don't gamble.

An exemption that creates chaos among compliant people without placing corresponding burdens on discompliant ones needs correction.

When Title XI was first implemented, the Treasury Department relayed assurances of "an official of DuPont" that contrary to long-standing rumor, DuPont had no intention of quitting the commercial market; that in fact, the intention was to increase the number of distribution centers so as to keep powder available despite decimation of traditional channels of supply. It was also pointed out that Friendship would serve as a midwestern distribution center—dates available, nearby state lines, and all the rest of the country notwithstanding. Later, a Treasury official said that DuPont had verbally agreed to maintain two outlets per state, which if correct, surely was not a commitment offering great promise of relief.

Six months later, following a plant explosion of a sort rare, but not unknown, in the manufacturing of any volatiles, Du Pont was out of the commercial market but soon producing again to fill government contracts, leaving Scotland the nearest source. Soon after, Du Pont was out altogether, shortly after which an official of Du Pont—apparently not the same one with whom Treasury had spoken—confirmed that it had been common knowledge for years that Du Pont's intention was to quit production of black powder. Within days after Congressional passage of Title XI, an official of the Institute of Makers of Explosives had said the same.

In the drought of dependence on Scotland, the Friendship magazine ran virtually dry, even with powder rationed to match participants only, in match quantities only.

That year, the Treasury Department's Director of Operations said, in a letter, that amendment *"would be of little significance snice no black powder is manufactured in the United States,"* seeming to miss the point that feasible distribution of the commercially manufactured Scottish powder would help, and that resumption of domestic production would be encouraged with feasible distribution in sight. At about the same time, a recent Deputy Assistant Secretary of the Treasury also gave non-production as the main obstacle to amendment, saying "I should think that if you produce the hen [of production], an egg would follow in terms of some legislative relaxation."

In the spring of 1973, Gearhart-Owen Industries, Inc., purchasing the operating DuPont plant, signed a *three-year* contract to produce black powder for the government, with surplus production to go into the sporting market. Instantly, officials of the same Treasury department that had just cited *non*-production as the key barrier to amendment, now cited *resumption* of production as a valid barrier to the same amendment!

Gearhart-Owen Industries did not agree. In a June 18, 1973 letter to the Indiana Sportsmen's Council, Harrold D. Owen said:

"I would point out that we are capable of producing powder and getting available amounts to the few major distribution centers equipped to handle great quantities . . .

"But the greatest access problems among sportsmen lie nearer field level, where it is least possible for us to assist. That is where the sportsmen's traditional system of courtesy dealers and mutual assistance has always played such an important part.

"In the continued disruption of that system by the Organized Crime Control Act of 1970, widespread field-level shortages and inflated prices will remain substantially unremedied by resumed production. Under the proposed exemption, the traditional system of supply could be revived to the benefit of sportsmen.

"Application of the proposed exemption only to commercially manufactured black powder is a particularly good feature, since it does close a present loophole allowing easy clandestine access through the simple expedient of home manufacture.

"We support the efforts of your organization and others to get the five pound limit lifted for legitimate sporting use of commercially manufactured black powder."

Throughout the post-1970 period, Treasury letters to the Indiana Sportsmen's Council and other interested organizations expressed great sympathy with the plight of antique sportsmen, typically explaining that "there is no avenue of relief without amending legislation enacted by Congress." In 1971, "constrained by the wording of the law" was the phrasing in a Treasury letter referring to Congress for relief.

Now we appear before Congress for a second time, the first time having been followed by United States Senate passage of S. 1083 by a 78 to 8 majority, with most absentees recorded elsewhere as favoring passage.

Meanwhile, black powder organizations, publications, and individual sportsmen maintain a national cooperative effort to head off sometimes-reported "advice" from store clerks and other persons not even connected with the historical shooting sports to substitute wrong powders for black in muzzleloading firearms, such persons sometimes even presenting themselves as knowledgeable.

Nor is the problem limited to history buffs. A bulletin released to all American ships in New York Harbor advises them to cut open and inspect all Lyle gun charges to ensure that they contain black powder, in proper granulation, instead of wrong powders provided by persons unschooled in the hazards of substitution. A Coast Guard memorandum gives similar warning. The chief officer of a U.S. merchant ship writes directly to the Indiana Sportsmen's Council about his shortage-related experience. A Department of Transportation official indicates that it may become necessary to withdraw all Lyle guns from service aboard United States merchant ships because of conditions intensified by the Organized Crime Control Act of 1970.

In plain language, the exemption proposed in S. 1083 would exempt *commercially manufactured* black powder and historically documentable antique ammunition implements *when distributed and possessed for use as antique ammunition components*, under the selfsame principle of exemption *now in effect* for many other more volatile and commoner special-purpose substances.

The proposed wording would remove the *now*-existing "bomber's exemptions" permitting home manufacture in five pound lots, and possession rights identical to the possession rights of legitimate users. It would illegalize the possession of any quantity of black powder, home made or commercial, and however small, in conjunction with bomb paraphernalia, a condition that does not now exist under Title XI.

It would in no way interfere with other Federal statutes prohibiting the making of a bomb, or possessing bomb components with the intent of doing so; it would in fact enhance probability of prosecution in such cases. Nor would it interfere with enforcement penalties under Title XI or other bomb statutes. Nor would it in any way modify State or local codes, nor impede their just application.

What S. 1083 *would* do is permit honorable citizens, history buffs and sportsmen, whose activities require reasonable access to the antique propellant as part of their legitimate activities to get back to their old and long-standing problems of acquiring it in the face of ever-marginal supplies, and free of harassment by conditions and prices beyond reason.

Since 1970, the provisions of S. 1083 have borne the endorsement of both Senators from Indiana. I am pleased to report that S. 1083 now also bears the endorsement of Dr. Otis Bowen, Governor of Indiana, and the Indiana Lodge of the Fraternal Order of Police, and so far as can be determined, the support of all Congressmen from Indiana save one, many of whom are sponsors and co-sponsors of similar House bills. Last year's overwhelmingly favorable concurrence in the Senate surely is an indication of favorable opinion in other parts of the country as well.

Finally, I respectfully bring to this committee's attention Northern Ireland, where there is no commercially manufactured black powder, and where the historical shooting sports and attendant studies do not exist at all.

I am appending to this statement several exhibits, as follows:

A. Descriptions of one type of activity disrupted by Title XI.

B. A 16th century description of the then-long known process of very simply making black powder with no special equipment.

C. A picture of gasoline and fertilizer being sold under their present intended-purpose exemption, as rightly are propane tanks, lacquer thinner, and a world of other special-purpose substances capable of being mis-used.

D. A typical state publication instructing in the use of fertilizer mix as an explosive.

E. A sheaf of newspaper clippings gathered randomly and on various occasion, and attesting to the splinter-and-plank oversights sometimes implicit in arguments against S. 1083.

F. An ATF statement of sympathy toward legitimate users of black powder, and expectation of reconsideration of their fair needs.

G. A substitutional warning jointly published by the Indiana Sportsmen's Council and *Muzzle Blasts*, the journal of the National Muzzle Loading Rifle Association.

H. An article on the significance of an ATF demonstration of the use of three dollars' worth of fertilizer as a massively efficient bomb.

I. A sheaf of about 50 letters of concurrence with the provisions of S. 1083, from persons and organizations all over the country.

J. An Indiana Sportsmen's Council research report of self-explanatory nature.

Again, thank you for allowing us to be heard.

EXHIBIT A

SAINT LOUIS SYMPHONY ORCHESTRA

WALTER SUSSKIND, CONDUCTOR; EUGENE LIST, PIANIST

Sunday Afternoon, May 28 at 5 p.m.
(Rain Date—May 30 at 8 p.m.)
Jefferson National Expansion Memorial

TCHAIKOVSKY PROGRAM

Overture, "Romeo and Juliet,"
Concerto, No. 1 in B-flat minor for Piano and Orchestra, Opus 23:
I Andante non tropo e molto maestoso.
II Andantino semplice.
III Finale: Allegro con fuoco—Eugene List.
Overture "1812," Opus 49.

This concert is sponsored by the National Parks Service in honor of the 100th anniversary of National Parks, and co-sponsored by Famous-Barr Company. It is a part of the "Environments" Project supported by the National Endowment for the Arts and the Missouri State Council on the Arts.

[From Gun Week, Aug. 25, 1972]

CANNON FIRM TO "PLAY" WITH PHILHARMONIC IN IOWA

South Bend Replicas, Inc., the Indiana cannonmaking firm, has recently contracted to assist the New York Philharmonic Symphony Orchestra in a Sept. 1 performance of Tchaikovsky's "1812" Overture, reported a firm spokesman.

The performance will be part of an Iowa State University music festival at Ames, Iowa. The program will be conducted by Andre Kostelanetz, and is scheduled to to include Peter Nero and Benny Goodman as featured soloists of the evening.

The "1812" requires punctuation by 16 precisely timed cannon shots, which will be provided through the use of 16 "Lyle" type lifesaving guns, fired electrically in accordance with Tchaikovsky's 1880 specifications.

Negotiations are presently under way for an identical concert two days earlier at Madison, Wis., where sponsoring officials are checking various aspects of obtaining and transferring black powder there, the spokesman said.

Under a ruling by ATF officials, "1812" concerts elsewhere have been allowed to continue under the Organized Crime Control Act of 1970 by having program sponsors purchase black powder locally and give it to the Indiana participants in five pound increments, thus avoiding felony charges for interstate transportation of more than five pounds. The process seems to have satisfied the law, but problems of depending on third parties for acquisition have several times created uncertainties regarding delivery, company spokesmen report.

Other concerts in which the company has participated this year have included one in St. Louis, with the St. Louis Symphony, and the annual Tchaikovsky-fest with the Cincinnati Symphony Orchestra, in Cincinnati.

The latter concert drew an audience estimated by Hamilton County, Ohio, park officials at over 40,000 persons, breaking all prior records for concert attendance in Cincinnati.

AMES INTERNATIONAL ORCHESTRA FESTIVAL

FOURTH ANNUAL SEASON

(Sponsored by Iowa State University in association with Columbia Artists Management Inc.)

NEW YORK PHILHARMONIC

Friday, September 1 at 8:00 p.m., James H. Hilton Coliseum

ANDRE KOSTELANETZ, CONDUCTOR

Friday, September 1 at 7:00 p.m., James H. Hilton Coliseum

THE BENNY GOODMAN SEXTET FEATURING BENNY GOODMAN

Andre Kostelanetz, who inaugurated the New York Philharmonic's "Promenade" concerts at Philharmonic Hall in 1963, has been associated with the orchestra since 1952. In addition, he has appeared as guest conductor with the orchestras of Philadelphia, Cleveland, Los Angeles, Houston, Minneapolis, and other cities in this country and Canada. He has also made many tours abroad, leading the Royal Philharmonic, the Philharmonia Orchestra, the London Symphony, the Berlin Philharmonic, and the principal orchestras in other European countries, Israel, and Japan. Mr. Kostelanetz has been responsible for the commissioning of works by leading composers, including Aaron Copland's *A Lincoln Portrait*, William Schuman's *New England Tryptich*, Alan Hovhaness's *Ukiyo-Floating World*, Virgil Thomson's musical portraits of Mayor La Guardia and Dorothy Thompson, Paul Creston's *Frontiers*, Ferde Grofé's *Hudson River Suite*, Jerome Kern's *Mark Twain* and, most recently, the Archibald MacLeish-Ezra Laderman's *Magic Prison*. During World War II, Mr. Kostelanetz volunteered his services to train and conduct G.I. orchestras in Europe, the Orient, and North America. For this he was awarded the Asiatic-Pacific campaign ribbon.

Benny Goodman was born in Chicago in 1909, and began his musical training in his synagogue's orchestra and at Chicago's Hull House. This was followed by private lessons with Franz Schoepp of the Chicago Symphony. A recognized clarinet prodigy by the age of ten, Mr. Goodman performed extensively around Chicago and later on excursion boats on Lake Michigan with a four-piece band which included Bix Beiderbecke as trumpeter. Mr. Goodman organized his own band in 1934, and with it launched the swing era in popular music. With such jazz notables as Teddy Wilson, Gene Krupa, Lionel Hampton, Red Norvo and Roy Eldridge, the band's new chamber music jazz attracted new audiences across the country and filled New York's Carnegie Hall in a 1938 concert which, when released on records, became an all-time best seller. Having commissioned such composers as Bartok, Copland, and Hindemith to write new works for the clarinet, Mr. Goodman is responsible for much new music for his instrument. He has performed these works, as well as works by Mozart, Debussy and Brahms, with such orchestras as the NBC and Boston symphonies, the Cleveland Orchestra and the New York Philharmonic, having made his debut with the latter in 1940. With his band, the clarinetis has made several world tours, two of which—to Russia and the Far East—were sponsored by the U.S. Department of State.

Peter Nero, born in Brooklyn, began piano lessons when he was seven. By the age of fourteen, he had won many piano awards, had appeared with symphony orchestras, and had won a Juilliard scholarship. On Saturdays he attended Juilliard while he was a student at the New York High School of Music and Art. While earning a bachelor of arts degree at Brooklyn College, he studied piano privately with Abram Chasins and his wife, Constance Keene. A composer as well as a performer, he has performed his own concerto, *Fantasy and Improvisa-*

tions (Blue Fantasy), with leading orchestras including the Royal Philharmonic and the symphony orchestras of Cleveland, Philadelphia, and Boston. He recorded the work with the Boston Pops. Mr. Nero wrote the score for and acted in the movie "Sunday in New York." He spends more than eight months of each year on U.S. and foreign tours which include many college concerts. A frequent guest on television, he has starred on five television specials for the BBC in London as well as others in Holland, Sweden, Italy, and other countries. In January of 1972, NBC presented a 90-minute tribute to the music of George and Ira Gershwin; in this show Peter Nero performed a medley of *An American in Paris, Concerto in F*, and *Rhapsody in Blue*.

J. Paul Barnett is president of South Bend Replicas, Inc. in South Bend, Indiana. This unique firm deals in building cannon to serve the needs of model makers, restorers, and other serious students of antique firearms and ordnance.

This is not the first time that Mr. Barnett's firm has been called upon to perform the operation of firing the cannons for the "1812 Overture." Since 1967 they have assisted at the Cincinnati Symphony Orchestra's annual performances of Tchaikovsky's thundering overture.

Mr. Barnett is in attendance at tonight's concert, personally taking charge of firing the cannons—Lyle guns. The cannon illustrated above is a Lyle gun, a term which applies to various types of lifesaving guns developed initially by David A. Lyle in 1878. They were used as a means of projecting lifelines to persons stranded by shipwreck or other disaster.

As befits a holiday weekend and a grand finale, sixteen electrically fired cannons—Lyle guns—are precisely timed to go off as per the original score of the "1812 Overture."

[From Cincinnati Enquirer, Aug. 10, 1973]

BRING BACK 1812

A bill which would enable the Cincinnati Symphony Orchestra to perform Tchaikovsky's 1812 Overture authentically has passed the Senate and is pending before the House Judiciary Committee.

The bill the Senate passed, 78–8, would remove restrictions on the sale of black gunpowder and certain igniting devices used to fire antique guns and cannon.

Symphony orchestras all over the country are now effectively prohibited from performing the overture because it is scored for closing with a cannon volley using commercial black powder. This has been an unintended side effect of the five-pound limit placed on sale or possession or transportation of this type of gunpowder by Congress in the Organized Crime Control Act of 1970.

The bill, sponsored by Sen. Birch Bayh (D-Ind.) would remove these restrictions on the sale of commercially produced black powder and the igniting devices when they are to be used for sporting, cultural or recreational purposes.

We wish speedy passage of this corrective legislation, so that the full, live and authentic sounds of this spectacular music can once again be heard in Cincinnati.

(Point of clarification: No. "1812" concerts, once scheduled, have been administratively cancelled, though PL 91–452 does seem a factor in decisions not to schedule. On the other hand, as Indiana Sportsmen's Council testimony shows, some performances have been jeopardized by last-minute uncertainties about arrival of powder, and preparations for many have been plagued by unusual distractions and expenses related to Title XI.

(Thus, in the above editorial, "seriously impeded" would be a more fully accurate term than "effectively prohibited" at present. But under less charitable Title XI interpretation, or under another worsening of the supply situation, or under non-arrival of powder via administrative error, "effectively prohibited" would be fully accurate.)

TEXT OF A JULY 31, 1973, LETTER FROM ERICH KUNZEL, RESIDENT CONDUCTOR OF THE CINCINNATI SYMPHONY ORCHESTRA

DEAR MR. BARNETT: I am in receipt of your letters of July 19 and July 20 in regard to the passage of the bill in the United States Senate that would relax Title XI of the Organized Crime Control Act of 1970 as it applies to legitimate

acquisition of commercially manufactured black powder for sporting, recreational, and cultural use, and would correspondingly tighten Title XI as it applies to clandestine acquisition of black powder through a present loophole allowing home manufacture of "bomb grades" useless for legitimate application.

I am rather astounded at the quotes that are in the *Congressional Record* as spoken by Senators Pastore and Javits.

May I repeat my statement previously in regard to the "1812" Overture by Peter Illytch Tchaikovsky. In the score, the composer most definitely states where he wishes to have cannon shots fired. There is an absolutely separate bass drum part. Thus, in regard to Mr. Pastore's statement that "they could kick the drum a little harder," first of all, in no symphony orchestra in the world does a percussionist "kick" a drum! This is an insult to professional percussionists to come from such a highly regarded Senator. Also, the bass drum part is absolutely separate and unique from the cannon part, and should be treated as such.

In regard to Senator Javits' statements that he has "heard the Overture one hundred times and a cannon is not needed in order to emphasize Tchaikovsky's point," and also that he thinks "Tchaikovsky would whirl in his grave if he heard that argument," I must ask that the Senator check with the document, namely, Tchaikovsky's own score, to find out that the composer wishes to have cannons fired in several designated intervals.

I am surprised that such distinguished Senators would care to state such falsehoods on the floor of the United States Senate without more thorough investigation into the authenticity of the composer's wishes.

I hope that I have cleared the matter up for all. If there is anything else I can do I would be most happy to comply in hopes that this will all get passed, and we can again present the "1812" according to the original concept of the composer without hindrance from Title XI.

With warmest regards.

ERICH KUNZEL,
Resident Conductor.

[From Gun Week, Sept. 13, 1974]

OVERTURE HIT AGAIN

For the second time in three years, a foul-up in powder delivery nearly cancelled a major civic event in Cincinnati, Ohio, again raising questions about the thrust of Title XI of the Organized Crime Control Act of 1970.

Under an early ruling by ATF officials, performances of Tchaikovsky's "1812 Overture" have been permitted to continue despite the Act's general ban on interstate transportation of more than five pounds of black powder, by having a local supplier deliver powder to the site of each concert.

Another ruling declares that acquisition and use in a single day does not constitute "storage" under the Act; therefore, by receiving the powder in five pound increments and using it the same day, the gunners who must have more than five pounds of powder for the Overture remain not in violation of the law, assuming no rain dates occur.

"It works fine on paper," says an official of South Bend Replicas, Inc., who has performed the Overture in many places around the Midwest with major symphony orchestras. "But in practice, depending on third parties for delivery means, quite simply, that we never know whether the powder will show up or not. Usually it does. On August 10, it didn't."

Before the Act became effective, the gunners took their own powder with them, used what was needed, and took the surplus home.

The trouble on August 10 became apparent after the 16 guns had been emplaced and equipment checks prior to afternoon test shots had been made. When the gunners asked the usual park ranger for the usual powder, the ranger checked and found none.

A call to the usual supplier revealed that when he had applied for a permit to obtain powder from Kentucky, the permit had been denied for lack of an ATF-approved powder magazine. The issue had not been raised before, since acquisition before had not been interstate. The supplier had no powder to deliver.

With an audience of 30,000 to 40,000 persons expected for the concert, the sudden news gave rise to much concern and some comment among orchestra and park officials, and the gunners.

By good fortune, one of the gunners recalled the name of a possible alternate supplier, about an hour away. A panic phone call determined that that supplier did happen to have enough powder for the concert. A park ranger quickly set out after the powder, returned with it, and handed it to the gunners in five pound increments, barely in time to avoid cancellation of the Overture.

In 1971, mis-timed delivery had caused a similar situation. The supplier had innocently delivered the powder a couple of hours early, leaving it wi'h a ranger who, assuming the delivery normal, made no special attempt to mention it.

Orchestra personnel and the gunners, not aware of the early delivery, spent the afternoon first waiting, then frantically trying to reach the supplier, who by then was out of town for the weekend. As plans for cancellation were being made, the communication lapse was discovered when another ranger said he did remember seeing somebody "deliver something" earlier in the day. The "something" was the powder for the concert.

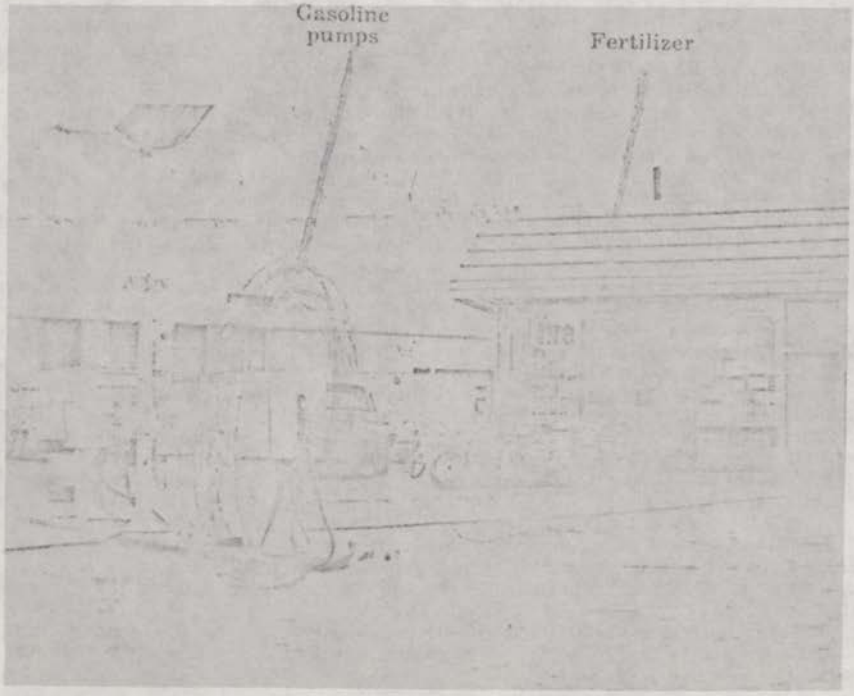
S. 1083 and several other bills now awaiting action by the House Judiciary Subcommittee on Crime would remove the present five pound stipulation from the law, and would substitute an intent clause such as the one now governing possession of gasoline, fertilizer, and various other potentially explosive materials.

The effect would be to relax the Organized Crime Control Act as it applies to legitimate users of black powder, and tighten it as it applies to bombers by removing the flat five pound exemption which, along with sportsmen, bombers share under present wording.

EXHIBIT B

> The foresaid Monk being a skillful Alchymist, had a Design to draw a higher Spirit from Peter than the common Aqua Fortis, and that he might the better open the Body of Saltpeter, he ground it with Sulphur and Charcoal, by which composure he soon became the Inventor of Gunpowder.— Henshaw, "*The History of Saltpeter.*"

EXHIBIT C



Ingredients of the Army Math Center bombing at Madison, Wis.

EXHIBIT D

[From Kentucky Happy Hunting Ground, Department of Fish and Wildlife Resources, January 1973]



Photos by John Hackworth

Digging the hole.



Emptying the blasting agent.



Inserting the detonating cord.

This past August game biologists and management personnel gathered in Muddy Slough on the 1400-acre Sauerheber Unit of the Sloughs Management Area in Henderson County, and watched in amazement as tons of earth skyrocketed from beneath the surface. The explosion caused a thunder-like roar three miles away and sent dirt clods showering down on vehicles parked near the blasting site.

Game Manager Larry Sharp and Biologists Carl Kays, Lee Nelson and I were blasting for, rather than at, ducks. Our purpose — to establish potholes for improved waterfowl habitat.

Although pothole blasting for marsh improvement (by creating more open water in the form of small ponds) is not a new concept among waterfowl biologists, the blasting on the Sauerheber Unit was the first to be conducted in Kentucky.

In past, waterfowl managers have relied on heavy equipment such as bulldozers and draglines to create open water areas. In the past decade, however, waterfowl specialists have turned to blasting, using a mixture of ammonium nitrate and fuel oil (FO) as the blasting agent.

A common fertilizer, ammonium nitrate (AN), when mixed with a carbonaceous "carrier" such as #2 fuel oil, becomes violently explosive. Advantages of the AN/FO compound are that it is easy to use, cheaper than large equipment and relatively safe when properly handled.

(The term "relatively safe" can be applied to the AN/FO compound, or other such mixtures, only when the blasting is conducted by individuals experienced in the handling of explosives. The AN/FO mixture must be considered dangerous and handled properly and the use of this blasting agent should not be employed without a qualified supervisor.)

For the Sloughs Area blasting, commercial mixtures of AN/FO were purchased and delivered in 25-pound bags. The fertilizer mixture was sealed in polyethylene sacks of sufficient strength to prevent puncture since the main disadvantage of ammonium nitrate is that it must be kept dry.

On the Sauerheber Unit we dug three holes 11 feet apart, in a triangular pattern, and approximately four feet deep. A 25-pound bag of AN/FO was emptied into each hole and detonating cord (Primacord) was used since multiple charges were to be detonated.

The Primacord was attached to a



Attaching the blasting cap to the blasting machine.



BOOM . . .



A newly blasted pothole.

section of a dynamite stick and inserted into the center of the AN/FO mixture. Then the fertilizer compound was covered with about 15 inches of tamped dirt. The three charges were then connected to a "main line" of Primacord and an electrical blasting cap was attached directly to the main line. Standard electrical wire was used to connect the blasting cap with the blasting machine.

The electrical blasting machine used was nothing more than a small generator operated by hand. The action and reaction was as follows: A quick turn of the hand generator explodes the blasting cap which sets off the detonating cord. The detonating cord simultaneously ignites the dynamite primers, which then "trigger" the three AN/FO charges. This entire process results in one loud BOOM. The potholes thus created averaged 20 feet in diameter and four and one-half feet deep.

The versatility of this procedure can be appreciated in the fact that almost any size or form of pothold may be blown. We blasted nine potholes by using the triangular pattern described above. A tenth hole was blown by extending the apex of the triangle with an additional charge and a pothole approximately one-fourth larger resulted. (Blasting efficiency varies greatly with soil types and testing is recommended before establishing a particular pattern.)

Past waterfowl studies have found that the highest utilization of blasted potholes occurs during spring and early summer. The studies also show that dabbling ducks have been found to visit the small ponds more than divers.

These observations have special connotations for the Henderson County area, since the Sloughs is used as a staging area for green-winged and blue-winged teal, gadwalls and shovelers.

After the initial sloughing-in and settling of the blasted potholes occurs, marsh vegetation will surround the waterholes and the small ponds should remain open for ducks for a number of years.

At present the potholes are full of water and are being used by wintering birds. Increased use is expected as the breeding and migrating season nears.

And so the initial phases of the "blasting for ducks" project can be termed successful. Time will tell us the rest. ■

Exhibit E

28 Die in New Orleans Fire—Victims Trapped in Bar

New Orleans, June 24.—A flash fire raced thru a second story bar in the French Quarter tonight. The Associated Press reported 28 persons were killed in what the coroner called " a mass of death."

Coroner Carl Radin said he had counted 28 bodies stacked near a stairwell and that it appeared there may be more.

Scene was in the lounge just one block off Canal Street and across Iberville Street from the new 40-story Marriott Hotel.

"All we can say is there is a heavy loss of life," said Fire Chief William McCrossen. "As far as death toll, it certainly may be one of the worst in New Orleans history. It was a rapid moving fire."

The bodies of three victims could be seen from the street near a charred window. The building was burned out.

The fire was put out by firemen only 16 minutes after it was reported, but it moved so rapidly thruout the building many patrons apparently were cut off from fire escapes.

Firemen reported seeing "many bodies."

"I saw the front door open and stay open for a second and that's when I saw the flames come in," said Douglas M. Rasmusfen, a bartender on the ground floor Jimani Lounge. "I took about 25 or 30 people out the back exit when I went."

The second floor of the building housed another cocktail lounge and the third floor also had a small bar.

Miami Firebomb Injures 90

Miami Beach (UPI).—A little man in a yellow suit walked into a crowded cafeteria last night, dumped gasoline in the middle of the dining room and set fire to it. An estimated 90 persons were injured in the ensuing blaze that gutted the cafeteria.

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15 Die in Australia Club Firebombing

Brisbane, Australia.—Two firebombs exploded and touched off a flash fire that swept through a night club early today and killed 15 persons in what police called the biggest mass murder in Australian history.

Ten men and five women died when two firebombs went off at 2:10 a.m. in the entrance of the Whiskey Au-Go-Go night club.

About 100 patrons and employees were in the club when the fire broke out.

Paper Boy, 18, Charged After Six Die in Fire

Kansas City, Kans.—Six counts of first-degree murder were filed Saturday against an 18-year-old newspaper delivery boy arrested shortly after six elderly women died in an apartment fire.

Another youth, 16, was referred to juvenile authorities in connection with the fire.

Joseph Crossland, fire chief, said the fire was "definitely arson." The building housed 20 persons, all elderly.

The murder charges were filed against Jimmy Massey of Kansas City, Kans., police said. He also was charged by the Wyandotte County attorney's office with one count of aggravated arson and one count of attempted arson.

The six victims—all widows—were identified as Alice Koontz, 72; Dale Kalene, 85; Hazel Vernon, 85; Rose Gainey, 85; Etta Ira, 83, and Pauline Kalousek, 77.

Rt. Rev. Msgr. J. K. Spurlock of St. Peter's Cathedral, whose parishoners included three of the victims, said a number of elderly widows lived in the neighborhood, not far from the downtown business district.

"They moved here in the 1920s and 1930s" when it was a fashionable suburb, Msgr. Spurlock said. "They did not want to move from the area when they were widowed."

Police reported that a small fire, apparently started by a book of matches left open in a hallway, was put out by the owner of a neighboring apartment building at about the same time the major alarm was turned in.

Convict Burned Fatally in Cell

Walpole, Mass., June 12.—An inmate at the maximum security Walpole State Prison was found burned to death in his cell early today, the Correction Department said. A spokesman said Patrick R. Gonsalves, 33, of Boston, was found in his cell in the maximum security Block 8 at abou' 2 a.m. "Apparently something flammable was thrown at him, then a match," said John A. MacLean, a spokesman for the department.

Eight Killed in Firebombing

Allentown, Pa. (AP).—Eight persons were killed and a dozen more injured Saturday afternoon when a lighted gasoline can was tossed into a crowded bar, fire officials said.

Other fires in other parts of the nation took at least eight more lives. And in Ghent, Belgium, another four died in a restaurant fire.

Earnest James Burton, Jr., 24, an employee of the Pennsylvania Department of Transportation, was charged with eight counts of murder, 10 counts of attempted murder and one count of arson, said Lehigh County Dist. Atty. George Joseph.

Joseph said Burton walked into a police station six blocks from the bar and turned himself in 23 minutes after the fire started.

Six of the injured were listed in critical condition. The other six, including a policeman and a fireman, were treated for smoke inhalation.

EJECTED FROM CLUB

Fire Chief Melvin Keyser said the Caboose Bar, a three-story brick building on N. 6th Street, was gutted by the fire, which was brought under control in 20 minutes.

Deputy Fire Chief James Thompson said: "From my understanding, it was a firebombing. The man had been ejected from the club, got the gasoline and returned."

Thompson said there were about 20 persons in the bar at the time of the incident.

FIREBOMB VICTIM REMAINS "CRITICAL"

One of two South Bend men burned late Saturday night when a firebomb exploded in the back yard at 1711 Magnolia St., remains in critical condition today at the University of Michigan Medical Center's Burn Unit in Ann Arbor.

TWO ASSAILANTS SET CLERK AFIRE IN CITY HALL

A young circuit court deputy clerk was burned seriously in a City Hall washroom yesterday by two assailants who tried to rob him.

Anthony Mele, 21, of 1620 N. Normandy Ave., was taken to Henrotin Hospital with burns on his chest, face, and legs.

He said the robbers doused him with rubbing alcohol and set him afire after he refused to give up his wallet.

NEW JERSEY BLAZE KILLS NINE

HOBOKEN, N.J. (AP).—"It was the kind of screaming that makes you sick . . . A man kept yelling. I'm over here! My babies! My babies!'," said a woman who lives around the corner from a fire that killed at least nine persons.

Firemen were to resume searching today in the rubble of four burned-out tenements for the bodies of three persons missing since Saturday's fire. Fire officials suspected arson.

DERELICT SET ABLAZE BY FOUR TEEN-AGERS DIES

MIAMI, Oct. 21 [AP].—A homeless derelict died today after he was doused with gasoline and set afire by four teenagers who also set fire to a second man and tried to burn a third, police said.

Officers said Charles Scales, 38, was sleeping behind an abandoned building last night when the youths, all apparently about 15, splashed gas over him and then threw matches on him.

YOUTHS SET VICTIM AFIRE

BOSTON.—Evelyn Wagler, 24, lived long enough to tell police how six black youths accosted her, forced her to pour gasoline over herself and then set her afire. Then she died.

TWELVE-YEAR-OLD GIRL SUFFERS BURNS AFTER DOUSING

SAGINAW (UPI).—A 12-year-old Bridgeport Twp. girl was burned seriously over 25 percent of her body Sunday after two boys doused her with a flammable liquid.

State Police at the Bridgeport post said the girl and her brother saw smoke coming from some bushes. When they went to investigate, two teenages boys jumped out and threw the liquid on her.

Gas Is Problem—Fire Concern Grows

City fire officials have expressed growing concern over the misuse of gasoline by homeowners. Two children killed Monday night in a gasoline-caused fire brought to five the city's 1973 toll of death by fire.

According to Fire Chief Jack R. Bland, all of the South Bend fire deaths this year resulted from fires caused by the presence of gasoline in homes. He pointed out that last year only three South Bend residents died in city fires.

The latest fire victims, Andrea J. Burton, 7, and her sister, Sabrina, 3, died after the ignition of gasoline, spilled from the fuel tank of a minibike that was being cleaned in the living room of their home.

TRAPPED IN BUILDING

The two children ran up the stairs of their home at 522 Wenger St. to escape the flames and were trapped inside the building. In an effort to rescue them, their father, Lee Burton, 29, a city police officer, and a city fireman were injured.

On Jan. 15, a fire resulting from the use of gasoline to clean paint brushes caused burns and other injuries that were fatal to three members of the Harry Scott family.

Officials said the blaze resulted when vapors from a can of gasoline inside the home reached the pilot light of a nearby stove.

Bland called the deaths "a tremendous, horrible waste of human life." He also said at least two other persons have been injured this year in flash gasoline fires while using the fuel as a cleaning agent. "There are probably many more instances that go unreported," he added.

Explosions, Fire Hit Kansas Town

Galena, Kans.—Three explosions ripped through a half-block downtown area and set ablaze a hotel, a cafe and a recreation center. Authorities said no one was seriously injured.

Fire companies from more than 15 surrounding communities rushed to the southeast Kansas town of 3,800 Sunday night to aid in fighting the fires at the Galena Hotel, Reed's Cafe and a recreation center. All were open at the time of the explosions.

Oil Stove Flares, Kills West Sider

A man was burned to death Monday when an oil stove suddenly burst into flames.

James Barnes, 36, of 3025 W. Washington, was pronounced dead at Cook County Hospital.

Homicide investigator Michael Shull said Barnes and Ray Wolton, 64, of 1912 W. Warren, were moving the stove in a garage at 2943 W. Warren when it ignited and caused a flash fire.

Shull said Barnes was trapped in the garage, but Wolton escaped without injury.

Woman Burned by Blast

Mrs. Phyllis Lemoine, 36, of 1611 S. High St., was released after treatment at Memorial Hospital for burns suffered about 10:20 p.m. Friday when her oven exploded.

Hospital officials said Mrs. Lemoine suffered first degree burns to both arms, hands and her face, and second degree burns to her right hand. Firemen said no fire resulted from the explosion and there was no damage to the home.

Mrs. Lemoine told police she opened the oven to check a pizza she was baking when the oven exploded. She was taken to the hospital in a Fire Department ambulance.

Check Car Blaze

Firemen are investigating the causes of a fire shortly after midnight which destroyed a 1970 Cadillac owned by Jerry T. Mason of 525 S. Carroll St. Mason told firemen he discovered the car burning in front of his home about 12:50 a.m. He set the loss at $4,000.

Broken Gas Line Causes $1,500 Apartment Fire

A fire caused by a broken gas line caused an estimated $1,500 damage this morning in the home of Lewis Jaronik at 614 Leland Ave. Fire inspector Lt. Richard J. Klemczewski said that Earl Brumbaugh, a service man for Radio Furniture Mart, was working on the gas stove in the kitchen on the second-floor apartment when a gas line broke.

The gas from the line ignited, causing extensive damage to the apartment which is owned by Mrs. Viola Felkins, of the same address, Klemczewski said. Responding to the alarm at 10:51 a.m. were Engines 2 and 7, Rescue 1, Ladder 3, a battalion chief and an inspector.

Pipeline Blasts Kill Four in Texas

Austin, Tex.—A series of thundering explosions in a liquid petroleum pipeline sent flames shooting hundreds of feet into the air and killed at least four persons, authorities reported early today. Others were injured. The explosions occurred 10 miles southeast of here.

Two automobiles and a truck on a nearby roadway were destroyed by the blast. Four persons were brought to a hospital here with burns.

Five Die in Northwest Side Flat; Heater Fumes Blamed

Five persons, three of them children, were found dead, apparently from gas fumes, in a Northwest Side apartment at 1623 N. Talman Ave. yesterday.

Police said all apparently breathed fumes from a gas space heater with a disconnected exhaust pipe.

The victims were Andrew Wantland, 21; his wife, Dorothy, 16; their daughter, Tammy, 6 months, all of the Talman Avenue address; and Mrs. Wantland's sisters, Sandra Richards, 13, and Sue Richards 11, of 2728 W. Chanay St.

Tammy Wantland was pronounced dead at St. Elizabeth's Hospital shortly after being admitted and after unsuccessful efforts at the scene to revive her by mouth-to-mouth resuscitation.

Overcome by the fumes and reported in critical condition in the hospital were two brothers of Mrs. Wantland: Martin Long, 6, and Frank Long, 4.

The dead Richards children were the daughters by a previous marriage of Mrs. Doris Wilson of the Chanay Street address.

Wantland's mother, Mrs. Shirley Patton, 49, who lives next door at 1625 N. Talman Ave., and Mrs. Adeline Kozlowski, who lives on the second floor over the Wantlands' first floor apartment, found the victims after breaking a chain lock on the back door of the apartment.

Arson Blamed in Car Fire

Arson was blamed in a fire which destroyed a 1968 Pontiac owned by Ernest Escobedo, 714 S. Falcon St., shortly before 3 a.m. Saturday.

Firemen said they found a metal container near the scene and that it contained a flammable liquid. Investigators said they believe the liquid was poured over the car's interior and ignited.

Blast Damages Dow Chemical

Midland.—An explosion of undetermined origin Sunday knocked out two walls and caused extensive internal damage to an agricultural chemical plant in the huge Dow Chemical Complex here.

No injuries were reported.

Source of the explosion in Dow's cycle products plant was a unit which manufactures a weed killer, a company spokesman said.

Explosion, Fire Injures Daryl Hull

Daryl Hull, 23, of 57045 Mayflower Rd. is listed in fair condition in Memorial Hospital with first and second-degree burns to both legs suffered Saturday afternoon when gasoline he was working with exploded in the rear of Veldman's Service Center, 430 S. Mayflower Rd.

Fire Inspector Lt. Edward J. Szymkowiak said Hull was using gasoline to burn insulation off copper wire when a gallon can of gasoline exploded. Hull was driven to the hospital in a private car shortly before 4 p.m.

Cops Seek Owner of Explosives Lab

Elmhurst police were trying yesterday to reach the family of a 13-year-old boy, whose well-stocked and potentially explosive chemistry laboratory was uncovered Wednesday in the basement of the family's home.

The John Davis family of 209 E. North Ave., Elmhurst, were reported on a camping trip, and authorities were hoping they might telephone a friend so they could be told police want to talk to them.

Police were told of the collection of dangerous chemicals by a runaway 14-year-old boy, who bragged he had a friend who could make nitroglycerine.

After verifying the formula, police and an army demolition team entered the vacant home with a search warrant from Judge Jack Parish of Du Page County Circuit Court. They found large stores of chemicals, along with crude handwritten formulas for producing various explosives.

After evacuating neighboring homes and carefully removing the chemicals, police called scientists at Argonne National Laboratory for advice on what to do with the substances.

Suspected Arson Investigated

Inspectors are investigating a fire of suspicious origin which occurred at 318 S. Taylor St. today, causing $8,000 damage to a vacant house owned by Robert Ruff of Westville.

Fire inspector Lt. Edward Szymkowiak said that the house had been ransacked and that a flammable liquid had apparently been used to start the fire on the back porch. Damage to the contents of the house was set at $50.

Worst Blaze Here Since Fire of 1871

Damage from the massive explosion and fire at a Southwest Side industrial complex Sunday will run between $30 and $50 million, an insurance investigator said yesterday.

$200 Garage Fire Reported on Ford Street

A fire of suspicious origin early today resulted in $200 damage to the garage of Price W. McMahan, 2906 Ford St.

The fire began on the overhead door of the garage and on the west wall, and fire investigators believe that a flammable liquid was used. A spout that would fit a gasoline can was found in the alley behind the garage.

McMahan told police that a young man came to his door after midnight and told him that his attached garage was ablaze.

A vehicle parked in the driveway suffered minor paint damage from the heat, and there was no loss estimate on the contents of the garage.

Three Arrested in Attack on Grandmother

An 82-year-old grandmother who was raped repeatedly, beaten, and robbed by three youths was in guarded condition yesterday in MacNeal Memorial Hospital, Berwyn.

The woman has lived in a West Grenshaw Street bungalow for 52 years. She suffered fractured ribs, head injuries, and extensive burns Wednesday when the three burned her with a toxic chemical substance, police said.

After neighbors saw the three flee the home, they called police. Police arrested Jessie Glen, 18, of 4129 West Grenshaw St., and James Blan, 17, of 1236 S. Tripp Ave., near the woman's home. They were charged with rape, robbery, and aggravated battery.

Delay Sentences of Two Teachers in Bombing

A Federal judge ordered a background investigation of two Gary school teachers before sentencing them for attempting to firebomb the home of another teacher during a 1972 strike.

William Tankersley, 27, of 108 Rensselaer St., Griffith; and Frank Steffaneli, 28, of 3509 Tyler St., Gary, teachers at Gary's Emerson High School, were found guilty late Wednesday by a jury in Federal District Court in Hammond.

The federal charges were possession of a destructive weapon and possession of a weapon without a serial number. The maximum sentence for each charge is 10 years in prison and a $10,000 fine.

The bombing attempt took place May 18, 1972, three days before the month-long strike ended.

Four Chicago Execs Are Found Dead in Canada Fishing Cabin

Coroner Colin Bullock said they apparently were asphyxiated from carbon monoxide produced by the incomplete combustion of propane gas used in the cabin stove and refrigerator.

Arson Hinted In Car Burning

Arson was listed as the probable cause of a fire early today which caused an estimated $500 damage to a 1965 model car owned by John F. Bean, 1022 N. Main St.

Lt. Larry Slabaugh, of the Fire Department inspection bureau, said the car's engine and hood had been doused with a flammable liquid and set afire.

The owner told police he was awakened at 3:13 a.m. by a loud explosion and found his car, parked in front of 109 W. Marion St., afire. The blaze damaged the engine, front tires and defroster hose. Engine No. 1 from Central Station extinguished the blaze.

Carrying Can of "Gas" in Trunk Could Be Fatal

Washington (AP)—Carrying a can of extra gasoline in the car trunk may help beat the gas shortage, but it could also be fatal, says a federal fire expert.

Richard E. Bland, chairman of the President's Commission on Fire Prevention, said such a practice "would be almost like having a bomb in your trunk waiting for something to ignite it."

Burn Victim Reported Fair

A 7-year-old boy who was accidentially burned by gasoline in an incident about noon Saturday, was reported in fair condition this morning in St. Joseph Hospital.

Larry T. Kolodziej, son of Mr. and Mrs. Larry Kolodziej, 1010 E. Broadway, was admitted to the hospital for treatment of first- second- and third-degree burns over the upper portion of his body. He was taken to the hospital from his home in a police patrol car.

Police had originally quoted the boy as saying two older boys had thrown some gasoline over him, and set him afire as he was playing near his home. After questioning Larry, police today reported that the boy admitted playing with a can of gasoline, and had held a lighted match near the opening of the container. The fumes exploded, burning him, detectives said.

Bombs Fall Accidentally

Las Vegas, Nev.—An A7D fighter jet accidentally dropped six 500-pound bombs near a residence 15 miles southeast of a bombing range outside Las Vegas, an Air Force spokesman said on Friday.

There were no injuries reported. It was not known if the building was occupied. Damaged from the bombs, dropped Thursday, were believed to be limited to broken window glass in the buildings," described as a residence and a smaller building."

Three homes are in the area where the bombs landed.

The mishap occurred about 7 :15 p.m. Thursday near the Nellis Air Force Base Bombing Range Three some 25 miles northwest of Las Vegas, the spokeman said.

Blast Levels Building, Killing 7

Cincinnati.—Mary Evans had the Cincinnati Gas & Electric Co. on the telephone complaining about a strong gas odor, when her apartment building exploded and collapsed.

Mrs. Evans' husband, in another room at the time, was one of seven persons killed in the Saturday night blast. Another 17 were hurt.

Five of the victims were in Al and Clara's Cafe on the first floor when the explosion, believed triggered by a natural gas leak, wrecked the brick and wood building in the over-the-Rhine area of the city. The other victims were in apartments.

The explosion heavily damaged an adjacent two-story storefront church, destroyed two cars, damaged a dozen others and shattered windows in houses blocks away.

Damage to the apartment building was estimated at $48,000.

Spilled Gas Fuels $1,300 Fire

Two 17-year-old boys removing a gasoline tank from a car inside a garage at the rear of the Robert E. Lemere home, 2126 Huey St., accidentally started a garage fire Monday, afternoon which resulted in an estimated $1,300 damage.

Fire Inspector Lt. Louis R. Kovach said gasoline spilled from the tank and was ignited by a gas heater inside the garage.

The flames were brought under control after 20 minutes firemen said. Among the items inside the garage at the time of the blaze were the auto, two motorcycles and a bicycle.

Responding to the alarm were Engines 2, 11, Rescue 1, Ladder 3, the battalion chief and the fire inspector. The youths were not injured.

Cause of Blasts—Not Malfunction

Roseville, Calif.—A boxcar fire which triggered a series of bomb blasts last weekend did not result from "physical or mechanical malfunction," but the exact cause may never be known, a Southern Pacific railroad (SP) official said Tuesday.

R. D. Spence, SP director of operations, said the railroad and five federal agencies, including the FBI, considered the initial blaze crucial to their investigations.

"There is nothing to indicate that any physical or mechanical malfunction caused the blaze," Spence said. But he pointed out that the impact of the repeated blasts could have destroyed any physical evidence.

Gas-Loaded Rail Cars Explode Near Memphis

Memphis, Tenn., Sept. 5 [UPI].—Two railroad tank cars loaded with propane gas burst into flames and exploded today, forcing police to evacuate two blocks of a nearby subdivision.

Blast, Fire Destroy Home

loss $25,000 as adjacent houses burn

An explosion and fire Sunday night leveled a home at 426 Parkovash Ave. and damaged two adjacent homes.

Flare Sets Car Afire

A kerosene-burning Street Department flare was used early this morning to set a fire that destroyed a car owned by Daniel Grove of 301 Haney Ave. in front of his home.

Firemen said the street flare was placed or thrown onto the roof of the 1964 Pontiac convertible and fell into the back seat seat, engulfing the auto in flames.

Gas Filled Cars Explode; 56 Injured

Oneonta, N.Y. (AP)—"Guys just started jumping for their lives off the side of the embankment into the snow," Mickey Hirten said of a train derailment and explosion which injured 56 persons Tuesday.

Twenty-one persons, many of them firemen were still hospitalized today. Roy Altheser, 25, was in critical condition with both legs broken and burns, a hospital spokeswoman said. Four others were in serious condition.

Arrest Three in Bombing

Three South Bend men were taken into police custody this morning and a fourth suspect was being sought after all four were indicted this week on federal charges in connection with the Feb. 12 fire-bombing of a semitrailer truck at McKinley Ave. and 29th St.

Canned 'Dynamite'

some ways of beating energy crisis are dangerous

That spare gallon can of gasoline you've hurriedly stored in anticipation of an emergency is a "liquid bomb" equal to 14 sticks of dynamite.

Blast Kills 1, Injures 19 at Wacker, Adams

Twenty persons were injuried, one of them fatally, in an electrical explosion and fire Tuesday in the Northern Building under construction at Wacker and Adams.

Three Commonwealth Edison Co. personnel were severely burned by a "massive short circuit" that occurred while they were testing three transformers the utility had installed in the 31-story building. A fourth Edison employee was in fair condition with burns received at the same time.

The accident happened about 10:15 a.m. in a ninth-floor transformer vault of the structure, which had been scheduled to open in part in December as a combination office building and branch of the Northern Trust Co.

Sixteen other persons, including at least one fireman, suffered smoke inhalation and other injuries in a fire that was quickly extinguished by 65 firemen who responded with 12 pieces of equipment.

Joseph Deichman, deputy chief fire marshal, said firemen using a dry chemical (Ancul) put out the blaze "in a matter of minutes." He said the accident was caused by a transformer short circuit, and he added:

"In recent months, we've had several transformer fires in buildings under construction."

Worst British Blast?

FEAR 55 DEAD

Scunthorpe, England (UPI).—In what may be Britain's worst industrial explosion in peacetime, a chemical plant blew up in Northeast England and poisonous fumes caused the evacuation of three villages.

Latest estimates said 55 were missing and feared dead and scores more wounded.

$250,000 Arson Damage

Portland, Oreg. (UPI).—Arsonists caused $250,000 damage to six fuel tankers Sunday, but officials said "the whole place would have gone up" had any been loaded with fuel. "This wasn't some kind of nut or kid playing around," said Fire Chief James H. Riopelle. The fire did extensive damage to five tractors and six trailers. Six fire bombs—half-gallon bleach bottles filled with gasoline and a rag wick—were found unexploded nearby. He said the company had received no threats and the FBI said it could not specifically link the fire to the strike by independent truckers. There have been no previous violent incidents in Oregon in connection with the strike.

Fuel Storage Perils

Hoarding gasoline in your home or car is like playing with loaded dice: It can put you one step ahead of the gas shortage but it can cost you your life.

Four persons were killed and two others severely burned on New Year's Eve when a five-gallon can of gasoline stored in a car trunk exploded after an auto-truck crash near Harrisburg, Ill.

A Chicago woman and her five children were rescued from a burning near North Side building Wednesday. Police reported finding two ruptured five-gallon gasoline cans near a space heater in another apartment.

The Chicago Motor Club said 13,500 persons sought hospital emergency room treatment last year for injuries associated with gasoline.

Nearly 7,000 injuries were burns caused when vapors from an open gasoline can were ignited by a cigaret or ignition spark. Another 5,100 were poisoned, including children who had drank gasoline.

Mobile Home Hit by Fire, Explosion

An apparent malfunction in an oven using bottled gas in the mobile home residence of Charles Howell, 14015 McKinley Hwy., resulted in an explosion and fire which caused an estimated $8,500 damage to the dwelling Wednesday night, firemen said.

Incendiary Fires Up

Boston.—A large increase in incendiary and suspicious fires occurred in 1972. The number of "set" fires rose 16.8 per cent, to 84,200, and losses were up 22.6 per cent to about $285.6 million.

54 Hurt as Propane Train Explodes

Oneonta, N.Y., Feb. 12 [UPI].—A freight train carrying propane gas was derailed tonight, triggering a series of explosions that hurled two railroad cars into a river and injured scores of firemen and bystanders.

Fire Deaths Equal Total for 1972

Boston, Jan. 2 [AP]—The national Fire Protection Association says 11,900 people died in fires in the United States in 1973, about the same number as the year before.

The number of deaths in dwelling fires was about 6,600, about the same for each of the last three years, the association said in a report issued yesterday.

Total property loss from fires was estimated at $3.1 billion, an increase of $150 million from the 1972 figure.

According to the report, the worst "loss-of-life" fire in 1973 was a gas tank explosion on Staten Island, N.Y., on Feb. 10, in which 40 workmen were killed.

The largest property loss—$37 million—occurred May 27 in Chicago when fire swept thru an ink plant, food processing plant, grocery warehouse, and furniture warehouse.

Worker Burned in Explosion of Fuse Box

Roman M. Popielski, 34, of 234 Concord Ave., is in satisfactory condition in Memorial Hospital with burns suffered when a fuse box exploded at 3:20 p.m. Friday at Allied Stamping Division, 601 W. Broadway.

A Danger Illustrated

It's a shame that American motorists can't take advantage of the benefits the gasoline shortage offers without inviting the dangers that come with it, too.

Highway death statistics suggest that perhaps 100 lives were saved by the tendency to drive more slowly than usual over the New Year's weekend, in order to save fuel; meanwhile a woman and three children were burned to death in downstate Illinois when a gasoline container exploded in the trunk of their car. The car stood stalled partly off the highway in bad weather, and was hit by a truck. The truck driver was charged with drunk driving.

Of course there is a strong temptation to carry extra gasoline for fear of running out. But safety experts have warned repeatedly, in recent weeks, that yielding to this temptation can be fatal.

Stored gasoline in any form is as dangerous as dynamite, but Director Francis J. Murphy of the Chicago Fire Prevention Bureau warns that the worst hazard of all is gasoline stored in cans in auto trunks. Fumes escape, and a minor spark—such as might come from tail light wiring—can ignite the fumes. A rear-end collision makes disaster almost inevitable.

Whether as individuals or as a nation, a tragedy seems necessary before we are impressed. As a police spokesman said after the downstate crash: "They've preached and preached on television and in the newspapers about carrying gas in your car—but nobody listens."

Carrying Extra Fuel "Dangerous"

San Francisco (UPI)—The California State Automobile Assn. has warned against the "very dangerous practice" of carrying extra gas in cars to avoid running out of fuel.

The association said gas carried other than in a car's fuel tank can expand and overflow, particularly in warm weather, creating fumes. As a result a spark or lighted cigarette could cause an explosion.

Blast Levels Home

A series of fires late Saturday night caused extensive damage to several homes in the city and left at least two persons injured.

Firemen early today were searching through the charred rubble of a home at 752 S. Bendix Dr., which was destroyed in an explosion and fire about 11:15 p.m. Saturday.

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1 KILLED IN LAGRANGE PARK BLAST

Jeffrey D. Moore, 23, of 2710 W. 55th St., was killed when a tank he was refilling with oxygen exploded yesterday in the Liquid Carbonic plant at 26th Street and Beach Avenue, LaGrange Park.

Windows in the 50- by 125-foot building were shattered. One other employee was stunned by the blast but did not require hospitalization.

LaGrange police and fire officials said another employee reported hearing a hissing noise from the safety valve on the tank before it exploded.

ALLOYS PLANT BLAST HURTS 3 WORKERS

BENTON HARBOR.—Three men were taken to Mercy Hospital with second- and third-degree burns this morning after an explosion at the Michigan Standard Alloys aluminum division.

Bruce Sokol, plant manager, said the injured men are Thomas Rybecki, 47, of 1187 M–139; Marvin E. Goodrum, 57, of Rt. 2, Riverside, and Francis E. Bracewell, 53, of 155 Garfield St.

Sokol said the explosion in a scrap crusher occurred soon after 9 a.m. He said he did not know the cause of the explosion but said he believed it was a dust explosion.

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59 STRICKEN AS CHLORINE GAS ESCAPES FROM RAILROAD CAR

GREENSBURG, PA., Sept. 7. [AP].—A valve failed today on a railroad tank car filled with 55 tons of chlorine gas, spewing yellow-green clouds of the gas over a broad residential area. The leak was capped six and a half hours later.

Authorities reported 59 persons stricken by the sour-smelling fumes. Ten were hospitalized, all in fair condition. The remainder were given first aid treatment at an emergency medical station near the tanker and at area hospitals, then released.

Almost all the injured were firemen and police officers. Among the few civilians stricken were three elderly persons. One was a man found lying on a sidewalk a block from the tanker shortly after the leak was discovered.

About 2,000 persons were evacuated from the area while the gas was leaking. Police allowed them to return after the tank car was moved out of town. Residents were advised to air out their homes.

Firemen and engineers wearing oxygen backpacks and heavy rubber suits got the cap in place after a variety of other efforts to stem the escaping fumes failed.

They worked with heavy black grease smeared over exposed skin to prevent burns.

Engineers replaced the faulty valve and a diesel towed the tank car to a railroad yard in Youngwood, two miles away. Officials said it would be taken back to a chemical company in Painesville, Ohio, for emptying.

BREAKOUT PLANNED?—BLAST KILLS INMATE

MICHIGAN CITY.—A homemade arsenal in a cell at the Indiana State Prison here blew up late Monday night, killing the occupant, James Lee Collins, 25.

Collins was serving a life sentence as an accessory before and after the fact in the murder of an Indiana state trooper on June 1, 1967, near Greensburg, Ind.

The blast set Collins' clothes on fire and he apparently burned to death, although state police have requested an autopsy.

Sgt. Leo Commiskey and Trooper Brian Vickers investigated along with Deputy LaPorte County Coroner Cecil Jansen.

DIES SCREAMING

Commiskey said weapons apparently manufactured by Collins caught fire at about 11:15 p.m., and the inmate died screaming in his burning locked cell.

Police recovered five homemade bombs, several homemade 410-gauge shotgun-pistols and 29 homemade shotgun shells. Commiskey said chemicals and even a formula for explosives have been found in Collins' cell.

Three other men, not immediately identified but all life-term prisoners, were reported involved in developments surrounding the explosion.

After the explosion, prison officials conducted a full shakedown of the inmate population. Numerous weapons were confiscated, according to Commiskey.

LASH LAUNCHES PROBE

Warden Russell Lash was behind the walls of the prison this morning conducting an investigation of the fatal explosion.

State Police at Indianapolis indicated that an investigation had been in progress into a possible planned break-out. Collins and the three other inmates reportedly had planned to use sections of pipe coupled together to scale the prison walls and then firebomb the guard towers.

Police believe the escape was planned for Wednesday night.

Collins was convicted in the shooting death of State Trooper William Rainer along Interstate 74 near Greensburg in Decatur County. Rainer had stopped the car for a tail-light violation and was confronted by two men. Rainer was shot but also was able to kill one of his assailants. Collins subsequently was convicted in the case.

PLANT RIPPED BY CHEMICAL BLAST

FREEPORT, TEX., Dec. 27 [UPI].—A railroad tank car leaking ethylene oxide exploded and sent flames ripping thru an epoxy resin unit of a Dow Chemical Co., plant today. Five persons were injured.

[Letter to the editor of Time magazine]

NO AMATEUR NUKES, PLEASE

SIR: I am incensed over the "Amateur A-Bomb?" article [May 13]. Is it really necessary to print for all to see explicit directions for the construction of a nuclear weapon? Honestly! Doesn't it become clear to us all that the suggestions of another way to terrorize society will do nothing but encourage psychotics and weirdos to try it out? Shame! Tell us the stories, yes, but please leave out the details and formulas.—Nancy Dees, Puyallup, Wash.

[NOTE: In a situation parallel to the one under objection above, an evening national television news program gave lengthy and fully detailed instructions on how to make a calendar bomb.]

ARMSTRONG SENTENCED

MADISON, WIS. (AP).—Former University of Wisconsin student Karleton L. Armstrong has been sentenced to a 23-year prison term in a 1970 bombing that destroyed a campus building and killed researcher Robert Fassnacht of South Bend. Armstrong, 27, pleaded guilty Sept. 28 to a second-degree murder charge and was sentenced Thursday by Circuit Court Judge William Sachtjen. Sentencing followed two weeks of defense testimony at a special hearing before the judge. The defense summoned a number of antiwar activists in an attempt to prove the bombing was justified as an act of resistance to the Vietnam war. Defense attorney William Kunstler said Armstrong's act was "not the willful act of a B-52 bomber or the President of the United States . . . it was a well motivated and well intentioned act."

[NOTE.—Armstrong used fertilizer.]

[From Chicago Tribune, Feb. 5, 1974]

EXPLOSIVE DANGER OF STORING EXTRA GASOLINE

(By Vernon Pechous, a Berwyn Fire Department lieutenant and a Berwyn resident)

In coping with the gasoline shortage, that first thought of "putting some gasoline away for an emergency" is a dangerous one. It may be just that "putting some away" which will cause the emergency.

Would you knowingly store, in your garage, under your porch, or in your cellar, 100 or more pounds of dynamite, with cap set and fuse leading out where any passerby might drop a match or a cigaret butt on it and blow your garage or your houses skyhigh, perhaps with you or your family inside?

You would not!

But, you ask, what harm can possibly come of the storing away of a few gallons of gasoline?

What harm? Under certain conditions over which you have little control, one gallon of gasoline and 100 pounds of dynamite have almost the same destructive explosive power. And, worse, it is almost axiomatic that a raging fire immediately follows and completes the destruction begun by a gasoline explosion.

You'll be amazed to discover how much you have either forgotten or never learned about this liquid dynamite you use every day. The flash point of gasoline, the lowest temperature at which it will vaporize in sufficient quantities to create an explosive mixture with air, is -45 Fahrenheit—15 degrees below zero!

And how much gasoline vapor is necessary to create an explosive mixture with air? We know that a concentration of only 1.5 per cent to 7 per cent by volume is enough. That means that in an average-sized room—a room 12 by 12 by 9—vapor from only three quarts of gasoline would make every cubic foot of the air in that room explosive.

Usually, however, only about one cubic yard of air near to the gasoline container need be so charged to result in an explosion; and to charge that cubic yard, only about two ounces of gasoline must vaporize. These two ounces of gasoline would, in controlled explosions within a motor, drive a large automobile about 500 feet along a level road.

Imagine the power released when that same vapor-air mixture is exploding all at once! Gasoline vaporizing in air gives off more than one hundred times its bulk in vapor, and converts more than 1,500 times its volume of air into an explosive mixture.

Any igniting agent will cause that explosive mixture to expand, literally "in a flash," to 4,000 times its volume. Well, you may say, who would be so foolish as to light a match or to do anything else to ignite that explosive mixture? Certainly, you would not, if you could possibly help it. But you have little or no control over the conditions that may cause ignition from a spark of static electricity or some other unforseen factor. A static spark may result from no more than pouring gas from one container to another.

HOME FIRE DAMAGE SET AT $18,000

Arson is suspected in a fire late Sunday which destroyed a public housing unit in the Harbor Homes housing development at 4735 Jamestown Ct.

ARSON SUSPECTED IN BARN BLAZE

Arson is believed to be the cause of a Saturday afternoon fire which destroyed a vacant barn at 18011 Cleveland Rd.

EXHIBIT F

(Reprinted by permission of Gun Week)

Commenting on the new law and its implications on black powder shooting, Rex D. Davis, ATFD acting director, said:

"I am particularly sympathetic to the problems of the sporting users of black powder. It is apparent that many of the problems of the black powder users

stem from the supply system rather than the law or regulations. With this in mind we have informally discussed the supply problem with an official of E. I. duPont de Nemours Company. He expressed considerable interest in increasing the availability of black powder to the sportsmen. This may provide black powder users some relief until further consideration can be given to their situation."

EXHIBIT G

INDIANA SPORTSMEN'S COUNCIL

BLOOMINGTON, IND.

IMPORTANT NOTICE TO OWNERS OF ANTIQUE FIREARMS

Antique and antique/replica muzzle loading firearms can be safely operated only on proper charges of commercially manufactured black powder. All other types of propellant and pyrotechnic powders yield pressures vastly in excess of those which firearms of an antique nature are designed to accept.

Title XI of the Organized Crime Control Act of 1970 (PL 91–452) has in many parts of the country created sudden shortages of the antique (BLACK) powder, by heavily restricting the interstate movement of it.

Those shortages, sometimes through mis-communication and sometimes error otherwise, have led to nationwide reports of occasionally-suggested substitutions of improper powders for the proper antique powder.

According to some reports, some who have suggested such WRONG substitutions have wrongly presented themselves as knowledgeable in the field of the muzzle loading sports. There is no substitute for commercially manufactured black powder!

All modern ammunition contains smokeless powder. Powder taken from shells and cartridges is totally unsafe for antique use.

All powders intended for use in hand-loading of modern ammunition are smokeless powders. Color alone is no guide!

Attempting any substitution in place of black powder in any muzzle loading firearm is more reckless than putting gasoline in a kerosene stove!! It cannot be done without serious hazards.

Commercially manufactured black powder is NOT available through typical retail outlets. When available, it is usually available ONLY through sources specializing in antique and antique/replica firearms.

Know your powder! Never attempt substitutions!

Where a trace of question exists, ask a bone fide expert. If no such person is available in your area, we will respond to inquiries, as a public service. The National Muzzle Loading Rifle Association, Box 67, Friendship, Indiana, is another source of expert information that joins us in making this warning against hazardous mis-loading of antique and antique/replica firearms.

[From The Handloader Magazine, November–December 1971]

$3 WORTH OF FERTILIZER

The awesome destructive power so vividly illustrated on these two pages was unleashed by Treasury Department agents in a demonstration for law enforcement officials at Vandenberg Air Force Base, California, in August 1971.

According to the officers conducting the demonstration, the blast was created with a homemade bomb rigged with $3 worth of common materials. The principal ingredient was ammonium nitrate fertilizer—available at garden supply stores for about $4 per 80 pound bag, or in bulk from farm suppliers for around $60 per ton.

So what has this to do with handloading? A great deal.

As a result of a sharp increase in terrorist bombings by militant radicals in the past few years, there has been an almost constant stream of explosives control bills introduced by city, state and federal lawmakers.

These bills follow one general theme: requiring licenses of all "explosives" dealers, with permits for "explosives" users. "Explosives" is usually defined in these bills to include all commercial high explosives," such as dynamite and TNT, but only two "low explosives"—the black powder and smokeless propellants used by handloaders and muzzle loaders.

Thanks to the assistance of the Nixon Administration, the federal explosives control law enacted last year exempted smokeless propellants and five-pound quantities of black powder. It is unfortunate that black powder was not exempted for the five-pound limit is proving inadequate for many shooters, due to a shortage of local suppliers. Also, although black powder suitable for bombs can be made with a junior chemistry set, the high quality black powder used in firearms must be commercially manufactured.

Since the federal law was enacted, many other bills have been introduced in Congress and in state legislatures which would place additional, more stringent controls upon purchasers of "explosives," including smokeless propellant and black powder. Many are poorly drafted, and all would fail to meet their stated objective of reducing terrorist bombings.

The average lawmaker—like the average citizen—has a limited understanding of explosives—and is likely to legislate on the basis of this lack of knowledge, drafting his bill to include "gunpowder." This imprecise term is a holdover from the last century, when black powder similar to that used for guns was the principal blasting agent.

The misunderstanding concerning firearms propellants is furthered by television and movie portrayals of someone blasting his way out of peril with a bomb made with the powder from a half-dozen rifle or pistol cartridges. Like so much else in the movies, "it just don't work that way."

Smokeless propellants are "deflagrants," that is they burn at a high, but controlled rate, releasing gases which force a bullet out the barrel. A person with considerable knowledge could make a bomb with smokeless propellant, but it is unlikely that he could produce other than a "low order" detonation.

As a guess, based on a considerable amount of research into explosives duplicating the $3 ammonium nitrate blast depicted on these pages would require at least $1,000 to $2,000 worth of handloader's smokeless propellant, almost as much black powder, an initiating charge of some type of high explosive, and a skillful explosives man. Even that might not do it; no one knows for sure because smokeless propellants simply aren't used that way.

Wouldn't the fact that smokeless can be made into bomb, justify its inclusion in anti-bombing laws? Only if all other materials which can be made into bombs are similarly controlled. And that's impossible!

In normal use, smokeless is not an explosive. The same is true of nylon panties, gasoline, propane, hand soap, playing cards, sugar, flour, or ammonium nitrate fertilizer. But with a little knowledge, any of these items—and a long, long list of other materials—may be made into bombs as powerful, or many times more powerful than any bomb made from either smokeless propellant or black powder.

None of the bills we have seen propose to regulate "low explosive" ammonium nitrate fertilizer, yet according to The Wall Street Journal, the same material—mixed with fuel oil—to make it a "high explosive"—is being used for 70 percent of the commercial blasting formerly done with dynamite. That standard mix requires an explosive priming charge to insure detonation, but ammonium nitrate fertilizer may be mixed with other materials in such a way as to be detonated by nothing more than a firecracker. The details of such "high explosive" mixtures are available in almost any public or college library.

Whatever laws are passed, such knowledge cannot be repealed, and it is being used by radicals. For instance, the devastating blast which destroyed the Mathematics Research Center at the University of Wisconsin last year, killing one and injuring several, was caused by a trailer loaded with 1,700 pounds of ammonium nitrate fertilizer mixed with gasoline.

Astonishingly, the Wisconsin tragedy has been cited as evidence of the "need" for new explosives laws regulating smokeless propellants—but such proposed laws do not include ammonium nitrate!

Even if ammonium nitrate were included in the laws, it would accomplish nothing, for how much control could be placed on the millions of tons used by farmers. And even if it could be regulated, all of the other potentially explosive

materials would still be available—and the information on how to make them explosive would still be in the libraries.

The only sensible solution is to make explosives laws apply only to commercial high explosives, then outlaw the unauthorized possession of any substance prepared in such a way as to perform as a high explosive or destructive bomb. And that is precisely what the existing federal law does though it needlessly includes black powder imitations.

When your lawmaker begins to think more laws are needed to control explosives, show him these photos and ask him how he proposes to control such homemade explosives.

He may ask, as Rep. Emanuel Celler asked at the explosives hearings last year, "What legislation can we enact to keep explosives out of the hands of bombers." And you may answer, as both this editor and a demolition expert answered: "None. Explosives are too easy to make."—Neal Knox.

EXHIBIT I

FRATERNAL ORDER OF POLICE, INDIANA STATE LODGE

Mr. MAURICE LATIMER,
President, Indiana Sportsmen's Council, P.O. Box 93,
Bloomington, Ind.

DEAR MR. LATIMER: The Indiana Fraternal Order of Police is very much interested in S. 1083 sponsored by Senator Birch Bayh and related House Bills intended to amend Title XI of the Organized Crime Control Act of 1970 (P.L. 91-452).

Presently, Title XI exempts quantities of "black powder not to exceed five pounds", and heavily restricts greater quantities. The Indiana FOP recognizes that the five pound limits insufficient to meet distributional needs of citizens who study and use antique firearms, these people not being any type of problem to Indiana Law Enforcement Officers.

From an enforcement point of view we see several objections to Title XI in its present form which are listed following:

(1) The term "five pounds" defies meaningful interpretation. If several gathered sportsmen, each possessing five pounds, are in violation, then the law is unjust. Yet if they are not in violation, then neither are several potential bombers gathered with five pounds each. Thus, those who would build bombs are provided the same legal protection as legitimate black powder users.

(2) It is difficult to directly categorize the amount, "five pounds," with a bomber. On the rare occasions where black powder bombs have been identified, the powder amount utilized has been under five pounds, which would exempt those bombs. By a direct analogy, the motorist possessing a tankful of gasoline is not a legitimate point of concern; it is the intended bomber with a pint of gasoline.

Limiting motorists and bombers to equal quantities of the explosive liquid could hardly be a worthwhile approach to the problem of gasoline bombings. Quite reasonably, gasoline and many other potentially explosive substances are regulated simply and effectively according to prima facie evidence of intended use. Possession of any of these substances in conjunction with bomb paraphernalia is, regardless of quantity, grounds for prosecution.

(3) The five pound exemption, being applicable to those who would misuse black powder, does not exclude the abundant and nonregulated simple materials needed for the homemade manufacture of the powder. Therefore, the potential lawbreaker or terrorist can obtain the means of making the explosive, while the legitimate user often has difficulty obtaining the scarce commercially produced powder.

S. 1083 would correct these listed deficiencies. It would remove from the law the ambiguities that are detrimental to enforcement officers and sportsmen. The possession of black powder, in any quantity, if illegal intent were proven, would be prosecutable, and by stipulating only commercial manufacture of the powder, would help prevent those who would make bombs from manufacturing their own powder in amounts under five pounds.

Overall, and considering the very low frequency of use of any and all grades of black powder in bombs reported by the International Association of Chiefs of Police, the Indiana Fraternal Order of Police concurs with Senator Bayh, Con-

gressmen Hamilton, Myers, Zion, Landgrebe, and almost all other federal legislators from this state who have addressed the issue, that the present black powder restriction under Title XI is unjustifiably singular, ineffective, and misdirected.

This is our endorsement of S. 1083.

Sincerely,

ANTHONY L. MILES,
Captain, Indianapolis Police Department, Legislative Chairman, Indiana Fraternal Order of Police.

CINCINNATI SYMPHONY ORCHESTRA,
Cincinnati, Ohio, November 13, 1972.

(Comments of Erich Kunzel on learning of the marginal conditions under which his concerts have been performed.)

Mr. J. PAUL BARNETT,
President, South Bend Replicas Inc., South Bend, Ind.

DEAR PAUL: Thank you for your letter of October 3. I was not aware that the Title XI of the Organized Crime Control Act of 1970 also involved the antique shooting sport, moreover, and in particular, I didn't realize this involved the survival of what you have been doing for us.

Thus, if any government official receives this letter, I would clearly like to point out to them that the contribution which your firm has made toward music here in Cincinnati as far as enjoyment and authenticity is concerned is overwhelming. In particular, you have performed on many occasions the "1812" Overture Sollennelle by Tchaikovsky with us, but by providing the cannon shots which Tchaikovsky clearly marked in the score.

These performances, of course, have been outdoors, either in Cincinnati's Riverfront Stadium, or at Winton Woods in Ohio, a suburb of Cincinnati. To perform this Tchaikovsky work without these cannons as called for by the composer would certainly detract both from the authenticity of the work and also from its complete enjoyment on the part of the listeners. Your firm has made this all possible and I would be deeply shocked if Congress would enact laws which would prohibit people from learning something historical; and this is historical in the art sense.

If there is anything I can do on your behalf, Paul, please feel free to contact me.

With all good wishes,

Yours sincerely,

ERICH KUNZEL, *Resident Conductor.*

NATIONAL MUZZLE LOADING RIFLE ASSOCIATION,
Friendship, Ind., June 23, 1971.

Mr. J. P. BARNETT,
Vice President (North), Indiana Sportsmen's Council,
South Bend, Ind.

MR. BARNETT: Thank you for your letter of June 2nd. I welcome your invitation to comment on a fair and proper exemption for black powder, and to clear up any misconceptions that may have arisen in regard to our position in the matter.

As you know, the current five pound exemption came to us as a choice between five pounds and none. The National Muzzle Loading Rifle Association has never approved that exemption except as the less objectionable of two wholly objectionable choices, neither of which was adequate to supply the needs of the general field of the antique shooting sports.

This organization was maintained from the outset that no amount of restriction on black powder, which is scarce under the best of conditions, can measurably affect the activities of bombers, whose field of choice is limitless, and common.

Our position remains that when it is possessed for use as a sporting propellant in antiques and replicas, black powder should be exempt.

I have examined the summary and position of the Indiana Sportsmen's Council regarding the situation, and have invited others among us to do the same. We

find it to be accurate and valid, and we gladly endorse it as a means of improving the effectiveness of the law as it pertains to those at whom it was aimed, and properly and necessarily relaxing it as it applies to the tens of thousands of honorable antique sportsmen who have thus far borne the brunt of it.

The proposals that it sets forth are reasonable, sound, and entirely consistent with the expressed purposes of Title XI of the Organized Crime Control Act. And, as you pointed out, are amply precedented.

I enjoyed the conversation we shared with Mr. Al Cors at Friendship, Indiana, and I hope you will keep us posted on any new developments. Our 12,500 members join me in extending our best regards to the members of the Indiana Sportsmen's Council.

Sincerely,

MAX VICKERY, *President.*

PRINCETON, ILL., *February 15, 1971.*

DEAR SIRS: The Dad Joe Smith Muzzle Loading Club of Wyanet, Illinois which was formed in early 1971 highly concur with H.R. 12406.

Our club was organized to provide safe shooting of Black Powder and antique firearms and to better assist Wildlife program, better landowners shooter relationship and above all to maintain the tradition relating to muzzle loading firearms and the way of life of the pioneer.

We feel that the 5 lbs. of Black Powder restriction hampers us in this endeavor. It makes it impossible for us to buy powder in quantity lots, which in turn creates a hardship as to prices and availability.

Thank you.

RONALD B. HULSLANDER.

ALBUQUERQUE, N. MEX., *September 23, 1971.*

INDIANA SPORTSMEN'S COUNCIL,
Bloomington, Ind.

GENTLEMEN: It was with great pleasure that I read your memo on a black powder exemption recently.

Having been a black powder shooter for a solid half century (I started at about 7), and being now the author of many articles, columns and handbooks on that subject, I think I am qualified to say that the ISC MEMO presents our mutual problems fairly and accurately. The solutions it proposes are only reasonable, unless the current governmental object is to flatly decimate the antique shooting sports in the interest of showing, on paper, an inconvenience to bombers that does not exist in fact. And which would be an insignificant one, if it did.

Black powder has been convicted of mystique as seen by incompletely-informed legislators, rather than on any concrete evidence. The five pound exemption shows that. So does the "intent" exemption for fertilizer, which is available anywhere, and which is well known for its potential as a bomb material.

I have heard it said that P.L. 91–452, Title XI, is not a factor in the current shortages of the antique propellant among sporting users; that it is the system of distribution which is at fault. Yet to say so is to propose that the two factors can be separated, and to deny the very purpose of the law—which was to restrict the flow of black powder.

It has done that all right. DuPont has quit the business, right after assuring the government of its interest in seeing the sportsmen are better supplied. Black powder shooters all across the country are running out of supplies. Bombers are not. Attempts to justify that condition are like firing a shot through a paper and then drawing a bullseye around the hole. It is not right.

Likewise, to say that since formal match activity is still well supplied (which it is not) and that therefore all is well, is to deny the existence of the bulk of the field. Formal match activity consumes a *very* small percentage of the requirements of the field and cannot exist by itself, any more than a small percentage of a ship can float by itself.

Please add my name to those of other individuals and organizations who have endorsed your excellent summary and position.

Very cordially yours,

R. O. ACKERMAN,
(For Gun Week, Guns, Muzzle Blasts, and others).

NATIONAL MUZZLE LOADING RIFLE ASSOCIATION, FRIENDSHIP, IND.

NATIONAL MUZZLE LOADING RIFLE ASSOCIATION RESOLUTION OF SEPTEMBER 4, 1971, CONCERNING BLACK POWDER

Whereas, it has been asserted that under the so-called Explosives Act being Title XI, Organized Crime Control Act of 1970 (PL 91–452), that adequate black powder is available for sporting and target uses by members of National Muzzle Loading Rifle Association, and, whereas, such is not the fact. Now, therefore, be it resolved, "The curent five pound exemption came to us as a choice between five pounds and none. The National Muzzle Loading Rifle Association has never approved that exemption except as the less objectionable of two wholly objectionable choices, neither of which was adequate to supply the needs of the general field of the antique shooting sports.

This organization has maintained from the outset that no amount of restriction on black powder, which is scarce under the best of conditions, can measurably affect the activities of bombers, whose field of choice is limitless, and common.

Our position remains that when it is possessed for use as a sporting propellant in antique weapons, black powder should be exempt.

Be it further resolved that exempting commercially manufactured black powder and all related accouterments of the black powder shooting sports, when distributed or sold or possessed as ammunition components is reasonable and sound consistent with the expressed purposes and intent of Title XI of Organized Crime Control Act of 1970 (PL 91–452) and that unlimited availability thereof is necessary to the survival of the antique shooting sports.

The National Muzzle Loading Rifle Association's black powder magazine located at Friendship, Indiana, is for the sole purpose of guaranteeing an adequate supply of black powder propellant for the members shooting at the national range. This magazine is not, and never was intended to supply the membership from coast to coast.

Due to the fact that only a small minority of the national membership ever attends matches at the national range, an unrestricted distribution system is of utmost importance if this sport is to survive.

The suggestion that the National Muzzle Loading Rifle Association magazine supplies the nation wide membership is erroneous. Furthermore, the present magazine system at our range has proved inadequate for the intended purpose stated above. To illustrate, a scheduled delivery of black powder failed to arrive at the fall 1971 shoot. Due to this fact, at one point the entire shoot was in jeopardy. Had there been unrestricted availability many shooters would have transported the necessary propellant from their home areas.

CANNON HUNTERS ASSOCIATION OF SEATTLE,
Seattle, Wash., September 7, 1971.

Mr. J. P. BARNETT,
Vice President, (North) Indiana Sportsmen's Council,
Bloomington, Ind.

DEAR MR. BARNETT: It is with much concern that the Great Guns of CHAOS have studied the Indiana Sportsmen's Council memo of May 20, 1971 re. the urgent necessity to introduce a measure of reason and fair play into the current black powder situation. The 4000 members of CHAOS extend to you their wholehearted support and concurrence.

CHAOS is an international organization, composed of a great cross section of citizens from 32 nations, from historians to government officials, yes, even royalty, we run the gamut of delightfully interesting, effective people. If John F. Kennedy had not passed away, we would have a President on our membership rolls.

It is quite natural that a large segment of our membership should participate in cannon shooting as well as cannon recovery, preservation and public display. In all respects, CHAOS is eminently qualified to represent a large segment of our nation's poorly-treated cannon hobbyists and students.

Anyone who says the current five pound exemption for black powder serves even the minimal needs of antique cannon lovers knows neither the nature, nor

needs, of this very dedicated portion of our population. Or, perhaps, he is not yet out of powder, himself.

Mr. Barnett, for your information, CHAOS was formed more than 32 years ago, and for a dual purpose:

1. To preserve ancient, historic cannon and,

2. To take a good-natured poke at the stuffed shirts of an over-organized society. It appears, today, that a cadre of well-entrenched professional administrators have, somehow, wrenched control of our government from the legislators and the citizens. It sounds as though the 1970 Organized Crime Control Act, Title XI, was born of this sort of bureaucracy.

We've known for some time that Du Pont would become irritated to the point, of action: the point where they would cease the manufacture of black powder. Now, there is no maker in the country. A direct contradiction, it would seem, to the apparently-well-meant assurances that exempt quantities would be made more available.

It is certainly difficult, and most optimistic, to imagine that either Canada or Scotland will rush in to fill the need in the face of such obstacles, plus the 10% import boost.

Today's hard-pressed taxpayer is already pushed to the limit of endurance, and, in many cases the only thing keeping him going is recreational release. To take this away provides an atmosphere dangerously parallel to that in socialistic states. Our people find joy in research and field work as well as in the operation of their cannon. Much work is voluntary, and most recovered cannon are donated to public sites for the enjoyment and education of all.

How, then, can they be expected to undertake these efforts at their own expense, with no reward other than personal satisfaction, when this satisfaction is dulled by official rejection in place of gratitude or protection?

Without an adequate supply of manufactured black powder, the antique sports are beyond pursuance. We are fast running out of powder, despite assurances of those who say the law will not let us run out.

Bombers and anarchists are not discouraged at all. They can whip up a batch of black powder with less effort than it takes us to find a pound of manufactured powder somewhere, for legitimate purposes?

These revolutionaries transport their bombs by means of an automobile. Then, let's restrict automobiles. They cannot survive without food, so, obviously, we must then cease all production of foodstuffs. They cannot reproduce without sex, so let us outlaw marital relations. Overstated, perhaps, but not too far from the quality of rationale employed by those who inspire such decisions as Title XI.

The Indiana Sportsmen's Council speaks with the *full* endorsement of the membership of this organization.

Sincerely,

DONALD R. CLARK.

ILLINOIS STATE RIFLE ASSOCIATION,
Chicago, Ill., January 27, 1973.

INDIANA SPORTSMEN'S COUNCIL,
Bloomington, Ind.

GENTLEMEN: Your "Memo on a Black Powder Exemption", dated May 20, 1971 has recently come to our attention. We strongly concur with your feeling that legislation should be based on the intent of the proposed views rather than arbitrary poundage.

Sporting use of powder, like sporting use of fire arms should be encouraged, but the illegal use or use in crime should be severely punished.

We hope that your activities lead to more sensible legislation.

Very truly yours,

JAMES VALENTINO, Jr.,
Chairman, Legislative Committee.

NORTH-SOUTH SKIRMISH ASSOCIATION, INC.,
Fort Knox, Ky., October 5, 1971.

Mr. J. PAUL BARNETT,
Vice-President (North), Indiana Sportsmen's Council,
South Bend, Ind.

DEAR MR. BARNETT: I have examined the Indiana Sportsmen's Council's position and arguments for exemptions for blackpowder shooting propellant from restrictions at the federal, the state, and the local levels of government. The N–SSA is very much in agreement with your position, for we believe that blackpowder shooting sports are threatened with possible extinction, largely because of the passage of well-intended pieces of legislation such as Title XI of the Organized Crime Control Act of 1970 and growing numbers of similar "anti-bomber" laws and ordinances passed by many states and local communities. We support our law-makers in their efforts to cope with terrorist bombers. Any explosive or anti-bomber laws, however, must be sufficiently flexible to accomplish their objectives of deterrence and punishment without imposing extreme and unreasonable hardships on the activities of legitimate sportsmen. Unfortunately, for the most part, the laws referred to earlier do not adequately exempt sportsmen! Instead of differentiating between shooting propellants and materials commonly used by bombers, these laws lump blackpowder shooting propellant into the same category as explosives and subject it to costly, bothersome, and unnecessary purchase, transportation and storage requirements.

While bombers face no shortage of usable materials, users of antique firearms and handloaders who re-load blackpowder cartridges do! Blackpowder is the ONLY propellant which can be safely used in muzzle-loading and other firearms specifically designed for it. Modern smokeless powders can not be used, for they produce dangerously high levels of pressure in antique firearms.

In addition to the wide range of commercially manufactured explosives and home-made blackpowder, the criminal bomber can make his destructive devices from a vast variety of suitable materials which can be readily obtained from such places as drug, grocery, and hardware stores and chemical storage rooms. The bomber has numerous alternatives; the blackpowder sportsman has but ONE!

It is the official position of the N–SSA that Blackpowder Propellant, when manufactured, possessed, and used as a shooting propellant should be exempt from all explosive and/or "anti-bomber" laws. We further feel it imperative that the growing "crazy-quilt" pattern of widely differing state and local laws restricting blackpowder propellant must be replaced by a single nationwide exemption.

Sincerely,

RICHARD L. CORRIGAN, *President.*

PENNSYLVANIA RIFLE AND PISTOL ASSOCIATION,
Mount Joy, Pa., June 1, 1971.

The Pennsylvania Rifle & Pistol Assn. representing 50,000 shooting sportsmen in Pennsylvania, is in disagreement with the black powder regulations in the Organized Crime Control Act of 1970, P.L. 91–452, Title XI.

Gasoline when purchased with the intent to use it as a motor fuel is unrestricted, but its use as an incendiary device is prohibited under the penalties of the above law. Likewise, ammonium nitrate when purchased with the intent to use it as a fertilizer is unrestricted, but its use as an explosive is prohibited.

Therefore, it is the contention of this organization that black powder, when purchased with the intent to use it as a sporting propellant should be unrestricted. Although black powder can be used in the construction of bombs, it is seldom used for this purpose, since there are more powerful and more easily obtained ingredients available for this purpose. Also, the present five pound limit on black powder will allow the bomber to purchase enough for his needs without violating the law.

The present restrictions on the purchase and possession of black powder serve only to harass the sportsmen and contribute nothing to crime control. We believe the burden should rest on the criminal and not on the law-abiding sportsman.

We also contend that the present storage regulations are useless and unnecessary. It is virtually impossible for the average citizen to locate the black powder storage facility on his property and maintain a distance of 75 feet from the facility to the nearest road, railroad or inhabited building. The law in Pennsylvania requires a distance of 30 feet and has caused no problems. There are many cases on record of homes exploding from leaking natural gas lines, but we know of no instance where a home has been destroyed by black powder.

Therefore, it is our unequivocal stand that black powder should be placed in the "intent category" now enjoyed by ammonium nitrate, gasoline and other explosives and that the storage facility distance should be reduced to 30 feet.

JAMES N. SPICER,
Legislative Chairman.

THE NATIONAL RIFLE ASSOCIATION OF AMERICA,
Washington, D.C., February 2, 1972.

Mr. J. P. BARNETT,
Vice President (North),
Indiana Sportsmen's Council,
South Bend, Ind.

DEAR MR. BARNETT: Like you we were glad to see the proposal incorporated in HR 12406. We did report this bill in our weekly legislative report which we distributed to our Official Family on January 21, and it will be further reported in The American Rifleman magazine, March issue.

Quite obviously, NRA will support HR 12406 and we are hopeful that this bill will be passed by the Congress.

Sincerely yours,

MAXWELL E. RICH,
Major General (Retired), Executive Vice President.

WESTERN STATES MUZZLE LOADERS ASSOCIATION,
El Segundo, Calif., September 16, 1971.

Mr. J. P. BARNETT,
Vice President (North),
Indiana Sportsmen's Council,
South Bend, Ind.

DEAR MR. BARNETT: Thank you for requesting WSWMLA's position regarding the 1970 Explosives Control Act.

The avowed purpose of legislation such as this is the control and successful attenuation of crime.

We feel that no law can prevent a dedicated revolutionary from obtaining the necessary equipment to construct a bomb, and that a greater deterrent to criminals and revolutionaries would be mandatory prison sentences rather than restrictions interfering with the legal use of propellants and reloading components, such as the 5 pound restriction applying to black powder (which by ATF definitions is a low yield explosive as opposed to some common household materials considered *high yield*).

The current restrictions on black powder have forced countless dealers, in the West, to cease the sale of black powder as a gainful employment thereby severely curtailing the pursuit of the muzzle loading sport by thousands of honest, law-abiding sportsmen.

The position of the Indiana Sportsmen's Council regarding the Explosive Control Act of 1970 is enclosed and supported by the Western States Muzzle Loaders Association and the 90 Clubs in 17 Western States represented.

Enclosed is a copy of Senate Memorial I, Oregon Legislative Assembly, urging Congress to repeal the Gun Control Act of 1968.

Please let us know if we can assist you further.

Sincerely,

VERN CHAPEN, *President.*

YONKERS, N.Y., *March 17, 1972.*

INDIANA SPORTSMEN'S COUNCIL,
Bloomington, Ind.

GENTLEMEN: The 64th Regiment of Foot, 1st Battalion, and Oakley's Rangers have been doubly blighted by the action of Congress in 1970. Not only have our interstate activities been halted, but influenced by this thoughtless restriction placed upon us, the New York State Legislature, in July of that year, through now admitted ignorance, made our recreational pursuits a criminal offense.

As this is written, a bill to rectify the injustice in this State has just been passed and awaits the Governor's signature.

Should provision be again made for our legitimate existence here, our participation in activities planned for the forthcoming bi-centennial celebrations of the birth of this Nation will still have to remain cancelled.

The present form of Public Law 91–452 has made it impossible to obtain sufficient black powder for our engagement. Further, since we would package powder in cartridges and charges in preparation for such events prior to traveling to them, Federal restrictions on our interstate movement with these items will stop us entirely.

Our organization wishes to declare its absolute concurrence with the Indiana Sportsmen's Council's MEMO ON A BLACK POWDER EXEMPTION of May 20, 1971.

Additionally, we enthusiastically endorse House Bill 12406 and fervently await its enactment.

Yours very truly,

JOHN G. SHERMAN,
Spokesman, 1st Battalion, 64th Regiment of Foot, British and Hessian Armies, and Oakley's Rangers.

THE SECOND PENNSYLVANIA REGIMENT OF THE CONTINENTAL LINE,
Valley Forge, Pa., October 25, 1971.

INDIANA SPORTSMENS COUNCIL,
South Bend, Ind.:

The members of this organization wish to go on record as being fully in accord with your stand for having black powder excluded from the Crime Control Act of 1970. We feel that the intent of the user should govern any question as to legality of its use.

It is indeed a pity that the outrages of a benighted few should have the effect of destroying the great pleasures of the many. The members of this organization and many more like it have for many years used black powder not only for recreation but to give pleasure to thousands who witness our activities.

I warmly support your efforts to have this legislation amended.

Sincerely yours.

G. G. GODWIN,
Major, Commanding.

THE COMMITTEE FOR EFFECTIVE CRIME CONTROL,
June 25, 1971.

INDIANA SPORTSMEN'S COUNCIL,
Bloomington, Ind.

GENTLEMEN: The Board of Directors has asked that I convey their commendation of your "Memo on a Black Powder Exemption" of May 20, 1971. It is well done and we appreciate your efforts on behalf of all black powder shooters.

We are enclosing our own statement on so-called explosives laws from the *Congressional Record* of June 22, 1970. We are also sending you a copy of our position paper and a check for $15.00 to help a little in your literature distribution.

Let us know when we can assist you. Both our attorney and myself are black powder shooters. He frequently uses his black powder shotgun and we're on the same mortar team at the annual July 4 cannon shoot at Mayer, Minnesota. Please be assured that the C.E.C.C. is alert to the problems of black powder shooters.

Thanks so much for your efforts.

Yours truly,

JON WILLAND, *Secretary.*

FORT ERIE MUZZLE LOADERS,
Erie, Pa., November 4, 1971.

INDIANA SPORTSMEN'S COUNCIL,
61650 Oak Road,
South Bend, Ind.

DEAR SIR: The Fort Erie Muzzle Loaders wishes to endorse your position regarding commercially manufactured black powder. We believe black powder should be excluded from the Crime Control Act of 1970, on the basis of intent of user.

As members of a Muzzle Loaders club, we enjoy the sportsmanship and competition we have at our meetings.

We would approve any laws making black powder more available.

Sincerely,

JUD TURNER, *Secretary.*

HARRISBURG HUNTERS' AND ANGLERS' ASSOCIATION,
Harrisburg, Pa., June 1971.

MR. J. PAUL BARNETT,
Propellant Blackpowder, Legislative Coordinator,
South Bend, Ind.

DEAR MR. BARNETT: As concerned citizens and Pennsylvania sportsmen, we endorse the principal that Title XI of the 1970 Crime Control Act should be amended to state that blackpowder shall be regulated according to the intent of the user, as are other potential bomb materials, rather than by weight which presently give five pound lots to *anyone*, no questions asked.

We favor the proposal that:

(1) Blackpowder, in any amount, possessed and used for sporting purposes, shall be called BLACKPOWDER PROPELLANT and shall be exempt from any and all regulations as an explosive under Title XI of the Crime Control Act of 1970 and/or any other acts which define it as an explosive. For purpose of definition, "sporting purposes" shall be for use in firearms defined as antiques or reproductions thereof in the Gun Control Act of 1968.

(2) Blackpowder, in any amount, possessed and/or used for purposes other than "sporting" shall be called an explosive and shall be subject to regulation as such.

(3) Congress shall have the exclusive right to regulate the purchase, storage, possession, transportation and use of blackpowder propellant.

Your assistance toward favorable consideration by the Congress of the above proposal will be very much appreciated by our 2200 members and Board of Directors.

Very respectfully,

WALTER A. WISE,
President.

NORTH INDIANA GUN COLLECTORS ASSOCIATION,
South Bend, Ind., August 30, 1971.

INDIANA SPORTSMEN'S COUNCIL,
Box 93,
Bloomington, Ind.

GENTLEMEN: The officers and members of this organization have read and discussed the "Memo on a Black Powder Exemption" published by the Indiana Sportsmen's Council dated May 20, 1971.

I am pleased to report our wholehearted endorsement of your analysis and position. The problem is correctly stated in every respect. The solution proposed is justifiable in every respect.

The governmental justification of intent-based exemptions for such common and powerful explosives as gasoline and fertilizer, saying that *if* made into bombs they are amply covered by the "destructive device" provisions is good, true, and entirely fair.

For the same exemption under the same justification *not* to be applied to commercially manufactured black powder—always scarce and the only substance on which an entire field of wholesome endeavor can survive—is ludicrous.

But alongside the unforgivable blunder of freely handing bombers a five pound exemption for home made black powder, useful to them but useless to us, the whole situation borders on incredible.

Meanwhile, as people in offices boast of their familiarity with and ability to prescribe for *our* problems of acquisition, *we* are out of powder. There used to be three fairly regular suppliers in our area. Now there is not one.

Rest assured that we are doing all within our power to bring the entire truth of the situation to public attention.

Call on our organization if there is more we can do.

Sincerely,

WILLIAM R. BEST,
President.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., October 21, 1974.

Mr. J. P. BARNETT,
South Bend, Ind.

DEAR MR. BARNETT: Thank you for your letter of October 19 recommending certain alterations of Title XI of the Organized Crime Control Act of 1970 which would benefit owners of antique firearms who use black powder in the pursuit of their sport.

The request of your organization seems like a reasonable one and I would be most happy to work with my colleague Lee Hamilton in this matter. I shall endeavor to ascertain if Lee plans actual bill sponsorship in the near future and, if he does, will assist him in any appropriate way to gain passage of his amendment.

As you may be aware, I strongly opposed the Gun Control Act of 1968, believing that it worked an unconscionable hardship on law abiding citizens without penalizing the criminal element who continue to have access to firearms. It is regrettable that the Organized Crime Control Act of 1970, an otherwise good law, compounded this particular problem for sportsmen and antique gun hobbyists.

You can certainly count on my support for Lee's efforts in this matter and I appreciate having this background. Incidentally, Belden and his wife enjoyed themselves a great deal at the NSSA meeting two weeks ago.

Sincerely,

ROGER H. ZION, M.C.
Indiana's 8th District.

KALISPELL, MONT., *September 20, 1971.*

INDIANA SPORTSMEN'S COUNCIL,
P.O. Box 93,
Bloomington, Ind.

DEAR SIRS: In reply to your Explosives Review in Sept. 3 Gun Week, let me say that you have my wholehearted approval, in trying to get relief from the present restrictive controls on black powder. Any law that is enacted against *an object*, is an Un-Working law.

Enclosed copy of "The Earl Nightingale Program" is one of the very best descriptions of why such laws are Un-Working.

This is the best description of why the "Abominable" 1968 gun control act should be "Abolished." (Repealed)

If you can show me where anyone who is a dedicated shooter, hunter or sportsman, has gotten into any serious trouble with a gun, I would just about promise to eat my whole "hawken" rifle, and it weighs about 14 lbs.

I hope we can induce our Senators and Representatives to go at these abominable gun bills in a sane manner. Control the "lawbreakers," and quit harassing us top citizens.

Respectfully yours,

LEE H. BROWN.

RIVER VALLEY MUZZLE LOADERS ASSOCIATION,
South Bend, Ind., September 30, 1971.

INDIANA SPORTSMEN'S COUNCIL,
Bloomington, Ind.

GENTLEMEN: We are a group of about 20 middle to retirement age men. Last year, a few of us took an interest in muzzle loading firearms, and shortly formed the River Valley Muzzle Loaders Association. Our hope, naturally, was to grow, and to provide a center of antique activity in our area. There is much interest here, but it is all scattered as yet.

Under the frustrations of Title XI of the Organized Crime Control Act, we are about ready to quit. Some already have.

There used to be three regular suppliers of black powder in our area. Two were just south of the Michigan line, and one just north of it. Now there are none.

Our "business address" (see permits) is my home in South Bend. Our range is a borrowed one at Edwardsburg, Michigan. The nearest source of powder is at Sawyer, Michigan, about 40 miles from either place.

When we go to the range at Edwardsburg, there is no practical and legal way for us to supply a match there. There is no practical and legal way for us to bring enough powder home from Michigan to shoot informally at nearby farms and gravel pits, as sportsmen do.

In short, for all practical purposes we are out of powder.

There is not a man among us who does not know how to make black powder from sulphur, potassium nitrate, and charcoal, which we could get anywhere. If we were bombers, we would legally make ourselves five pounds each, but not being bombers, we have no use for home made powder.

And our antiques won't work on fertilizer, which makes a better bomb than black powder but is exempt.

Please accept the enclosed token contribution (we aren't rich, either) and use it in your effort to gain a reasonable exemption for antique sportsmen. Our legislators must think very little of us, to give bombers a better exemption than they gave us, and then to not want to correct it.

Sincerely,

RICHARD PRICE,
Secretary.

KNAP'S BATTERY E,
PENNSYLVANIA LIGHT ARTILLERY,
June 7, 1971.

To All Friends of Our Traditional American Sports:

DEAR SIRS: Some portions of Title XI of the 1970 Crime Control Act are NOT effecting their intended purpose of discouraging criminal bombers but ARE strangling our black powder shooting sports. Recreational muzzle loader shooting (which can use NO other propellant but black powder) is the sport and hobby of MANY thousands of Americans but it will not long survive the strict interpretations of Title XI copies being enacted by state and local jurisdictions nor the stricter interpretations of some perhaps not too future ATFD administrator.

The fallacy of Title XI is that it regulates our SCARCE propellant black powder by weight (exempt up to five pounds) while much more readily available bomb materials such as gasoline, nitrate fertilizers and smokeless powder are regulated only according to the intent of the user. This error makes black powder as readily available, no questions asked, to the bomber as to the sportsman while effectively shutting off interstate supplies to legitimate users and halting the purchase of economically practical quantities by shooters clubs; i.e. one pound cans are now retailing at about three dollars each, while in a 25 pound keg it is about a dollar and a half a pound. Black cannon powder for commemorative reenactments and other patriotic events is ONLY available in twenty five pound kegs. Our propellant black powder is a LOW explosive which knowledgable bombers disdain to use even when it is available.

We therefore most strongly urge that you support an amendment to Title XI which shall contain the following stipulations:

(1) Blackpowder, in any amount, possessed and used for sporting purposes, shall be called BLACKPOWDER PROPELLANT and shall be exempt from any and all regulations as an explosive under Title XI of the Crime Control Act of 1970 and/or any other acts which define it as an explosive. For definition pur-

poses, "sporting purposes" shall be for use in firearms defined as antiques or reproductions thereof in the Gun Control Act of 1968.

(2) Blackpowder, in any amount, possessed and/or used for purposes other than "sporting" shall be called an explosive and shall be subject to regulations as such.

(3) Congress shall have the exclusive right to regulate the purchase, storage, possession, transportation and use of blackpowder propellant.

Respectfully submitted for your urgent consideration.

JOHN DEWALT, *Harrisburg, Pa.*

JANUARY 2, 1972.

J. P. BARNETT,
61650 Oak Road,
South Bend, Pa.

DEAR SIR: You have my endorsement for the Indiana Sportsmen's Council's black powder policy.

Sincerely,

ELDON M. CADY,
NMLRA, NSSA, NRA.

SYCAMORE VALLEY GUN CLUB,
Bloomington, Ind., August 9, 1971.

INDIANA SPORTSMEN'S COUNCIL,
P.O. Box 93,
Bloomington, Ind.

GENTLEMEN: Please be advised that the position of the Indiana Sportsmen's Council, relative to the commerce, possession and use of blackpowder by sportsmen (as stated in the ISC May 20, 1971 "Black Powder Memo") meets with the full support and approval of the Sycamore Valley Gun Club, Inc.

We of the Sycamore Valley Gun Club share wide-ranging interests, one of the foremost being blackpowder shooting in all its forms. Since the passage of the Organized Crime Control Act of 1970, Title XI, our members have suffered drastic inconvenience in the lawful pursuit of this sport, and have been distressed by the continual fears that a casual error in following the unreasonable dictates of the above law might result in a possible felony conviction.

It is a most unsatisfactory situation when what has been over two hundred years of custom and lawful national tradition becomes overnight a criminal act. Worse, it is a serious blow to popular faith in our governmental processes when the same legislation which causes such hardship is so carefully drawn that we find ourselves continually harrassed by arbitrary administrative decisions and regulations.

If the efforts of the Indiana Sportsmen's Council are able to gain, even in a small way, the overdue relief due sportsmen from the burdens and dangers of this law, the ISC has the full support and cooperation of all our members, both individually and as an incorporated group. We know that we speak not only for ourselves, but for our community as well.

Most sincerely,

MAURICE LATIMER,
President.

SELLERSVILLE, PA., *December 6.*

INDIANA SPORTSMEN'S COUNCIL,
C/O J. P. Barnett
6650 Oak Rd., South Bend, Ind.

GENTLEMEN: As the man in charge of the Rifle section (including smallbore and handguns) and also in charge of Pub. of a fairly new club of only 300 members I am writing to you to let you know that we do support you and endorse your stand for having black powder excluded from the Crime Control Act of 1970.

Let me add that any law that is aimed against any shooting group, including even Archery we are opposed to. For no matter what is in front of a shooter, be it a cloud of smoke, or the handle of a bow we are all kin. I personally know many people who are die in the wool Rifle, that come Archery season have a bow in their hands and also Archers who use Rifles and Pistols and while each sport has its high lights, the day of one being opposed to the other or down

grading the other has passed. We in our club stand together and while a few will vote the party line, most of us today vote the man. Remember Clark, and another named Scott who stirred up a hornets nest. I'm sure Clark is still crying.

Your truly,

PAT ALLEN.

JASPER RIFLE AND GUN CLUB INC.,
Jasper, Ind., September 15, 1971.

To Whom It May Concern:

The Jasper Rifle and Gun Club Inc., its members and officers unanimously endorse the Indiana Sportsman's Councils position on Black Powder Legislation.

Our club sponsors monthly black powder matches with 25 to 40 competitors, drawing shooters as far as 125 miles. We also sponsor a spring and fall two-day registration match sanctioned by the NMLRA and one annual match in October. In these 15 matches we have approximately 500 entries.

The present restrictions on Black Powder are definitely a hardship on the members who compete in this fine sport.

The Black Powder shooters are our most active members and a great asset to our club. Black Powder guns, percussion and Flint, are owned by most of our members.

Sincerely,

AL MILLER,
President.

HYATTSVILLE, MD.,
October 20, 1971.

INDIANA SPORTSMEN'S COUNCIL,
c/o Mr. J. P. Barnett, 61650 Oak Road,
South Bend, Ind.

GENTLEMEN: I am associated with a group of Blue Ridge Mountain men, up in the hills back of Thurmont, Maryland, who use black gunpowder for their muzzle-loading rifles ("patch-guns").

We endorse your stand on having black powder excluded from the Crime Control Act of 1970.

There are about 50 of us who use old Kentucky rifles for target shooting and like to use them on ground hogs and other small game.

We need black powder.

Cordially yours,

WILLIAM O. HARRIS.

3100 BANCROFT, MISSOULA, MONT.,
August 31, 1971.

INDIANA SPORTSMEN'S COUNCIL,
P.O. Box 93,
Bloomington, Ind.

GENTLEMEN: Please add my name to the list of those wishing a change in the BLACK POWDER regulations. It has always been rather difficult to obtain black powder except in small quantities at high prices but it is next to impossible now.

Those of us who live away from large city sources of supply must expect some sort of difficulty but there is no honest excuse for the action of the government in denying us the opportunity to buy black powder in sufficient quantity to last awhile.

Those who wrote the black powder regulations, not only for the federal government but also for state and local governments, seem to forget, for example, that black powder is shipped in 25 pound kegs as well as one (1) pound tins. It would be of great economic value to many of us to be able to buy a keg of powder at, say $30.00 rather than the same 25 pounds of powder at $3.00 per pound. The difference between $30 and $75 is considerable but the government thinkers do not want to know about common sense things like that.

Good luck in your efforts and best wishes.

Sincerely yours,

R. G. SCHIPF.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., November 5, 1971.

Mr. J. P. BARNETT,
Vice-President, Indiana Sportsmen's Council,
61650 Oak Road, South Bend, Ind.

DEAR MR. BARNETT: I certainly appreciate your kind letter of November 2, 1971, indicating support for my stand on gun control legislation.

I have advised Congressman Hamilton of my support for his proposed legislation correcting inequities in Title XI of the Organized Crime Control Act of 1970. He has agreed to furnish me with a copy of the draft of this legislation so that I might study it and consider joining him as a co-sponsor.

If, in the future, there is some further way that I can assist you in this or any other matter, please do not hesitate to call on me.

With best wishes, I am
Sincerely,

JOHN R. RARICK,
Member of Congress.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., February 1, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Association,
740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: Thank you for expressing interest in my supporting legislation which would exempt black powder from the Crime Control Act of 1970 and sending me a copy of a photo editorial reprinted from *The Handloader Magazine.*

At present, this proposal is pending before the House Judiciary Committee awaiting assignment to a subcommittee for action.

My position has always been to support tough laws which should be directed against criminals, not against legitimate sportsmen.

During the 91st Congress, I supported legislation to permit sportsmen to possess black powder and percussion caps and I shall continue to oppose unreasonable inconviences to sportsmen.

I appreciate having the benefit of your views on this matter.

With all best wishes,

LAWRENCE COUGHLIN.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C. March 21, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Association,
740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: I have been reviewing your letters and enclosures regarding H.R. 12406, and I want you to know that I appreciated receiving them.

I will support this legislation should it come before the House for consideration.

With best regards,
Sincerely yours,

ALBERT W. JOHNSON.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVE,
Washington, D.C., February 1, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Assn.,
740 South 29th Street, Harrisburg, Pa.

DEAR JOHN: I received your letter regarding H.R. 12406, a bill which would ease the federal regulation of black propellant powders and certain ignition devices for firearms.

I am for this legislation, and I would like you to know that I am doing all I can to see that it is passed.

If I may ever be of any assistance to you, please do not hestitate to contact me at my Washington office.

With kindest personal regards, I am

Sincerely yours,

FRANK M. CLARK,
Member of Congress.

December 9, 1971.

INDIANA SPORTSMEN'S COUNCIL,
Mr. Maurice "Red" Latimer, President, P.O. Box 93,
Bloomington, Ind.

DEAR SIR: The members of the CDCC Gun Club are 100% in back of any movement that will allow a freer usage of the time honored sport of shooting.

We believe that the Constitution of the United States guarantees us this right as a protection for ourselves and our Nation.

It is our intent to use every legal action toward continuing this end.

Very truly yours,

EUGENE G. HALL,
President, CDCC Gun Club, Box 328, Crane, Ind.

THE ROD & GUN CLUB OF NEW BEDFORD, INC.,
New Bedford, Mass.

SIRS: My name is John Buckles and I am head of the rifle comm. and we are very interested in black powder shooting. We are interested in what the Indiana Sportsmens Council is doing for black powder. We are starting our own muzzle loading rifle Brigade and would like to have any help you could give. We would like to take a stand and help the Indiana Sportsmens Council as much as possible. We would also like to meet the Council's representatives if there is one in this area. I would also like to keep in touch with someone from the Council each and every month so we can give a report and stay up to date on what is going on. We would like to join you 100 percent. We will be looking for your reply. Please send all mail to my home address. Thank you.

JOHN BUCKLES III,
Rifle Committee.

BOX 7, MIMOSA HALL, GLASSBORO STATE COLLEGE,
Glassboro, N.J.

INDIANA SPORTSMANS COUNCIL,
Bloomington, Ind.

DEAR SIRS: I received your memo on the black powder crisis in my latest Dixie Gun Works catalog. It's tough enough for me to get black powder as it is, let alone having the government clamp down on it even more. It makes no sense for black powder firearms to be classified as antiques and thus freely transportable and not say the same about the propellant. A black powder gun without the powder is no more than useless scrap iron. What is equally disturbing is the decision by Du Pont to quit the manufacture of black powder. At no time has black powder usage been so low as to discontinue its manufacture, even after the advent of smokeless powders around the turn of the century. Black powder usage should be even on the rise, what with more and more brands of replica arms coming out. Everybody knows that b.p. sportsmens aren't going to use the stuff to make bombs, the amounts needed to produce the results of say, dynamic rule this out right away. But, then, everybody knows our State Department. All I can do is to wish you fellows the best of luck in your fight. I intend to write letters to my Congressman, Senator, or any damn person who will listen.

Good luck!

WAYNE ANTONIAZZI.

RICHMOND, MICH.,
January 11, 1972.

J. PAUL BARNETT,
South Bend, Ind.

DEAR MR. BARNETT: This letter is in regards to the Resolution on Laws regulating the use of Blackpowder Propellant. The 1st. South Carolina Vol. Inf. has adopted this resolution, but regrets to say that due to difficulties which we are trying to correct we do not have a letterhead on which to place this resolution.

We are sorry for this delay and we hope to have the resolution on a letterhead and sent to you in the near future.

Thank you for your patience.

Yours Sincerely,

NORMAN GIBSON,
Adj. 1st. South Carolina Vol. Inf.

INDIANA SPORTSMEN'S COUNCIL,
c/o J. P. Barnett, 61650 Oak Road, South Bend, Ind.

DEAR SIR: On behalf of Old Westmoreland Rifles, Pittsburgh Pennsylvania, I write in regards to the propellant used in our type of arms.

We heartily endorse your stand on having black powder excluded from the Crime Control Act of 1970 on the basis of intent of user, the same as gasoline and explosive nitrate fertilizer.

Sincerely,

JACK MOUCHESON,
Adjutant, Old Westmoreland Rifles.

SEPTEMBER 28, 1971.

INDIANA SPORTSMEN'S COUNCIL,
Box 93,
Bloomington, Ind.

GENTLEMEN: I've been using muzzle loaders for a number of years. I've suddenly found that there is no black powder available.

I hope that you will do everything you can to correct this situation in order that this interesting sport will not go down the drain.

Sincerely,

NORRIS E. WILLIAMSON.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., January 31, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Association, 740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: Through your letter of recent date you urge my support of H.R. 12406, legislation that would ease the Federal regulation with respect to black propellant powders and of certain ignition devices for firearms.

H.R. 12406 has been referred to the House Committee on the Judiciary. I have checked with that Committee, and I am advised that no hearings have either been held or scheduled with respect to H.R. 12406 or any other legislation dealing with firearms.

Ample time remains for Congress to extend consideration to H.R. 12406, because the current 92nd Congress will not terminate until sometime late this year. I appreciate knowing of your endorsement of H.R. 12406, and you can be certain that when and if this legislation comes before me in the House of Representatives for consideration, I will certainly view it sympathetically.

Sincerely yours,

GEORGE A. GOODLING,
Member of Congress.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., March 23, 1972.

Mr. JOHN H. DEWALT,
National Muzzle Loading Rifle Association,
740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: I have received your letter expressing your concern with the excessive controls on the use of black powder.

I appreciate having the benefit of your views on H.R. 12406, which would amend certain provisions of Federal law relating to explosives.

I am in agreement with you, and read the editorial you sent with interest. You can be sure of my support of this bill to eliminate restrictions on black powder.

Again, thank you for sharing your concern with me.

Sincerely yours,

JEROME R. WALDIE,
Congressman, Fourteenth District.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C. January 31, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Association, 740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: I have received your letter of January 28th concerning H.R. 12406 which deals with the regulations on black propellant powders.

Thank you very much for taking the time to write to me. I did appreciate hearing from you and knowing your views on this bill. As you know, in the past I have supported legislation which benefits the sportsman and I shall continue to give such issues my close attention. Please rest assured that I will keep your thoughts in mind when this matter comes before the members of the House of Representatives for consideration.

If I can be of further assistance to you at anytime in the future, please do not hesitate to contact me.

With best regards, I am.

Sincerely yours,

JOSEPH P. VIGORITO,
Member of Congress.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., January 31, 1972.

Mr. JOHN H. DEWALT,
Muzzle Loading Rifle Association,
740 South 29th Street,
Harrisburg, Pa.

DEAR MR. DEWALT: Thank you for your letter of recent date concerning Congressman Hamilton's bill easing restrictions on the use of "black powder."

Congressman Hamilton's intention to introduce such a bill came to my attention last October even though it was not actually put into the hopper until the beginning of this session. I studied the provisions of the legislation when it was first presented to me, I feel that it has a great deal of merit.

As in the past, I will certainly cast my support to the sportsmen of Pennsylvania.

With every kind of regard, I am

Sincerely yours,

JOHN H. DENT, M.C.

NORTH-SOUTH SKIRMISH ASSOCIATION, INC.,
CO. K, 42ND NEW YORK VOL'S. INF.—NASSAU-SUFFOLK COUNTY CHAPTER,
Hicksville, N.Y.

RESOLUTION ON LAWS REGULATING THE USE OF BLACKPOWDER PROPELLANT

Whereas, our forefathers fought for and gained the independence of this nation through the use of muzzle-loading firearms,

Whereas, our nation was carved out, settled, and developed by men and women who relied on muzzle-loading firearms for both food and protection,

Whereas, the muzzle-loading shooting activities of the North-South Skirmish Association, the National Muzzle-Loading Rifle Association, and the numerous other organized and unorganized users of blackpowder propellant for a wholesome sport steeped in American heritage,

Whereas, blackpowder is the only propellant (gunpowder) which can be used safely in muzzle-loading and other firearms specifically designed for it,

Whereas, the future use of firearms similar to those used by our forefathers is gravely threatened because blackpowder propellant has been classified as an explosive and severely restricted as such under Title XI of the Crime Control Act of 1970,

Whereas, many state laws and local ordinances restrict the availability and use of blackpowder propellant more severely than does Title XI,

Whereas, terrorist bombers face no shortage of explosive materials, with the wide range of commercially made explosives and the vast numbers of potential bomb ingredients available in drug, grocery, and hardware stores or chemistry laboratories, blackpowder shooters are limited to using commercially manufactured grades of blackpowder:

We, Company K, 42nd New York Volunteer Infantry, Hicksville, New York, through the passage of this resolution, do hereby implore national, state, and local elected officials to cease enacting laws and ordinances which threaten the legitimate sport of blackpowder shooting. We further ask that our public officials at all levels of government speedily amend existing laws and ordinances so that the future of blackpowder shooting can be insured.

Identical resolutions from:

First Pennsylvania Artillery, Forty-Third Regiment, Light Artillery Reserves N.S.S.A., and Philadelphia Muzzleloaders Association, January 1972.

"A" Battery, 1st California Volunteers, Light Artillery, Norwalk, Calif., December 26, 1971.

1st New Jersey Cavalry, Fort Lee, N.J., December 15, 1971.

115th New York Volunteer Infantry, St. Johnsville, N.Y., January 1, 1972.

The Second United States Regiment of Sharpshooters, 1st U.S. Artillery, K Battery, 6th Wisconsin Volunteers, Milwaukee, Wis., November 6, 1971.

27th Volunteer Virginia Infantry Inc.

2nd Pennsylvania Reserves, Company F, Hollidaysburg, Pa.

33d Va. Vol. Inf., Company E, New Market, Va.

Adopted by the Board of Directors of The North-South Skirmish Association on October 2, 1971 at Gainsboro, Virginia.

Resolution passed by unanimous vote, Indiana Department of AMVETS State Executive Committee Meeting, July 25th, 1971.

MUNCIE FIRE DEPARTMENT,
FIRE PREVENTION BUREAU,
Muncie, Ind., March 18, 1974.

Mr. MAURICE LATIMER,
President, Indiana Sportsmen's Council,
P.O. Box 93, Bloomington, Ind.

DEAR MR. LATIMER: I have been a fireman for nearly 25 years. For about the same length of time, I have been a black powder shooter. In the first capacity, I

am a captain on a municipal fire department. In the second, I am a past president of the National Muzzle Loading Rifle Association. All of which is to say that I have some direct experience in general safety, and in black powder handling as well.

Since that combination seems rare in the few people opposing S. 1083, I welcome the opportunity to comment on the subject of safety in the handling of black powder.

As a practical matter, the only thing that will ignite black powder is heat. Contrary to common impression, percussion and concussion of the sort found outside of laboratories will not do it.

But folklore leaves powerful impressions. Some years ago, a massive explosion in downtown Richmond, Indiana, was nationally identified in news reports as a black powder explosion, because a sporting goods store was one of the buildings destroyed. Even smokeless powder containers were identified as containing black powder. When Federal inspectors later determined the cause of the explosion to be natural gas, only the Richmond newspaper printed one small retraction. The national impression remained that it was a black powder explosion.

The substances stored in and around ordinary homes for lawn care and painting are greater practical hazards than black powder. To assign stringent federal regulations to black powder, but not the others, is wrong. Black powder gives off no explosive fumes.

Sincerely,

MAX VICKERY,
Captain.

STATEMENT OF INDIANA SPORTSMEN'S COUNCIL—A REPORT ON CERTAIN EXAGGERATED STATEMENTS AND INFERENCES PERTAINING TO BLACK POWDER AND MADE IN OPPOSITION TO S. 1083

INTRODUCTION

The recent 78 to 8 Senate passage of S. 1083, with most absentees registering favor, reflects the margin by which persons across the entire spectrum of thought on gun control generally, have come to realize the merits of exempting antique ammunition components from Title XI of the Organized Crime Control Act of 1970 (PL 91–452), while concurrently tightening that same law as it applies to bombers.

Basic justification for the amendment proposed is twofold:

1. It would exempt *commercially manufactured* black powder distributed and possessed as an antique ammunition component, thus removing the present five pound exemption which is surrounded by vague and burdensome red tape that applies almost exclusively to persons of a compliant nature, and

2. By definition, it would illegalize home manufacture—a simple evasion useful to bombers but useless to historical sportsmen—and would also illegalize the possession of any quantity of black powder, however small, under evidence of intent to make a bomb.

The mode of exemption proposed is amply precedented in all sorts of federal, state, and local laws and regulations pertaining to many actions and substances, one of those being Title XI itself. Under such an exemption, no bomber can build his defense on having possessed an exempt *quantity*, as he can now with black powder, but not fertilizer, which is exempt under an intent clause.

Opposition to S. 1083 and similar bills has centered on the purported usefulness of Title XI in preventing bombings. Yet S. 1083's opponents freely admit that *of* black powder bombs encountered, *most or all are made of exempt quantities*, rendering Title XI *void* as a tool of prosecution. In such cases, prosecution effectively ensues under the "destructive device" clause of the Gun Control Act of 1968, which prohibits the making or possessing of a bomb.

S. 1083's opponents have not explained why it is best to closely regulate historical sportsmen while defending built-in defenses, under the same law, for bombers. The proposed amendment would remove those defenses.

Frequency of use of black powder in bombs itself seems subject to interpretation. The National Bomb Data Center, a Justice Department subsidiary, says about 3.5 per cent. Treasury figures are higher: but those figures are defined so selectively that under them, a gasoline massacre is not a bombing.

In the opposition to S. 1083, many statements have been made that are designed to portray black powder as a dreadful substance that should reluctantly, if at all, be allowed in the hands of sporting users. Unfortunately, many of

those who have made such statments have never used or had occasion to use black powder, have never sought to locate it under the impositions of Title XI or even ordinary conditions, and have no interest in it at all except as a substance given to regulation. Some of those same people have expressed an inability to even identify it through its singularly characteristic residue, alluding instead to strong probabilities of other substances being confused with it for purposes of material identification—a complaint long voiced by students of black powder.

Since some who have made statements about the frightful volatility of black powder reside in high places, their comments are sometimes taken at face value without further examination, and without regard for the many comparable other substances and actions with which we all live in daily proximity. By way of example, some of those statements—often repeated as plain gospel down the line—are presented here. They are taken from ATF testimony.

". . . the strength of black powder is .55 of TNT, or roughly one-half the strength. So, 50 pounds of black powder would be equivalent to 25 pounds of TNT in strength. Again, I would like to point out that this would be where the black powder was contained." [1]

(Authors' note: The equation would have to involve black powder under *maximum* containment, versus *no containment at all* for TNT, and there are other flaws in the comparison. One would look a long way, for instance, before finding a black powder shooter suicidal enough to substitute .55 ounces of TNT in a gun barrel designed to chamber one ounce of black powder. TNT is not a propellant.)

"Black powder is a mass detonating explosive, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, to severe concussion or impact, to the impulse of an initiating agent, or to the effect of a considerable discharge of energy without. Such an explosion will normally cause severe structural damage to adjacent objects, or simultaneous detonation of other separated ammunition and explosives if it is stored sufficiently close to the initially exploding material. The untrustworthiness of black powder cannot be overemphasized." [2]

(Authors note: Black powder is not a detonating (high) explosive. It is a deflagrating (low) explosive. Many substances available in daily commerce are more treacherous than black powder. Gasoline and lacquer thinner are two of those, exempt when distributed and possessed for their intended purposes.)

"I would like to say, sir, in speaking of the untrustworthiness of black powder, we are speaking in terms of explosives. Dynamite, you can pound, you can drop, you can do a lot of things with it without it detonating. However, with black powder, we have some rather gruesome pictures of explosions in fireworks factories caused by percussion. There are a number of ways that black powder can be ignited. And so this is the basis on which we say it is hazardous and explosive." [3]

(Authors' note: Fireworks factories contain *much* hotter stuff than black powder. Though the mild propellant charges behind aerial bombs are black powder, for instance, the bursting charges in the bombs themselves are not. Those have *many times* the potency of black powder, and for purposes of safety, if not accuracy, the two should *never* be confused.)

(Even so, the ATF has offered no gruesome photographs of gasoline massacres, gas explosions, or explosions of printing ink factories. The question of whether black powder is *capable* of exploding has never been at issue.)

"* * * it should be noted that this Bureau is not in favor of the existing five pound exemption, which is a statutory exemption rather than an ATF concession." [4]

(Authors' note: The five pound exemption was expressly approved, in 1970, by a Mr. Liddy, who at that time held a policy-level Treasury office. Since 1970, many Treasury letters have expressed regret at not being able to make easements beyond the five pound exemption. Most of those letters have referred antique sportsmen to Congress for relief.)

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[1] Hearing before the Committee on the Judiciary, United States Senate on S. 1083, June 12, 1973. Statement of Rex Davis, Director, Bureau of Alcohol, Tobacco, and Firearms, Department of the Treasury, page 117.

[2] Hearing before the Committee on the Judiciary, United States Senate on S. 1083, June 12, 1973. Prepared Statement of Rex Davis, Director, BATF, page 133.

[3] Hearing before the Committee on the Judiciary, United States Senate on S. 1083, June 12, 1973. Statement of Rex Davis, Director, BATF, p. 126.

[4] Hearing before the Committee on the Judiciary, United States Senate on S. 1083. Letter of June 28, 1973 from Rex Davis, Director, BATF, to Senator Birch Bayh, p. 143.

Statements alluding to the singularly dreadful and treacherous nature of black powder go on an on. Even the comic strip character Dick Tracy has by coincidence lately gotten into the act with a story line in which an arsonist has been destroying buildings by mixing black powder with floor sweepings, which are then ignited by the action of a broom. Characteristically, the term initially used in the series was "gunpowder," which was soon specialized to "black powder," consistent with the subject of S. 1083. And ironically, if the premise of the series were true to fact, the series would be providing *textbook instruction* to would-be arsonists who would be *immune from the Organized Crime Control Act*, since the quantities in reference—whether commercial or home made—are under five pounds!

In any case, the common tread of the cataclysmic volatility of black powder runs through all such statements and stories: the idea, for instance, that to drop a can of black powder is to run the serious risk of exploding it.

Which is false.

TESTS

In view of all of the foregoing, the board of directors of the Indiana Sportsmen's Council instructed its black powder committee to conduct tests to inquire into the validity of those concepts.

The approach selected was the most direct: to subject test quantities of black powder to great abuse, and examine the results. If the results indicated imminent disaster in the normal careful handling of black powder, then the comments about its volatility could be regarded valid. If not, then not.

For reasons of economy and obedience to the Act, the tests involved quantities less than five pounds. No bombs were made, since doing so would have violated many state and federal laws: most notably, "destructive device" clauses in the Gun Control Act of 1968. It was ironically noted by one of the participants, however, that so far as the *Organized Crime Control Act* was concerned, the tests could have been conducted with live bombs on Main Street, since the quantities involved were under five pounds.

The tests were conducted at a private dump on private property, with the willing cooperation of the owner of the land. The personnel conducting the tests were people long experienced in the safe handling of black powder. The abuses to which the powder was subjected far exceeded normal handling procedures, and were done solely for test purposes. During the tests, all reasonable precautions were taken to ensure the safety of test personnel.

Test #1 (Figures 1, 2, 3, 4): A one pound can of black powder was placed atop a barrel-head so as to remain upright against considerable impact. From a safe distance, 14 rifle shots were fired through the can of powder. So as to achieve maximum bullet contact with the powder, the first shots were placed near the top of the can, with the rest placed progressively downward to the bottom as the unexploded powder was blown out the back of the can by the force of the bullets passing through. After the can was thus emptied, a further dozen or so shots were skidded across the barrel-head, through the spilled powder. The powder did not explode.

Upwind and from a safe distance, the participants threw cigarette butts at the spilled powder until one landed in it and remained. After 17 seconds, the powder flashed, leaving the barrel-head scorched but otherwise undamaged. It is interesting to ponder what a .55 pounds of TNT detonated on the barrel-head would have done to it.

Test #2 (Figures 5, 6); A one pound can of powder was laid on the ground. The can was of a type long approved for interstate shipping and was the type in which sportsmen normally receive and keep black powder. A freshly lighted cigarette was taped to the can, whereupon the participants retired to a safe distance from the can. On returning to the site a safe time later, it was found that the cigarette had completely burned itself out without affecting the powder inside the can.

Test #3 (Figures 7, 8): A tablespoonful of black powder was laid atop an anvil and with full force, struck with a five pound sledge hammer. The test was repeated seven times, with the anvil relocated each time to avoid accumulated spillage. The powder did not explode.

Test #4 (no photographs taken): In recognition of the recent subject of the Dick Tracy adventures, a small quantity of black powder was placed on a concrete floor, and three times swept from one end of its 45 foot length to the other. It did not explode, and being no longer fit for propellant use, it was gathered into a dustpan and flushed down an appropriate receptacle.

For all of the tests, the grade of powder used was FFg, which by virtue of fine granulation, is effectively more potent than coarser grades.

Photographs of the tests follow.

FIGURE 1



FIGURE 2

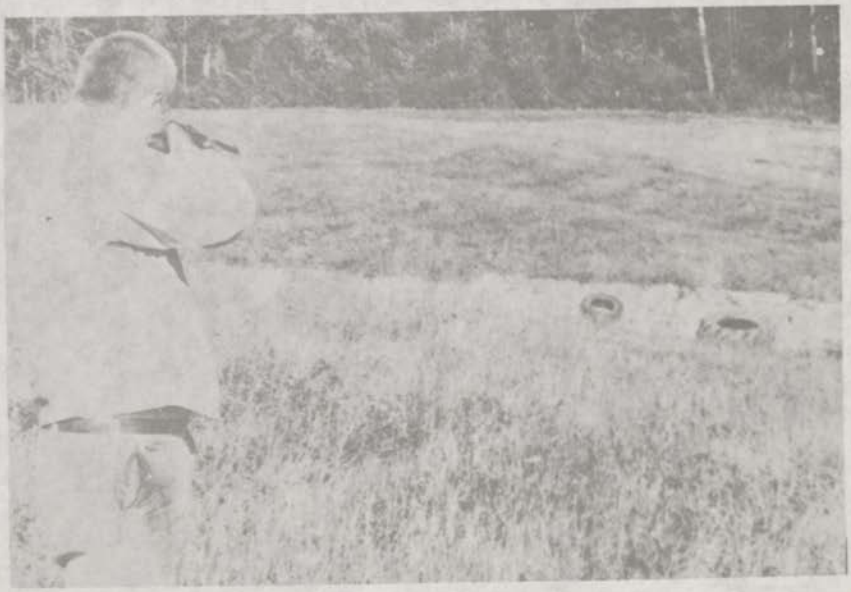


FIGURE 3



FIGURE 4



"The untrustworthiness of black powder cannot be overemphasized." [5] Above: One pound of black powder shot full of bullet holes.

[5] Hearing before the Committee on the Judiciary, United States Senate on S. 1083, June 12, 1973. Prepared Statement of Rex Davis, Director, BATF, p. 133.

FIGURE 5

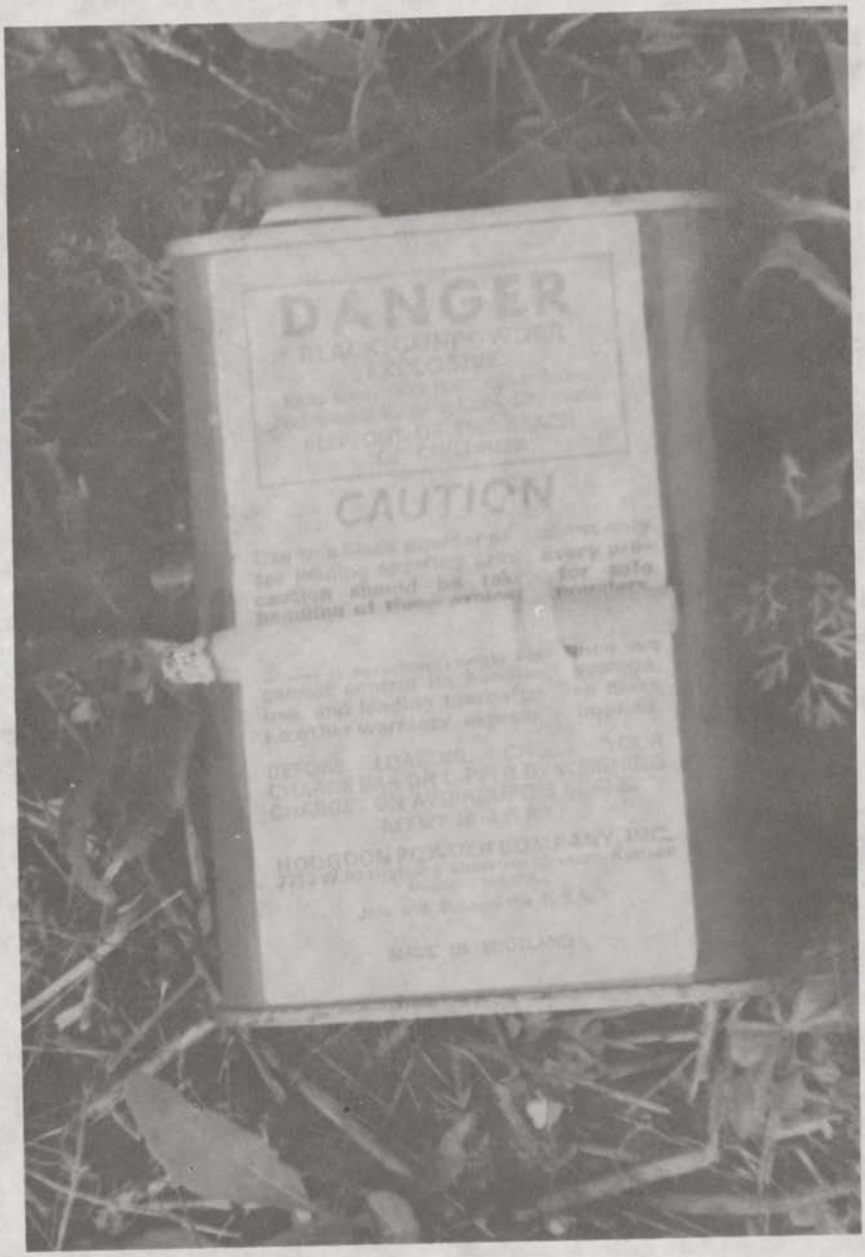
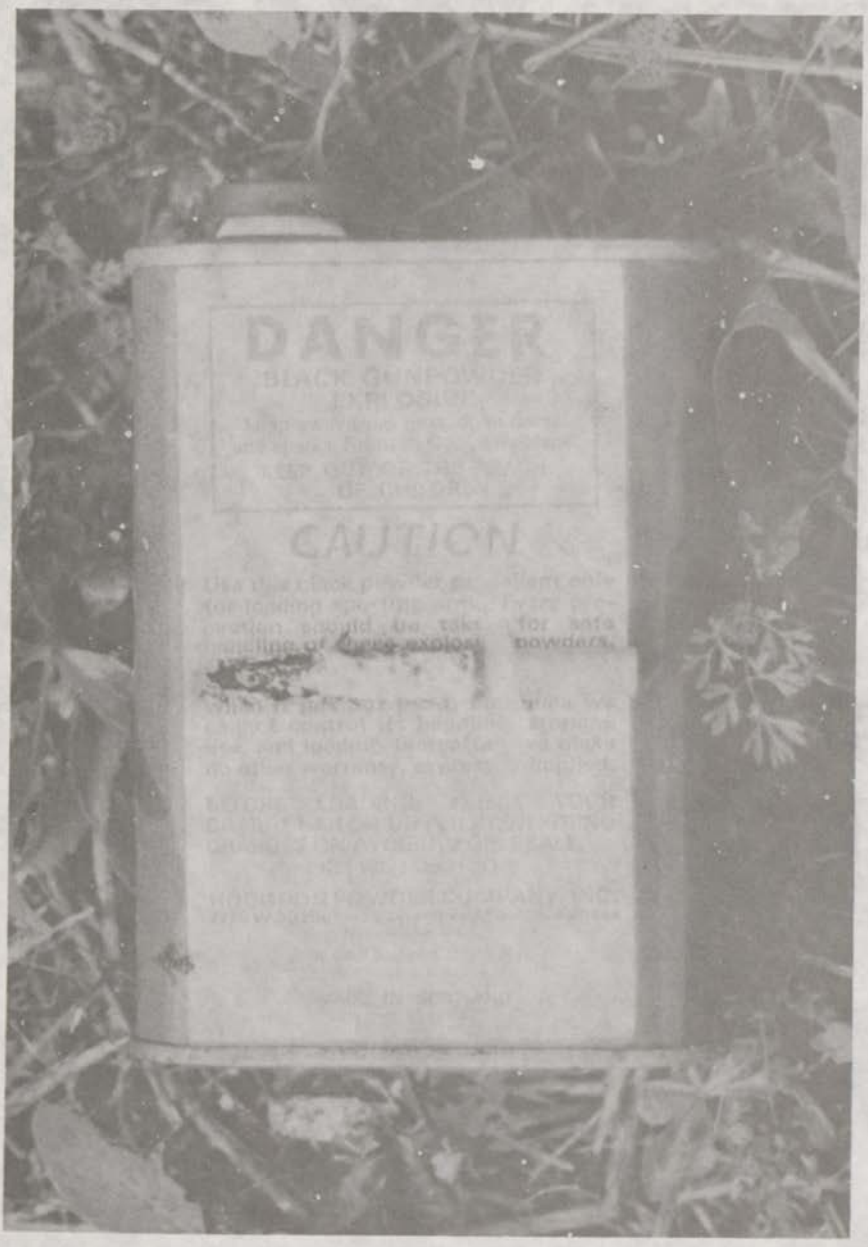


FIGURE 6



"There are a number of ways that blackpowder can be ignited. And so this is the basis on which we say it is hazardous and explosive." [6] Above: Normal black-

[6] Hearing before the Committee on the Judiciary, United States Senate on S. 1983, June 12, 1973. Statement of Rex Davis, Director, BATF, p. 126.

powder handling container subjected to the entire duration of a burning cigarette.

FIGURE 7



FIGURE 8



"Dynamite, you can pound, you can drop, you can do a lot of things with it without it detonating. However, with blackpowder. . . ." [1] Above: Blackpowder on anvil being pounded with a five pound sledge hammer.

[1] Hearing before the Committee on the Judiciary, United States Senate on S. 1083, June 12, 1973. Statement of Rex Davis, Director, BATF, p. 126.

CONCLUSIONS

The authors of this report know of no situation among sportsmen where outside of careful test circumstances, handling of blackpowder even approaching the severity here demonstrated would be tolerated for an instant. Like many substances freely available in everyday commerce, blackpowder deserves respect and reasonable care in handling.

But by having stripped away all semblance of reasonable care in handling under these test circumstances, these tests graphically illustrate the breadth of misimpressions being circulated by testimony and so forth designed to portray blackpowder as a routinely treacherous and unstable substance, unfit for handling among prudent historical sportsmen—which means by far the most of them.

To attempt to justify Title XI's singular excesses with respect to blackpowder by so portraying it, is to promote ideas that are not consistent with fact.

When the promotion of those ideas is coupled with disregard for the admittedly plain fact that bombers *now* have greater practical and legal access to black powder than historical sportsmen via easy home manufacture, that legal access to commercial grades is now the same for both groups, and that bombers have many options to begin with while antique sportsmen have only one, then the simple conclusion must be that our government does not mind giving bombers the fairer shake.

In any case, these tests refute exaggerations made about the sensitivity of blackpowder.

APPENDIX

[From the Chicago Tribune, Tuesday, November 27, 1973]



Some time after this report was completed, the Dick Tracy series was also finished.

In view of the highly coincidental timing of the series, the term-switch from "gunpowder" to "blackpowder," and so on, the Indiana Sportsmen's Council asked Mr. Gould, the series author, if the coincidence was pure, or was perhaps related to testimony opposing S. 1083, or related to perhaps yet other factors.

Mr. Gould did not respond.

After this report was examined by members of the Indiana Sportsmen's Council and various muzzle loading groups, the ISC received many comments, among which are the following:

"You might have point out that the ATF testimony in reference was given just a few days before John Dean named a former assistant director of the ATF as a conspirator in a plot to bomb the Brookings Institute and burglarize it during the confusion."

"I have been handling dynamite for a long time. People who pound on it with hammers handle it for only a short time."

"In view of the ATF's comments about dynamite and blackpowder, why don't you invite them to participate in a simple test? At one end of a football field, you fire pistol shots into a one pound can of blackpowder for as long as they, at the other end, do the same with a pound of dynamite."

"Long storage of blackpowder may, through dampness, ruin its potency, but will not render it unstable. With dynamite, long storage permits the nitroglycerin to seep out, making the dynamite as unstable as a bottle of raw nitro."

"Gasoline gives off explosive fumes. Blackpowder doesn't."

"Gasoline is rated at 14 dynamite sticks per gallon. Does that mean that people with power mowers and outboard motors should be slapped with a five quart limit?"

"I know of a case where a man who owned no blackpowder was refinishing a modern shotgun stock in his basement, and was killed when lacquer thinner fumes were exploded by a gas pilot light. The incident was promptly reported as a black-powder explosion."

STATEMENT OF VAUGHN K. GOODWIN, PAST PRESIDENT, NATIONAL MUZZLE LOADING RIFLE ASSOCIATION

Mr. Chairman, Members of the Committee, I appreciate the opportunity to represent the National Muzzle Loading Rifle Association (NMLRA), the parent organization of muzzle loading shooting in the United States.

The NMLRA is an American Heritage shooter-sportsman organization of over 17,500 members and 270 Charter Clubs in the United States. We are a non-profit organization dedicated to the development of skills in marksmanship and rifle-making craftsmanship of early American muzzle loading firearms, and to furthering the heritage on which this country was founded. From the meeting of a handful of sportsmen who gathered in February 1933, at Portsmouth, Ohio to shoot the muzzle loading rifles of our nations forefathers and who established the NMLRA, muzzle loading shooting has grown until today it is heralded as the fastest growing shooting sport in the United States.

From the very beginning the NMLRA has constantly directed its efforts to furthering the traditions of the American way of life. Our shooting matches are family affairs which feature matches for both ladies and junior members of our Association. During the matches held at our 431 acre National Range at Friendship, Indiana we play host to thousands of shooter members, their families, antique gun dealers and visitors. In our forty years of existence we have fired and handled tons of black powder without a serious accident. We feel that this record speaks for itself and to our ability to handle black powder in the quantities required to meet the needs of our members.

In order to shoot muzzle loading firearms you must for reasons of safety use only black powder. We cannot use manufactured fixed ammunition, but must load from powder horn and bullet pouch. We have fought long and hard to have muzzle loading firearms both antique and replicas thereof exempted from the control provisions of the law. We also fought to prevent propellent shooting grade black powder from being included in the Federal Explosives Law of 1970. During the hearings on this regulation held by the House of Representatives Judiciary Committee on July 29, 1970, could be best described as a frantic last minute effort to pass an explosives bill which would eliminate the bomber's source of explosives. We were barely able to get into this law an exemption of five pounds of black powder. To the uninformed five pounds of black powder seems like an adequate amount. If it were smokeless powder for modern rifles it would be. However, five pounds of black powder because of the amount needed per shot is hardly enough for two days competition with muzzle loading shotguns or large bore rifles.

At the time of the hearings on the 1970 Explosives Law, it was pointed out that the controls on shipment of black powder were already severly controlled and shipments regulated by Interstate Commerce Commission regulations. I explained that we obtained our powder at our National Matches from five muzzle-loading gun suppliers and dealers on our Commercial Row. These dealers had their powder delivered to them by a distributor, it was then stored in our approved powder magazine until sold by the dealer to the individual. I pointed out that this highly successful method of powder sale and supply would cease to exist if the proposed law were passed, since these dealers were from Ohio, and

under the new bill they would be precluded from selling black powder except for their home state and place of business. This is exactly what happened. None of the dealers were able to supply us and several of them were forced out of the powder business as were hundreds of other muzzle loading suppliers throughout the country, who handled black powder as a convenience to the shooter. Coupled with this loss of the hundreds of dealers who sold black powder was the almost instant rise in price caused by the drying up of dealers and distributors who could handle black powder under the new law. Since that time, we have seen black powder rise from $1.50 per pound in 1970 to prices from $3.00 to $6.50 per pound when it can be found today. While not all of this increase in price can be laid directly to the passage of the Federal Explosives Law of 1970, it can indirectly. At the House Judiciary hearings of 1970 the Dupont Representatives said that they were not planning on curtailing the manufacture and sale of shooting grades of black powder. In fact, they were planning on increasing their manufacture and distribution. Scarcely had the ink dried on the new explosives law when Dupont went out of the commercial sale of black powder in June 1971, but continued to fill their Government contract for Government grades. Dupont's decision to do this was sudden and was certainly influenced by the new explosive law and the manufacturing, distribution and dealer problems involved. This action left the only available manufacturer of sporting black powder as Curtis and Harvey in Scotland, which remained as the only source until Gearhart-Owen Industries purchased the Dupont plant in 1973 and resumed the commercial sale of black powder.

Since August 1971 it has been my responsibility to obtain an adequate supply of black powder for the National Muzzle Loading Matches. In 1971 after the present law was passed we obtained our own license and have fortunately been able to obtain and provide five pounds per registered shooter during our matches. I want to emphasize that we do not sell powder at any other time. Obtaining a sufficient supply has not been easy. It has been necessary to scour the country to obtain powder regardless of price. In January 1972 one of the three main distributors of black powder, the Austin Powder Company suddenly went out of the black powder business because of the problems involved. With their demise went our six ton requirement for 1972. Coupled with this was the delay of the scheduled U.S. and Canadian shipment from Scotland. It was only through the support of Canadian Industries Limited and the Hodgdon Powder Company of Shawnee Mission, Kansas that we were able to obtain the only powder on hand in the U.S. and Canada to conduct our National Matches. With the reestablishment of a U.S. source of black powder it has been somewhat easier to obtain a supply of powder at our National Range. This does not hold true everywhere. The large quantity of powder at the Gearhart-Owen plant in Pennsylvania, or at the ten master distributors throughout the U.S. does not make it readily available to the shooters throughout the country. The reason for this is the limited number of dealers who can cope with the restrictions placed on sales and storage of black powder by the 1970 Explosives Law. Unless something is done to eliminate the restrictions posed on the sale of sporting grades of propellant black powder so that we can induce domestic industry and distributors to get back into business, our sport is in serious jeopardy.

It can be truly stated that the Treasury Department went as far as they could under the letter of the 1970 Explosives Law to be as lenient as possible in the wording of their regulations to the black powder shooter. We met with the Treasury Department and they included as many of our recommendations as possible in the implementing regulations. They stated that they realized the problems the black powder sportsman shooter is having, but pointed out only by amending the present explosives law could any relief be obtained. That is why it is difficult for me to understand why the Treasury Department is here today testifying against black powder relief legislation.

Most of the individuals and organizations testifying here today have been working to obtain the support of our own lawmakers to amend the Federal Explosives Law of 1970. (Title XI of the Organized Crime Control Act of 1970). That is why we are here to present our case and ask for passage of an exemption for commercially manufactured propellent black powder. The exemption we are asking for is that proposed in S1083, which has already been passed by the Senate 68–0. This exemption would remove the restriction on the black-powder shooting sportsman and place the burden where it should be on the criminal bomber. This exemption would permit the honest citizen shooter to ob-

tain his commercial black powder propellant without harassment, and provide an inducement to increasing the availability of sporting grades of black powder.

Approval of this exemption would also help to restore many of our chain of small business dealer distributors. It will also aid in providing black powder supplies needed for Bi-Centennial celebrations and events being planned for the 1976 time period. Among the many planned events involving muzzle loading firearms is an International Match between the United States, England, France, Germany and Spain. Invitations for this event scheduled by the NMLRA for July 4–6, 1976 at Friendship, Indiana, have already been issued. We solicit your support by passing the exemption which can provide the black powder needed to conduct this shoot and the many other National and State shooting events and demonstrations being planned. Above all we urge the passage of this exemption to keep alive this truly American heritage sport of muzzle loading shooting.

STATEMENT OF C. R. GUTERMUTH, PRESIDENT, NATIONAL RIFLE ASSOCIATION OF AMERICA

Mr. Chairman and members of the committee: I am C. R. Gutermuth, President of the National Rifle Association of America. I am delighted to have the opportunity to testify in support of the blackpowder ammunition exemption bills before this committee.

The National Rifle Association numbers among its more than one million members many thousands of muzzle-loading shooters in all parts of the country. These shooters pursue their sport on the target range and in the hunting field. Moreover, Mr. Chairman, many of them hold colorful and historic shooting events annually, using not only blackpowder shoulder arms but also blackpowder cannons. These events are exemplified in the gala affairs sponsored by such groups as the North-South Skirmish Association and the National Muzzle-Loading Rifle Association. The muzzle-loading shoots are well known to America's sportsmen and have been widely publicized in the press and over television. Users of muzzle-loading firearms and participants in local, regional and national muzzle-loading shoots view their activity not only as a sport but also as a means of preserving for the public good the historical drama and events associated with obsolete ordnance.

I should like to point out that muzzle-loading shooting sports are among the fastest growing of any in this country. To encourage and support the growth of this unique form of shooting, the National Rifle Association has recently created a special committee for this purpose.

I have brought with me some short films showing some blackpowder shooting events and with the permission of the Chairman would like to show them to the committee. This would take only a few minutes.

Before proceeding, Mr. Chairman, I should like to say that the National Rifle Association supports the purpose and approach of H.R. 14018 and H.R. 14549 by Representatives Hamilton Fish, Jr., William S. Cohen and Harold V. Froehlich of this distinguished committee, and several other blackpowder exemption bills by other Members of the House, as well as S. 1083 which passed the Senate overwhelmingly last year. This printed resolution attests to that.

The necessity and desirability of legislaton to exempt blackpowder from existing legal restrictions if muzzle-loading shooting is to continue as a healthy sporting activity are based upon the following considerations:

(1) The existing law provides for the unrestricted purchase, without permit, of five pounds of blackpowder or less as often as required. However, repeated purchases in such small quantities can not be done without great inconvenience and substantial expense because of the obvious factors of time, travel distance, frequency of use and limited availability.

(2) Unlike smokeless powder, where a small amount goes a long way, large quantities of blackpowder are required for each shot fired. The typical blackpowder shooter uses several times the present unrestricted amount of five pounds each year. The growing number of cannon shooters will use much more than that.

(3) The sources for the purchase of blackpowder are much fewer than those for smokeless powder. Hence, where the purchase without restriction of small amounts of smokeless powder from many outlets presents no real problem, the acquisition of small amounts of blackpowder from far fewer outlets poses a difficult and serious problem. Many states have few or no sources at all.

(4) Blackpowder suitable for use in muzzle-loading firearms can not be "home-made" easily as is sometimes thought. Only commercial blackpowder which meets certain physical and qualitative standards is suitable for antique firearms.

(5) Commercially manufactured blackpowder is the only propellant that can be used in muzzle-loading and other firearms designed for blackpowder because only this propellant has the low pressures and other characteristics which are safe for antique-type arms.

(6) Commercially manufactured blackpowder propellant is made and sold in four different granulation sizes, with each intended primarily for certain types of muzzle-loading arms—rifles, pistols, shotguns and cannons.

(7) There are many materials which present a far greater hazard than blackpowder that are easily available, in abundant supply, that are not covered by the federal explosives law. I need mention only a few, such as gasoline, cleaning solvents, certain fertilizers (e.g. ammonium nitrate) and bleaching powders. Ammonium nitrate, the most widely used fertilizer, was used to blow up the mathematics research building at the University of Wisconsin a few years ago. The effectiveness of ammonium nitrate as a blasting agent has caused its general substitution for dynamite in most kinds of blasting and a very great decrease in the manufacture of dynamite.

Mr. Chairman, the future of countless numbers of individual and organized muzzle-loading shooters hangs in the balance because of the present severe restrictions of the federal explosives law of 1970. While the rationale of the law and accompanying regulations is to deter the criminal use of explosives, the law and regulations nevertheless have had the effect of severely curbing an historical sport and a wholesome recreation. This, indeed, is an ironical twist when one considers the nature and use of blackpowder in relation to the wide availability of common substances which would easily be converted to bombs and other unlawful explosives.

On behalf of the membership of the National Rifle Association of America and the thousands of muzzle-loading shooters throughout the land, I urge the speedy and favorable consideration of H.R. 14018, H.R. 14549 and S. 1083 and/or similar legislation pending before Congress.

Mr. Chairman, we deeply appreciate your concern and your interest.

THE NATIONAL
RIFLE ASSOCIATION
OF AMERICA

Resolution



WHEREAS, The muzzle-loading shooting activities of the members of the National Rifle Association, the North-South Skirmish Association, the National Muzzle Loading Rifle Association, the Bi-Centennial Commemorative Associations and those of numerous other legitimate users of blackpowder propellant form wholesome sports steeped in American Heritage; and

WHEREAS, Commercially manufactured blackpowder is the only propellant (gunpowder) which can be used safely in muzzle-loading and other firearms specifically designed for it; and

WHEREAS, The present restrictions on ammunition components for antique firearms impose excessive restrictions on honest citizens without placing any real restraint on the criminal user, and

WHEREAS, The National Rifle Association of America by resolution of its Board of Directors on November 14, 1971, declared its support for amendment of Title XI of the Organized Crime Control Act of 1970 to remove unnecessary restraints on blackpowder shooting; and

WHEREAS, The United States Senate has already acted to provide an exemption for commercially manufactured blackpowder propellant through the overwhelming passage (78-8) of Senate Bill 1083; now, therefore be it

RESOLVED, That the Board of Directors of the National Rifle Association of America, assembled this twenty-fifth day of March, 1974, in its Annual Meeting at Atlanta, Georgia, urges the prompt passage of Senate Bill 1083 by the United States House of Representatives and its signing into law by the President of the United States.

Attest:

Secretary

ALONZO H. GARCELON, D.D.S.,
Augusta, Maine, November 15, 1974.

HON. JOHN CONYERS, JR.,
Chairman, Subcommittee on Crime, Committee on the Judiciary, House of Representatives, Washington, D.C.

DEAR REPRESENTATIVE CONYERS: Your recent letter offering me an opportunity to testify before your Committee was received with a great deal of pleasure and appreciation.

I want to thank you for your courtesy but, as Mr. Hart has, I hope, explained, due to a recent surgical procedure I am unable to travel at the moment. So I am submitting a statement on behalf of the Muzzle Loading and Bench Rest Shooting Committee of the National Rifle Association that will explain sufficiently, I hope, the basic reasons why the National Rifle Association is in full support of this Bill S. 1083 and its purposes. I have asked Dr. C. R. Gutermuth, President of the National Rifle Association, to appear in support of this statement.

I want to thank you for your courtesy.

Sincerely yours,

A. H. GARCELON, D.D.S.

STATEMENT OF DR. ALONZO H. GARCELON, CHAIRMAN OF THE NATIONAL RIFLE ASSOCIATION COMMITTEE ON MUZZLE LOADING AND BENCH REST SHOOTING

I am writing this statement in support of S. 1083, primarily because the present law, Title XI of the Organized Crime Control Act of 1970, does not deter nor does it punish terrorist bombers as was intended, but it has resulted primarily in excessive restriction of those who would shoot antique firearms for legitimate purposes.

This law (Title XI) does little or nothing except restrict the legal activities of the honest citizen. As a matter of fact, the proposed legislation (S. 1083) will substantially strengthen the law's intended purpose for it removes the present exemption for "homemade" blackpowder. Title XI states that no matter what its type, homemade or commercial, or its intended use, commercial blackpowder is by fallacious definition an "explosive" and is thereby subject to unreasonable restriction on purchase, possession, transportation and storage.

The term "blackpowder" in Title XI is a generic one that fails to differentiate between shooting propellants and other substances such as homemade "blackpowder." It is important, I believe, to point out that the only safe propellant that can be used in antique firearms is commercially prepared blackpowder which is standardized and maintains the same properties lot to lot. The unreasonable restrictions of the present law prevents shooters of antique firearms from obtaining the necessary quantities of commercial propellants, thereby restricting the opportunities for these shooters to enjoy their historical sport to its fullest.

At the present time there are, without question, well over 100,000 people participating in the black-powder shooting sports. This is a family pleasure and one sees fathers, mothers, children and grandparents participating in it. The tremendous increase in interest in the romantic and historical aspects of shooting blackpowder weapons has resulted in this becoming the fastest growing family sport in the United States. This, of course, includes formal and informal target shooting, the historical reenactments and demonstrations of the American scene of the past including such cultural events as the presentation of Tchaikowsky's "1812 Overture" which requires the firing of 16 cannons in order to follow the author's directions.

Almost universally throughout the United States, the State Bicentennial groups are presently planning celebrations of the American Revolution including pageants, tournaments and exhibitions of shooting of the historical arms of that period. Unless this law (S. 1083) is passed, these activities will be sadly restricted.

It is a common myth that blackpowder is used routinely for terrorist bombs and this, I presume, is what prompted its inclusion in Title XI. The fact is that evidence obtained from the Bomb Data Center of the International Association of Chiefs of Police indicates the fallacy of this myth. In one 18 months study, blackpowder was only used in 149 of nearly 4,000 bomb devices and there was no differentiation, I might point out, between "homemade" blackpowder and the scarce commercial propellants.

The "homemade" blackpowder is not suitable for use in antique guns and is not used for this purpose by knowledgeable shooters. Homemade "blackpowder" can be made by anyone, and all the ingredients are readily available at the local drugstore. In fact anyone, who as a youngster had a chemistry set, has probably made blackpowder.

I might point out that the Senate Judiciary Committee in June of 1973 wisely concluded: "Indeed all evidence would indicate that the few blackpowder bombs reported are made from 'homemade' blackpowder."

As the result of extensive hearings in July of 1973, the Senate acted to provide relief for the legitimate users of blackpowder by passing S. 1083 by a margin of 78 to 8.

Nothing new has happened in the blackpowder field, and the same arguments and the same proposals that were true in July of 1973 are true today and will be true tomorrow.

This proposed legislation (S. 1083) will do three important things:

(1) It will eliminate the present unreasonable burdens of the legitimate users of commercial blackpowder propellant.

(2) It will strengthen the law's intended purpose by removing the present exemption for "homemade" blackpowder.

(3) It will remove "the bomber's exemption," for under the present law a potential bomber can legally purchase the same amount of blackpowder as can the legitimate user.

THE OHIO GUN COLLECTORS ASSOCIATION, INC.,
November 18, 1974.

Re: Appearance of LaDow Johnston of Toledo, Ohio, before the House Committee of the Judiciary on Senate bill No. 1083, in the matter of relaxing the 5-pound limit on black powder for sporting purposes.

Mr. Chairman and Gentlemen of the Committee: My name is LaDow Johnston. My home is Toledo, Ohio. I am a graduate of the University of Kansas and of George Washington Law School. I practice law in Toledo, but I do not appear here in a professional capacity but as a director of and past president of Ohio Gun Collectors Association and as a past president of Kentucky Rifle Association, also a collectors' group.

The Ohio Gun Collectors Association is the largest of all gun collecting associations and has approximately 8,500 paid members in good standing. While our association is not a shooting organization, as such, there are a great many members of it who are not members of other groups appearing here in support of Senate Bill 1083. We have no way of knowing how many of our members shoot black-powder arms who do not belong to the National Rifle Association, the National Muzzle Loading Rifle Association, and the North-South Skirmish Association; however, there is considerable membership in local Muzzle Loading Clubs having no affiliation to the mentioned national groups. Our members engage in black powder activities as a hobby, a pleasurable pastime, and hunt big game with rifles and upland game with shotguns as well as shooting skeet and trap with shotguns.

Because of the restrictions placed on the sale of black powder, dealers are few and far between; and many areas now are without sources of it to the extent that a person interested in such an activity, in many instances, must drive many miles to secure the black powder needed for shooting hobby and then only five pounds, which could be entirely exhausted in one day's shooting of skeet or trap.

In the days before the stringent regulations were in effect, the shooter, for himself and his family, bought the black powder in 25-pound kegs which would last a considerable period of time and then could be bought locally. Today it cannot be bought in 25-pound kegs, nor can it be bought, in most instances, locally. This creates a hardship to the individual sportsman and necessitates traveling long distances to buy black powder, an expensive interlude especially when the limit is five pounds at each purchase. The large membership of the Ohio Gun Collectors favors a sensible relaxation of the five-pound limit.

For many years the Henry Ford Museum—Greenfield Village at Dearborn, Michigan, has conducted an invitational shoot called the Muzzle Loader Festival. This is a shoot in which contestants must appear in costume, and their arms must be commensurate with the costumes they wear.

There are individual events on Saturday and Sunday. There is a North-South Skirmish with approximately 30 eight-man teams competing for prizes. There are activities for the whole family with prizes given for costumes of various kinds to women and children as well as men. This is a shoot conducted with bustable targets so that spectators can see, immediately, what has happened. In June of 1974 there were 629 individual competitors as well as the 30 eight-man teams of the North-South Skirmish Association.

The skirmishers, shooting military muskets of the Civil War era, can and do use as much or more than five pounds of black powder per man for the two-day

shoot. They shoot, in addition to the team and individual musket matches, muzzle loading cannon which consume a pound or more of black powder each shot. The five pound black powder limit presents a problem, especially where there is competitiveness between two or more cannon for marksmanship purposes. This subject, I assume, will be testified to by the representative of the North-South Skirmish Association.

I am intimately associated with the Greenfield Village Muzzle Loaders Festival, having been one of the two masters of ceremony announcing the events, as the same transpire, to the general public. During the two-day period in 1974, over 40,000 spectators paid admission to view this affair. The announcements from the control stand by the masters of ceremony consist of continuous comment in describing the weapons used, how the same are loaded, commenting on the costumes the several competitors wear, and the general, pertinent historical background involving the guns and costumes of yesteryear which were commonplace in the early days represented by this muzzle loading festival shoot.

It is to be noted, also, that on the Greenfield Village and Ford Museum grounds, there are facilities for campers, trailers, teepees, etc. and that whole families participate and camp there for about three days during the shoot. In 1974 there were approximately 400 families set up in such temporary quarters, all of whom participated in the shoot.

The conduct of this shoot in a safe and discreet manner is always a matter of acute concern; and no accidents, of any kind, in the more than 20 years that this muzzle loading festival has been conducted at Greenfield Village have been experienced.

It is respectively submitted on behalf of the members of the Ohio Gun Collectors and those participants who enjoy the family affairs conducted at the Greenfield Village Muzzle Loader Festival, that Senate Bill 1083 be enacted to exempt black powder from the license and permit provision of Title II of the Organized Crime Control Act and to relax the so called five pound black powder statute.

Respectfully submitted,

LaDow Johnston,
Director and Past President,
Ohio Gun Collectors Association.

Mr. Conyers. Our first witness here is a gentleman who has testified on this matter before in the Senate. He is the Director of the Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms. We have his prepared statement.

We welcome you, Mr. Davis. Your statement will be entered into the record, and you may proceed in any way that you choose.

TESTIMONY OF REX D. DAVIS, DIRECTOR OF THE BUREAU OF ALCOHOL, TOBACCO AND FIREARMS, TREASURY DEPARTMENT; ACCOMPANIED BY ROBERT DEXTER, CHIEF, EXPLOSIVES TECHNOLOGY BRANCH; AND MARVIN DESSLER, OFFICE OF CHIEF COUNSEL

Mr. Davis. Thank you, Mr. Chairman and members of the committee.

I would like to introduce the two gentlemen who are accompanying me here in case their expertise would be of assistance to the committee. On my left is Mr. Marvin Dessler, who is a member of our Chief Counsel's Office. On my right is Mr. Robert Dexter, who is an explosives expert employed by the Bureau.

As you have indicated, I have testified before the Senate Committee on this subject, and that testimony is available to you. I might say that at the time of that testimony the Department of the Treasury was opposed to the legislation, and we have not changed our position in that respect.

My understanding is that we have been joined in that position by the Department of Justice with a statement.

[Mr. Davis' statement follows:]

STATEMENT OF REX D. DAVIS, DIRECTOR DEPARTMENT OF THE TREASURY, BUREAU OF ALCOHOL, TOBACCO AND FIREARMS

Mr. Chairman and members of the Committee, I am Rex D. Davis, Director of the Bureau of Alcohol, Tobacco and Firearms, Treasury Department. I am here in response to your request to give the views of the Treasury Department on S. 1083. I am accompanied by Robert Dexter, Chief of our Explosives Technology Branch, and Marvin Dessler from our Chief Counsel's Office.

You have available my testimony before the Senate Judiciary Subcommittee to Investigate Juvenile Delinquency on this bill, so there is no reason to read it here. We opposed the legislation at that time, and we have not changed our position.

I would like to take a few minutes to more or less recap our testimony before the Senate Subcommittee, and then expand on a phase of the black powder issue that has not been given the attention which we think it deserves—its storage.

Basically, we feel that Title XI, Regulation of Explosives, is sound legislation. It has given us the tools by which we have attacked the criminal misuse of explosive materials, and that includes everything from labor-related bombings to the illegal production of fireworks. While we have no specific incidents to cite, we feel sure our increased pressure on the licensed dealers and users of explosive materials to bring their storage facilities up to par has thwarted many attempts to steal dynamite and other explosives. It is our sound belief that whatever action Congress takes in relation to S. 1083, it must make sure that it doesn't cut into or reduce the means by which we keep explosive materials out of the hands of the criminal.

We will admit that all of the pipe bombs using black powder during the past year could have been made from black powder purchased in quantities of five pounds or less—the amount now exempted by the law. But at the same time, we cannot overlook the fact that perhaps the amount of black powder which can be purchased without a permit may have restricted the sizes of bombs as well as their numbers. A total lifting of the restrictions on black powder could mean we would begin to experience more destruction through the use of bigger bombs. We realize this is only speculation, but in law enforcement work we sometimes have to engage in speculation in order to be prepared to handle what later becomes fact.

As we pointed out in our testimony last year, the real problem, insofar as the legitimate black powder user is concerned, lies in the fact that black powder just isn't being made in this country for commercial purposes. The lack of supply has worked a hardship on their ability to acquire black powder where and when they want it, and at prices which they feel they can afford to pay.

While black powder is one of the oldest, and at one time was the most generally used explosive material in commercial work, its use today is limited to the manufacture of fireworks, military pyrotechnics, and sporting events. This is due to the discovery of dynamite and other superior commercial explosives. I would like to emphasize that the discontinuance of manufacture was not the result of its regulation by Title XI, but because of the hazard of manufacture in comparison to its cost.

To a certain degree, part of the problem does lie with the Federal laws regulating explosives since it requires the dealer to maintain certain storage facilities if he is to deal in explosives. Many of the dealers, who handled black powder as a courtesy service to their customers prior to enactment of Title XI, have discontinued the item rather than be bothered with meeting the present storage requirements. Prior to the effective date of Title XI, these dealers had a free hand in where and how they stored their supply of black powder.

The present recordkeeping requirements of Title XI enable us to identify those persons who have purchased more than five pounds of black powder, and inspect their premises to make sure they are in compliance with the regulations on storage. Now if the restrictions on black powder are removed, dealers and users will once again be able to stock whatever black powder they can find on the open market in sufficient quantities without being concerned with storage other

than the restrictions imposed by the Occupational Safety and Health Administration of the Department of Labor.

And this is what truly concerns me. Storage of black powder without restrictions represents a threat to the community which I think must be considered in the Committee's deliberations on this proposed legislation.

The untrustworthiness of black powder cannot be over-emphasized. It is the most treacherous explosive material used today, and is regarded as the worst explosive hazard. Its high degree of accidental explosive hazard is attributable to its great sensitivity to ignition by flame, incandescent particles, or electric spark.

Black powder is a generic term applied to low explosive materials which are an intimate mixture of potassium nitrate, sulfur and charcoal. Classified as a low explosive, black powder can be expected to deflagrate. This means over a relatively sustained period of time, it will burn in comparison to a detonating explosive which decomposes almost instantaneously. The effect of true deflageration under confinement, however, is an explosion. The pressure, rate of reaction and temperature increases when confined, causing a transition to an explosion.

Black powder can be expected to mass detonate virtually instantaneously when a small portion is subject to fire, to severe concussion or impact, to impulse of an initiating agent, or to the effect of a considerable discharge of energy from lightning. Such an explosion will normally result in extensive damage to structures adjacent to the explosion or will cause simultaneous detonation of other explosives or ignition of other combustibles if they are sufficiently close to the exploding material.

I have a short film on the sensitivity of black powder which Mr. Dexter and his staff made and which I would like to show the Committee at the close of my testimony. While our tests on the effect of impact on black powder did not produce any results, I have had access to the results of impact tests on black powder conducted by ITT Research Institute which show that black powder will, under certain conditions, ignite upon impact. The other sensitivity tests, which Mr. Dexter will explain during the showing of the film, speak for themselves and will, I think, support my concern over storage of this product.

As a result of these tests and the advice of those on my staff who are knowledgeable in the field of explosives, it is my contention that black powder is a significant danger to public safety for two reasons: (1) Individuals purchasing black powder usually are not aware of the dangers involved in its use, transportation and storage. (2) The storage of black powder will normally be in the users' residence, probably with no regard for compatibility to surrounding materials such as paint, household cleaners, electrical fixtures, or to its potential ignition.

Personally speaking, I would be extremely uneasy if I knew that my next door neighbor had a 50 pound keg of black powder sitting on his garage floor fifty feet from my bedroom.

To support our position on storage, I think we need only to look at the military requirements for storage of black powder. We are all aware of how safety-conscious the military is, and their requirements for the storage of black powder is far more stringent than that which the current Federal law requires. I am not proposing that we tighten up on our storage regulations, but I point this out as an example of how the military view this substance. If they think it is that dangerous—and they are in a dangerous occupation—then we ought to also.

The removal of all restrictions on black powder if it is to be used for sporting purposes means also the removal of all storage requirements for this dangerous substance. I do not think such a move could be in the best interest of the public. It seems to me that those who advocate it have failed to give sufficient thought on how it might affect their fellow-man.

I would like to be able to find a solution to the problems of the muzzle loaders and black powder shooters. I have had two very important meetings during the last eight months with Mr. Richard Corrigan of the North-South Skirmish Association during which we explored ways that we both might be satisfied with the law.

But when I receive reports from our field agents that the cause of an explosion in an illegal fireworks plant was black powder, and several persons are injured or dead, I cannot bring myself to sponsor or support a lowering of the storage requirements for black powder. I can only envision similar incidents in the residential areas where, through an accident, a heavy volume of black powder is set off and unsuspecting neighbors suffer the consequences.

On November 8, 1974, the United Press International wire service carried the following story: "An explosion leveled a black powder plant Thursday, killing two employees and scattering men and debris over a mile of sagebrush country. An eyewitness said the narrow, three-story steel building 'just disappeared' after the blast. Owners of the plant, Western Technology Corporation, could not be reached, but a spokesman for a customer of the plant, Green River Rifle Works, said there could have been as much as 1,000 pounds of powder in the building."

As is usual in such explosions, the persons who could tell why the explosion occurred are both dead. Our agents investigating the explosion report that the two men were making black powder. They had finished the screening process and were starting to bring water back to the mill for the wetting process. The electrical power to the mill was discovered to be off at the time of the explosion. The company water truck was about 50 feet from the point of explosion and was badly damaged. The ignition switch was in an "on" position. Our agents are looking at the possiblity that static electricity from the clothing of the men or an electrical charge of some type from the truck caused the powder to ignite.

This concludes my testimony, Mr. Chairman, and I would like to show our short film at this point. It takes approximately 15 minutes and will be narrated by Mr. Dexter. Upon its conclusion, I will respond to any questions which the Committee might have in relation to my testimony or the subject of black powder which they feel I, or my staff, might be able to answer. Thank you.

Mr. DAVIS. Again, certainly without repeating the testimony which is a part of the record here, I would like to point out that one of the areas which have been identified already and with which we have a great deal of concern is the unlimited and uncontrolled storage of black powder as being a threat to the public safety.

Mr. COHEN. Do not State laws take that into account?

Mr. DAVIS. There are a great many variations. The State laws, I guess, are as varied as the 50 States and the local communities.

Mr. COHEN. Most States do have prohibitions against the storage of inflammable materials or explosive materials.

Mr. DAVIS. I might add too, some States have delayed or halted any efforts to do this in view of the 1970 act that was passed by Congress.

Mr. CONYERS. They have halted what?

Mr. DAVIS. Enacting legislation in the area of black powder regulations.

I might point out to the committee, that while S. 1083 would exempt black powder from the provisions of title XI of the 1970 law, there would still remain—and we have checked with the Department of Transportation on this—the regulation of the transportation of explosives, which is under that agency's jurisdiction. So that even though there was the unrestricted purchase of quantities of black powder, and even though that black powder could be stored without adherence to the Federal regulations, there would still be the requirement for compliance with the Department of Transportation regulations as to the transportation from point of purchase to the point of storage.

Mr. CONYERS. Is that statutory? What kind of control would the Department of Transportation exert?

Mr. DAVIS. Yes; it is statutory. And it does involve the interstate transportation of explosive and hazardous materials.

Mr. CONYERS. What was envisioned, if you can tell us, by the other body when it passed this bill? If it becomes the law, would it still preclude the objective that is apparently sought under the legislation?

Mr. DAVIS. Yes, sir, in my opinion, it would. Of course, this is something out of our purview, but Mr. Dessler, I think, has the law in front of him.

Can you comment on that?

Mr. DESSLER. Yes. Section 845(a)(1) exempts from the provisions of the chapter any aspect of the transportation of explosive materials by railroad, water, highway or air, which are regulated by the U.S. Department of Transportation. And the definition of explosives in section 841 includes black powder.

Mr. COHEN. That was the law prior to the enactment of the 1970 transportation law as far as explosives are concerned?

Mr. DESSLER. That is right.

Mr. DAVIS. While we realize that it is speculative, we did want to point out that while we certainly concede that many of the pipe bombs that have been used since the enactment of the law could have been made with the purchase of 5 pounds of black powder, the 5-pound limitation could have an influence on the size of bombs and their numbers.

Mr. COHEN. Could I interrupt you? Your department is also opposed to the 5-pound exemption in current law is it not?

Mr. DAVIS. I see what you mean. In other words, if black powder was not exempted in any quantity.

Mr. COHEN. Right.

Mr. DAVIS. We have not addressed ourselves to that question. But my own position on it would be that we would not be opposed to it.

Mr. COHEN. I am a little surprised that you are not opposed to it, because it is my understanding that most of the black powder bombs, on the very few occasions on which there have been bombs made of black powder, involved less than 2 pounds of black powder. So I do not see why you would be opposed to the present law that allows such bombs to be made.

Mr. DAVIS. Well, if you take both aspects, and that is, trying to deny the availability of black powder to the criminal misuser of it, as well as the personal safety aspect, then the 5 pounds seems to be a happy medium, and again taking into consideration the interests of the sporting user of black powder.

Now, it is true that we have not kept statistics, I think, as to the misuse of homemade black powder. Since we did not anticipate these hearings, either this one or the one in the Senate, we did not feel the maintenance of those kind of statistics would have any valid use in the administration of the law. But we have polled our field offices, our special agents throughout the United States—and although they don't have statistics to back it up—they indicate that there are very few occasions in which homemade black powder is used in pipe bombs. Mr. Dexter can speak to this point better than I can. But it is my understanding that it is not easy to make an efficient homemade black powder, and it certainly is dangerous to try. To come up with a product that is effective just is not that easy.

Mr. CONYERS. Has there been any inclination to begin the statistical process? Would it be too complicated for us to begin at this point in time to get this down to a statistical situation? If you have not done it yet, let us start now, regardless of what happens to this legislation; I think whether it makes it or does not, it would still become an

important factor in considering what is going to happen in the future.

Mr. DAVIS. We will certainly make every effort to initiate something along that line.

Mr. COHEN. Could I ask a further question?

You do not have any statistics in terms of commercially manufactured black powder as opposed to homemade, but you do have statistics available in terms of the numbers of bombings that have gone on in a certain period of time how many involved black powder, have you not?

Mr. DAVIS. We have figures which I think these were put together as late as yesterday.

Mr. COHEN. Let us just take the period of July 1970 through June of 1971. The information that I have is that of the 352 bombings reported by the National Bomb Data Center 96 contained black powder.

Mr. DAVIS. I might point out that we have a little different method of collecting statistics, and we feel it is a little more accurate method. We collect them through our special agents. We have a form. Every time a special agent, either in an investigation he conducts or in a joint investigation with State and local authorities, submits a form. This form contains accurate information as to the nature of the incident, the type of explosive used, and so forth. So there will be some inconsistency. But to give you a comparison of what our statistics show, the figures that we have available before us indicate that for the fiscal years 1972 and 1973 that black powder accounted for 21 percent of actual bombings that took place, and that for the period of 1974, which includes the first 9 months of 1974, that black powder accounted for 14 percent of the actual bombings that occurred.

Mr. COHEN. Did you make any determination in your statistics as to whether or not it involved under 5 pounds of powder or more by the size of the bomb and the damage done?

Mr. DAVIS. They would all be under 5 pounds.

Mr. COHEN. They are all under 5 pounds. And yet, your department favors the 5-pound exemption, which has no bearing really on the control of it, since it is increased.

Mr. DAVIS. Well, there has been a percentage reduction. Again, we feel that the five pounds would accommodate the various interests. It does give us an opportunity in the law enforcement area, for those people who accumulate black powder in excess of 5 pounds for the manufacture of pipe bombs and other destructive devices, to have a criminal charge to use against them in terms of unlawful storage of the explosive. We think that it protects the public interest to the extent that it does limit the amount of black powder that can be stored without complying with Federal regulations.

An then, third, we think the 5 pounds—although there is a disagreement on this—does accommodate the legitimate interest of the sporting user.

On a question of balance, we feel that the 5 pounds accommodates in an equitable way all three of those interests.

Mr. COHEN. What about smokeless gun powder? What is the justification for no distinction between smokeless versus black powder?

Mr. DAVIS. I must rely on Mr. Dexter—but black powder is considered a less stable compound than smokeless.

Mr. COHEN. As far as the criminal point of view, what difference is there? It is faster burning, as I understand, the black powder is simply a faster burning.

Mr. DEXTER. As far as using a filler for bombs, why the bomber picks a particular type of material is probably due to the availability or accessibility of the material at hand. Why he uses black powder over smokeless powder may determine the type of ignition system he is going to use.

Mr. COHEN. Can they use the smokeless powder to make bombs?

Mr. DEXTER. Yes, sir, they certainly can; and they do.

Mr. COHEN. And that is freely available?

Mr. DEXTER. Yes, sir.

Mr. COHEN. You may continue with your testimony.

Mr. CONYERS. May I recognize that Congressman Harold Froehlich of Wisconsin has joined us in these hearings. We welcome our subcommittee member.

Mr. FROEHLICH. Thank you, Mr. Chairman.

Mr. DAVIS. I might say, Mr. Chairman, that we have a short film, 10 or 15 minutes, which Mr. Dexter and the members of his staff made to demonstrate the sensitivity of black powder, and its explosive effect. Subject to the committee's desire to see it, we feel it would be informative.

Mr. CONYERS. Is there any other thrust to the film?

Mr. DAVIS. It does show two things. One, the sensitivity of black powder to various forms of ignition. And, the explosive effect of 5 pounds of black powder.

Mr. CONYERS. I would like to see it. But we will arrange it at a time other than this hearing.

Mr. DAVIS. All right, sir.

Mr. CONYERS. And, of course, we would notify all of our members of the subcommittee in case they would want to see it too.

Mr. DAVIS. One of the things I think I should point out, Mr. Chairman, is that the regulations on the storage of black powder that were promulgated by the Bureau of Alcohol, Tobacco, and Firearms, are less stringent than those of the military toward the same substance. I think this points out two things. One is that we have to the best of our ability attempted to accommodate the storage of black powder by the sporting user. It also points out that the miiltary at least have a high regard for the sensitivity of the substance.

Mr. CONYERS. In what ways, if it is important, are the military restrictions more severe than ours?

Mr. DAVIS. Sir, it is primarily storage at distances from inhabited buildings, and so forth. But Mr. Dexter can point it out.

Mr. DEXTER. The Department of Defense classifies black powder in the same classification as TNT or other high explosives, mainly because black powder is a mass detonating explosive. In other words, if there was a certain amount of black powder stored in a facility and there was a fire, the heat from the fire would explode this explosive. The other reason is that it is the most sensitive explosive probably known to man today that can be easily detonated. And, of course, in

storage facilities they require certain specific conditions as far as sensitivity to spark, and so forth.

Mr. DAVIS. How about pointing out specifically the differences in volume and distances of our regulations as compared to, say, the lesser amount?

Mr. DEXTER. The present regulation as to the storage of black powder has a table specifically for low explosives, which black powder is classified as. In this table it states that a person can store from zero to 1,000 pounds of black powder from an inhabited building at a distance of 75 feet. Now, this is not the same storage table that is used by the Department of Defense. The Department of Defense uses another table that is applicable to this type of explosive. The distance is about 500 feet as compared to 75 feet in our regulations.

A copy of that, incidentally, is contained in this report.

Mr. DAVIS. I would like to point out to the committee that on November 8, 1974, the United Press International Wire Service carried a story concerning an explosion at a black powder plant in Utah which killed two employees and destroyed the facility. Our agents did investigate that explosion along with other agencies. There are two possible theories for the explosion. About 2,000 pounds of black powder were involved. One theory is that the explosion could have been caused by the static electricity on the clothing of the two employees. The second theory is that a truck parked nearby, a company truck, had the ignition switch in the accessory position, and it could have been caused by that.

Mr. CONYERS. We will make this document, "Documented Explosive Effects of Black Powder," a part of our record.

Mr. DAVIS. Thank you, Mr. Chairman.

[The document referred to follows:]

DOCUMENTED EXPLOSIVE EFFECTS OF BLACK POWDER (TEST SERIES II) BY RALPH E. COOPER AND BOYD B. BUTTS, EXPLOSIVES TECHNOLOGY BRANCH, BUREAU OF ALCOHOL, TOBACCO, AND FIREARMS, WASHINGTON, D.C.

INTRODUCTION

This report describes the results of an investigation to determine the explosion and deflagration characteristics of commercially available black powder caused by accidental ignition resulting from fire, heat, impact and/or incandescent particles.

A total of 55 (lbs.) of black powder was used in the test program. This powder represents a readily available commercial product purchased from a local source. The work was directed toward evaluating, experimentally the intensity and reaction of commercial black powder in sporting granulation (2FG and 3FG) if these materials were accidentally ignited in both confined and unconfined situations.

The intensity of the reaction was determined by 8 mm. movies and 35 mm. slides which provided documentation on ignition and deflagration properties. The appearance of the test site area witness plate and test site hardware and contents also were used as indicators of reaction intensities.

GENERAL

The underlying objective of this testing program was threefold: (1) identify the major hazard potentials associated with the accidental ignition of commercial black powder; (2) determine events which would simulate the hazards and (3) document the simulated events to provide data for illustrating the hazard and effects related to the ignition and/or subsequent deflagration or explosion of commercial black powder.

PLAN

Three test series were carried out; thermal (fire), impact sensitivity and flame and incandescent particles sensitivity. The purpose of the thermal (fire) series was to document the casualties of ignition of black powder by fire while being stored and transported in a confined configuration; (1(lb) containers). The impact sensitivity tests were to document the susceptibility of ignition of black powder when dropped from different heights in its original 1(lb) metal container. The purpose of the flame and incandescent particle test was to document the susceptibility of black powder to this type of ignition.

EQUIPMENT AND MATERIALS

The following materials and equipment were utilized in the performance of these tests:

1. 4'' x 4'' x 16 foot western red cedar column.
2. Safety fuse.
3. Electric squibs.
4. 55 (lbs) of black powder including FFG and FFFG in 1 (lb) metal cans (manufactured by Gearhart-Owens, Inc.).
5. 18 gauge blasting wire (1000' spool).
6. Standard blasting galvanometer.
7. 1 car—1960 Rambler Station Wagon.
8. (6) 4' x 8' x ¾'' sheets of particle board.
9. (10) 2 x 4 inch studs in 6, 8 and 12 foot lengths.
10. Military—M60 fuse lighters.
11. Common sparklers.
12. 16 movie high speed, Nova camera at 1500 fps, 35mm slide camera and (4) super 8 movie cameras.
13. Spray paint (red, black and yellow).
14. Small hand tools.
15. (2) 2 x 2½ foot x ¼ inch cast iron plates.

PROCEDURE

The maximum explosive energy tested in this program was that developed by 2.45 (lb) of TNT. This is the relative effectiveness (strength) of TNT for 5(lbs) of black powder. The test procedures involved black powder in FFG, FFFG granulations manufactured by Gearhart-Owen, Inc., in their original 1(lb) containers, in a drop test apparatus, simulated fire environment within a structure and vehicle and a table test site involving ignition by flame and incandescent particles (spark), also included was the ignition of 5(lbs) of black powder unconfined on the surface which will provide the fireball size, ignition and deflagration characteristics for such ignition with photographic documentation.

It was determined that impact sensitivity tests could be accomplished by constructing a drop test apparatus (Figure 4). This apparatus would allow the testing of impact sensitivity for 1(lb) container of black powder tested at heights of 2 feet to 16 feet.

Additional tests allowed for the susceptibility of ignition by fire. This was accomplished by the construction of a structure (Figure 2). Within this structure was placed five 1(lb) cans of black powder. In addition, a test vehicle was used to simulate the transportation of black powder by private vehicle (Figure 3).

Additional tests were conducted with sample black powder to document the materials susceptibility to ignition by flame and incandescent particles (sparks). This test procedure involved the use of a deflagration and propagation test table apparatus (Figure 5), with several ignition and propagation tests conducted with black powder in an unconfined state.

Evaluation of the results of all tests was limited to a visual inspection of containers, witness site, structure or vehicle and effects to areas adjacent to the test site, vehicle, structure, drop test apparatus or table apparatus test site.

Test Type.—(Surface ignition).

Test Number.—1.

Ignition Source.—Flame, Electric Squib, Dual Priming.

Confinement.—None (FFFG Black Powder).

Photographic Record.—8mm. Movies.

Configuration.—The contents of five (5) 1(lb) cans of FFG black powder were placed on a tin witness plate. The contents of the can were piled together to form a cone with (2) electric squibs inserted in the center of the powder cone. Witness stakes were placed directly behind the ignition point and were graduated in feet to form an "H" which would give approximately height and width estimates of the fireball at point of ignition. The squib was initiated by a 10 cap military blasting machine with 1000' of commercial blasting wire, which was tested for continuity prior to ignition by a standard blasting galvanometer.

RESULTS

Upon squib ignition the cone of FFFG black powder produced a V shaped fireball (probably due to the dual priming) which gradually increased to an approximate diameter of 10'. The fireball then was transformed into dense white smoke which moved quickly from the test site area.

Test type.—(Structure).

Test number.—2.

Ignition source.—Heat.

Confinement.—1 (lb) original metal cans of FFFG Black Powder.

Photographic record.—8mm Movies.

Configuration.—A wooden structure with approximate dimensions of 4' x 4' x 8' consisting of seven (7) sheets of ¾" thick particle board reinforced with 2 x 4 inch studs of varying lengths was used in this test (See Figure 2). A 2' x 2' window was left in the upper right corner of wall (2) directly in front of the shelf containing the powder. This hole was to be covered with glass, or plexiglas but was not due to the anticipated hazard to personnel from fragments. Within the test structure, attached to wall (1) was a shelf made from particle board attached with standard shelf brackets (Figure 2). Five (5) one pound original metal cans of FFFG black powder was placed on the shelf with their sides in contact with each other. In the opposite interior corner at the intersection of walls (2) and (3) were placed rags, small combustible materials (leaves and twigs) which were moistened with diesel fuel. Ignition of the combustibles was accomplished with a safety flare (fusee).

RESULTS

Upon ignition of the combustible materials located inside the structure at the intersection of walls (2) and (3) a fire resulted and spread across the interior of the structure. After a period of about 90 seconds some flame and smoke could be seen escaping from the window cut in the upper right corner of wall (2). The intensity of the fire increased until the flames reached a height of approximately 4–5 feet. Just before ignition of the test cans of black powder it was clearly seen that the interior of the structure was engulfed with flame. An explosion resulted from the fire with the fireball initially escaping from the window in wall (2) with all five (5) cans apparently exploding together. When the physical integrity of the structure was overcome, the fireball (approximate diameter 20 feet) quickly dissipated. A loud report was heard and dense white smoke could be seen resulting from the explosion.

The test structure suffered some damage but as it was not rigidly constructed, the walls and ceiling were blown apart by the explosion as a result of a sudden outward push which flattened the walls and caused the ceiling to land adjacent to wall (4).

Test type.—(Vehicle).

Test number.—3.

Ignition source.—Heat.

Confinement.—1 (lb) original metal cans of FFFG black powder.

Photographic record.—8mm movies.

Configuration.—A 1960 Rambler 4 door Station Wagon with no side or rear window glass was used. Combustible material to include small twigs, grass, rags monitored with diesel fuel was placed on the inside rear cargo compartment of the wagon (See Figure 3). Five 1(lb) original metal cans of FFFG black powder were placed in a paper bag on the right rear floor of the vehicle between the front seat and bottom portion of the rear seat. The left rear door remained open. Ignition of the combustible was accomplished with a safety flare (fusee).

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RESULTS

Upon ignition of the combustibles located in the rear cargo compartment of the vehicle a fire resulted and spread forward along the floor of the cargo compartment and into the rear passenger compartment. Flames could be seen traveling along the interior roof line and escaping from the side windows and rear window area. The intensity of the fire increased until the fire engulfed the entire interior of the vehicle. Approximately 3½ minutes from the ignition of the combustibles an explosion resulted. The fireball escaped from all window areas and reached an approximate diameter of 20 feet. As a result of the fire the car continued to burn. Due to the fact that there was no window glass in the vehicle except for the right portion of the front windshield, only thermal damage resulted from the explosion. A loud report was heard and all five (5) cans of black powder apparently exploded at approximately the same instant.

Test type.—(Drop test).
Test number.—4.
Ignition source.—Impact/friction.
Confinement.—One (lb) original metal cans of FFG black powder.
Photographic record.—8mm movies and 35mm slides.
Configuration.

A drop test apparatus was constructed of a 4'' x 4'' x 18' red cedar column. This column was graduated in feet from 0'–16'. Attached to the cedar column was a drop test platform constructed of particle board to form an outer box. This box was of a size which allowed it to move up and down the cedar column. A trap door (released by pin action) was constructed on the drop test platform. The test platform was raised and lowered along the vertical axis of the column by means of a pulley and rope.

The 1(lb) cans of black powder were tested at drop heights of 2–16 feet. The results are included in Table 1.

Test Type (Table Apparatus).
Test Number—5.
Ignition Source—Flame and Incandescent Particles.
Confinement—None.
Photographic Record—8mm Movies and 35mm Slides.
Configuration.

All tests were done on a table apparatus with two cast iron witness plates and vehicle and horizontal scales (See Figure 5). The horizontal scale was graduated in 6 inch increments and the vertical scale in feet. Ignition was accomplished with safety fuse, electric squibs or common sparklers. (Class C Fireworks). Safety fuse was ignited with the use of an M–60 military fuse lighter and electric squibs with a 10 cap military blasting machine and commercial blasting wire. Sparklers were ignited with a safety flare (fusee). The results are included in Table 2.

Test Type (Table Apparatus).
Test Number—6 through 9.
Ignition Source—Flame.
Confinement—None.
Photographic Record—8mm Movies, 35mm Slides.
Configuration.

All flame ignition propagation and incandescent particle ignition tests were performed on a static table apparatus (See Figure 5). This apparatus utilized a tubular steel table with wood construction. On the table surface was a sheet of 20 gauge steel which covered the table surface and two rectangular cast iron witness plates 2½ x 2 feet by ¼ inch thick were positioned on the steel table cover. A vertical scale graduated in feet and a horizontal scale graduated in 6 inch increments were positioned to allow estimates of fireball size and provide a reference during the tests. The results are included in Table 2.

Test Type (Table Apparatus).
Test Number—10.
Ignition Source—Incandescent Particles (Sparks).
Photographic Record—35mm Slides.
Configuration.

This test utilized the table aparatus for the previous flame ignition tests with the addition of a sting suspension modification to control the sparkler for personnel safey (See Figure 5). A length of heavy twine was threaded through four (4) screw "eyes" to form a continuous loop. This loop was suspended by two vertical members to form a horizontal suspension line over the table surface. A lanyard was attached to the continuous loop. By pulling on this lanyard any point on the continuous loop could be remotely moved across the table surface. A sparkler was attached to the continuous loop (See Figure 5) with a ½ pound sample of black powder placed on the witness plate at the opposite end of the test table. By pulling on the lanyard attached to the continuous loop the sparkler (after ignition by safety flare (fusee)) could be pulled to a point approximately 10 inches above the black powder sample; thus, allowing the powder to be ignited by the incandescent particles emanating from the ignited sparkler.

RESULTS

The sparkler was ignited with a safety flare and was pulled remotely to a position directly above the sample powder causing the powder to ignite, producing a fireball and dense white smoke.

TABLE 1.—DROP TESTS

Test type	Drop height	Ignition source	Confinement	Photographic results	Post test results
Drop test	2	None	1(lb) original container metal cap FFG granulation.	Super 8 mm movie, 35 mm slides.	No apparent damage to can.
Do	3	do	do	do	Do.
Do	4	do	do	do	Do.
Do	5	do	do	do	Slight damage to bottom seam.
Do	6	do	do	do	Slight damage to bottom seam of can.
Do	7	do	do	do	Can landed on longest width no apparent damage to can.
Do	8	do	1(lb) original metal container FFG granulation.	do	No apparent damage to can.
Do	9	do	do	do	Damage to upper can seam rear cap.
Do	10	do	do	do	Damage to top and bottom seams of can.
Do	11	do	do	do	Do.
Do	12	do	do	do	Damage to can back with dent approximately 3 in. by ½ in
Do	13	do	do	do	Slight damage, can landed on wideside.
Do	14	do	do	do	Damage to casn—dent in can face approximately 4-in. length by ¼-in. depth.
Do	15	do	do	do	Slight damage to can—landed on widest side.
Do	16	do	do	do	Damage to can upper and lower seam with slight bulge to can face.
Do	[1]16	do	do	do	Major damage to can with splitting of seam and crushing of front side of can.

[1] 5 lb. rock dropped on 1 lb. original metal can.

TABLE 2—FLAME/PROPAGATION

Test type	Test No	Ignition source	Photographic record	Configuration	Results
Flame	6	Electric Squib, position within powder sample.	8 mm movies	See description (fig. 5) with contents of 1 (lb) can of black powder in a cone configuration.	Ignition of the sample powder, fireball approximately 4 ft in diameter, which liberated a cloud of dense white smoke.
Do	7	Safety fuse, positioned 1, 3, and 6 in from test powder sample.	do	See description above (fig. 5) approximately ½ of pound of black powder in a cone configuration.	Ignition of test sample when safety fuse was placed 1 and 3 in. from sample—this resulted in ignition of the powder sample with an approximate fireball of 3 ft. no ignition when safety fuse was placed 6 in. from test sample.
Propagation	8	Electric Squip	do	See description above (fig. 5) with 3½ (lb) sample cone of black powder positioned with 1 ft centers.	Ignition of primed black powder sample and propagation to other 2 samples combined fireball 6 ft diameter.
Do	9	Safety fuse	do	See description (fig 5) with ½ (lb) samples of black powder with 4 ft centers.	Ignition of all powder samples, fireball approximately 6 ft in diameter.

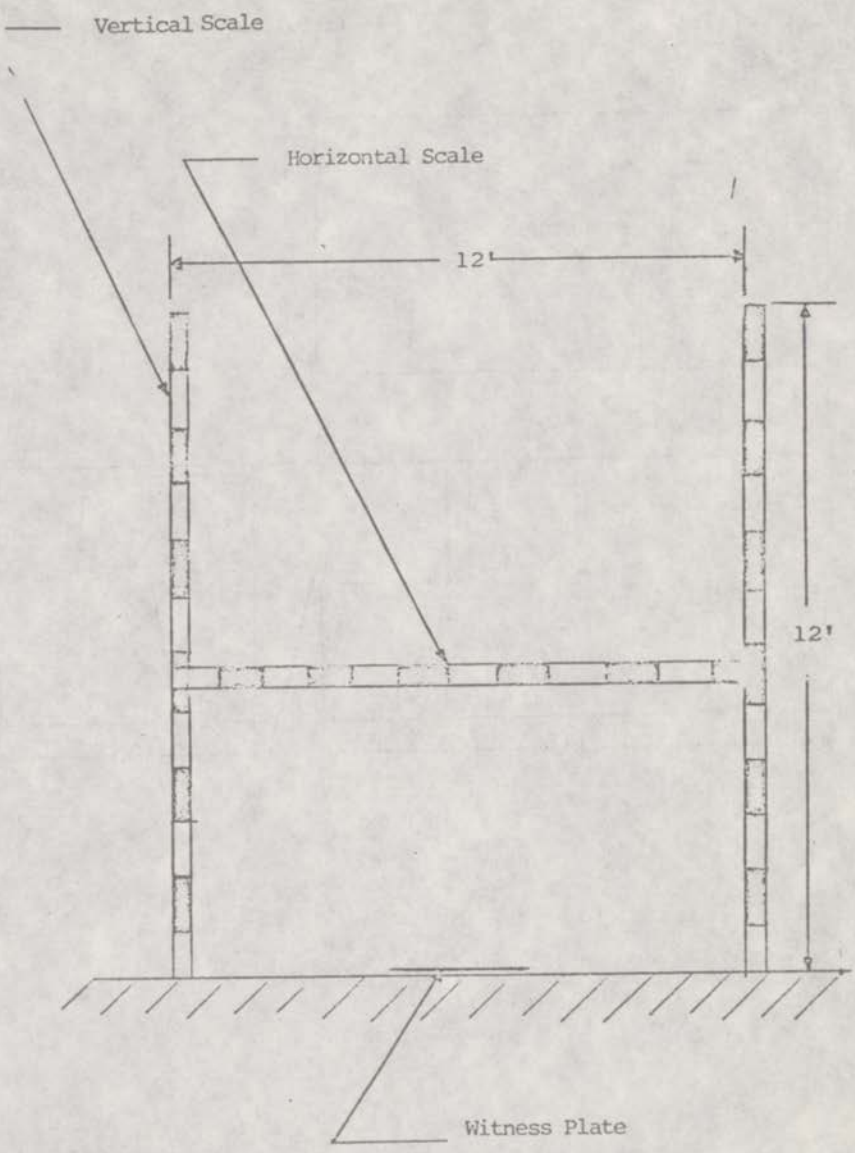


FIGURE 1.—Surface ignition apparatus.

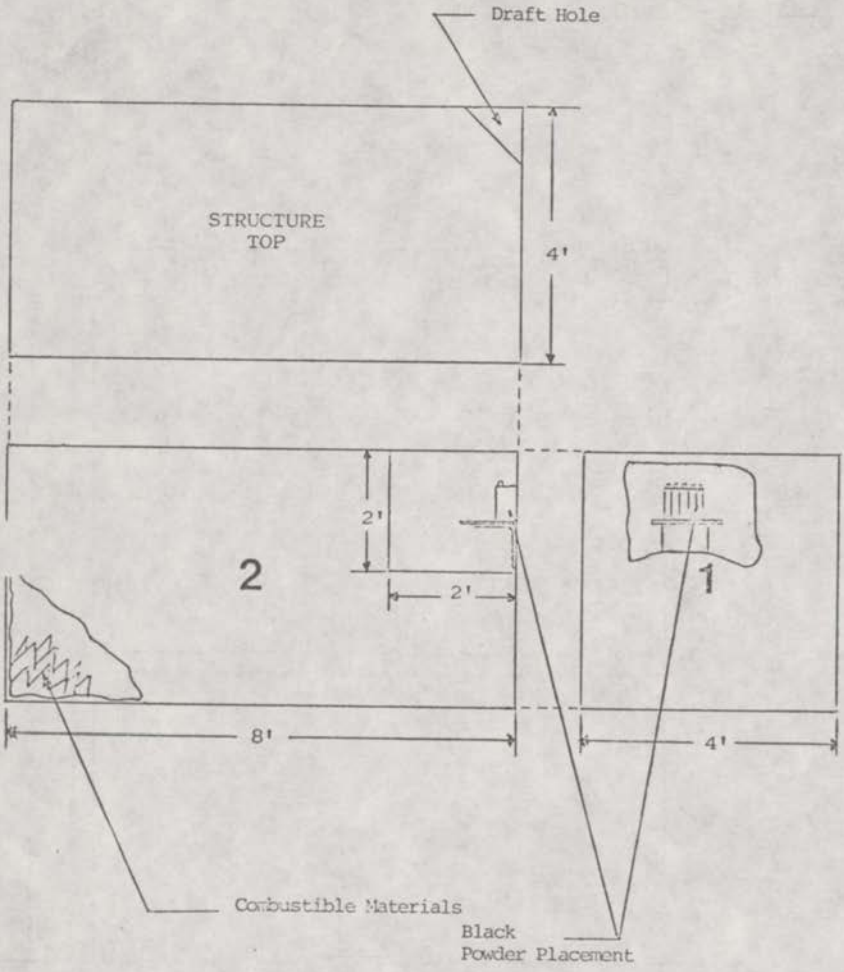


FIGURE 2.—Structure.

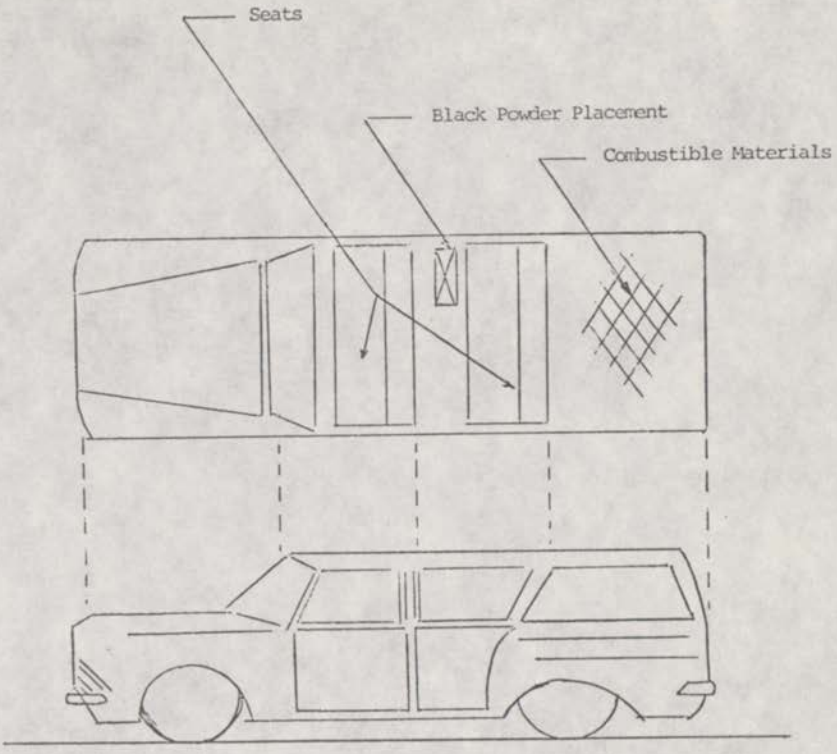


FIGURE 3.—Vehicle.

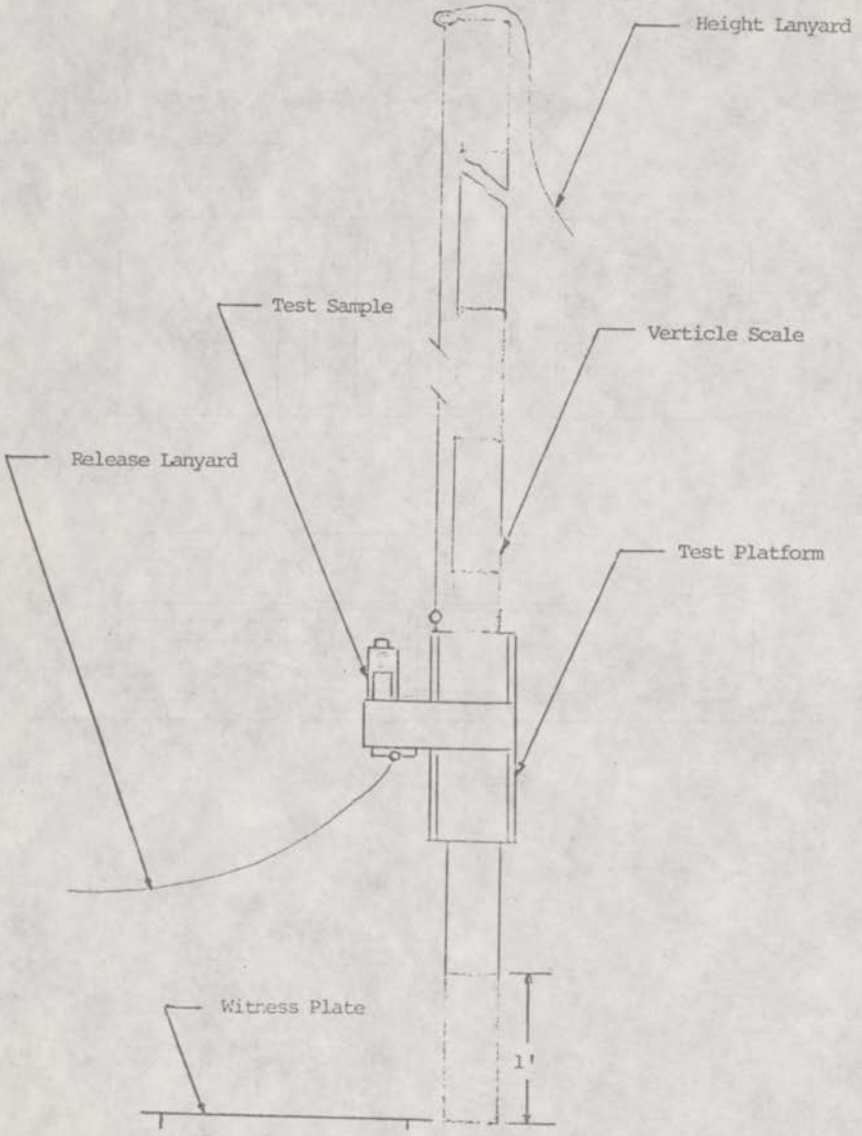

Height Lanyard
Test Sample
Verticle Scale
Release Lanyard
Test Platform
Witness Plate
1'

FIGURE 4.

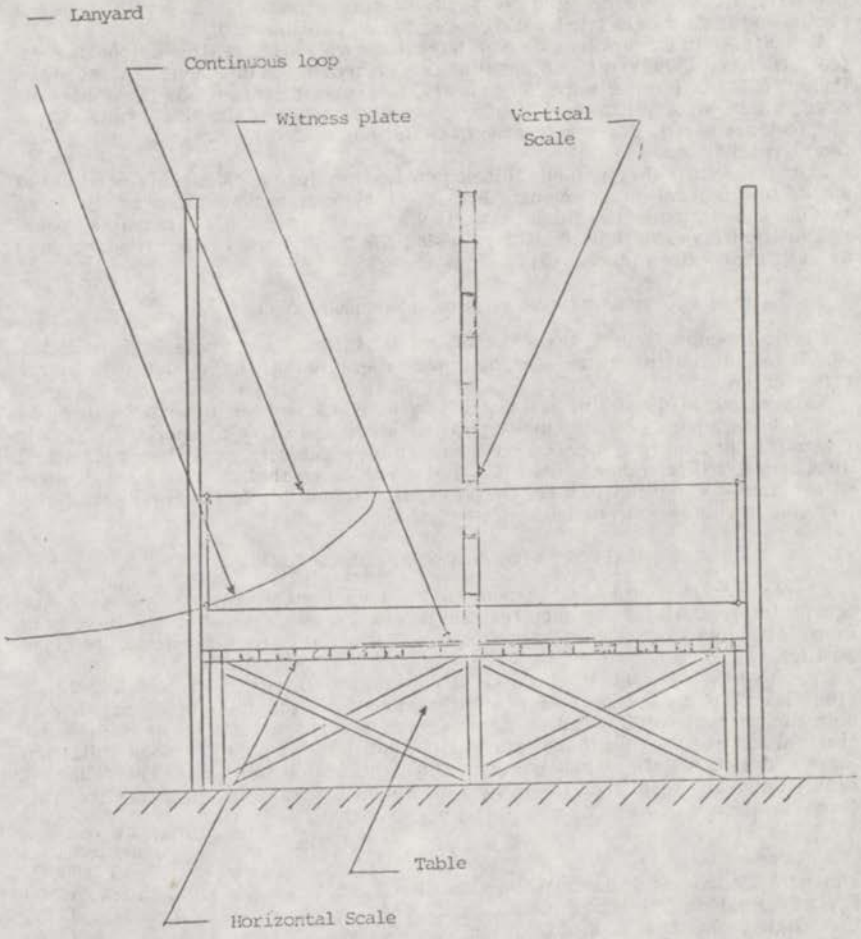


FIGURE 5.—Table apparatus.

ADDITIONAL INFORMATION ON SENSITIVENESS OF BLACK POWDER

BLACK POWDER PROPERTIES

(Most of the information given here is excerpted from the DuPont *Blaster's Handbook*, since they are referring to commercial black powder as opposed to military black powder.)

Sensitiveness.—Black powders are relatively insensitive to shock, friction and static electricity; however, any treatment that produces a spark or heat of sufficient temperature and quantity will ignite black powder. (5)

Dust cloud suspensions are much more hazardous, in general, than bulk powders, because the dust motion in air can create significant electrostatic arc energies. Thus, dust clouds are not only more sensitive to initiation, but can generate sufficient electrostatic charge, depending on humidity, motion, etc., to self-initiate an explosion. Also, the output of a dust explosion could cause initiation in bulk materials. (3) (p. C–2).

Ignition.—Black powders ignite instantly at about 300° Centigrade (572° Fahrenheit). (Modern Pyrotechnics lists ignition temperature at 164° to 290° C.). They should not be exposed for long periods at temperatures above 100° Centigrade (212° Fahrenheit). Ignition can be effected by any flame, spark,

hot wire, or hot surface and by such blasting accessories as squibs, electric squibs and igniters, electric blasting caps, and detonating cord.

Velocity.—Black powders do not have time velocities as the detonating explosives have. Their rate of burning is affected by confinement. In the open, trains of black powder burn very slowly, measureable in seconds per foot. Confined, as in steel pipes, speeds of explosions have been timed at values from 560 feet per second for very coarse granulations to 2,070 feet per second for the finer granulations. (5).

Fumes.—When they explode, black powders produce considerable amounts of smoke and several gases among which are toxic carbon monoxide and hydrogen sulfide. Consequently the fume properties of black powder are classed as "poor" and adequate ventilation must be provided for it to be used safely underground or in other confined places. (5).

SENSITIVITY TO INCANDESCENT PARTICLES

Black Powder is highly susceptible to initiation by incandescent particles. Nowhere, in the literature searched, was there found any evidence to refute this statement.

Very often, in discussing the sensitivity of black powder, a writer will make a statement such as, ". . . . black powder is very sensitive to sparks . . ." It is frequently unclear whether the writer means incandescent particles or electrical discharges. *Military Explosives* (1), however, states that ". . . its high degree of accidental explosion hazard, therefore, is attributable to its great sensitivity to flame, incandescent particles, or electric spark."

SENSITIVITY TO ELECTROSTATIC DISCHARGES

People working with black powder have long been concerned about its susceptibility to initiation by electrostatic discharge. As a result, there have been many attempts to ascertain how strong a discharge is required to ignite black powder.

The investigator who worked on ITT Research Institute Project J6289 (3) (pp. C–1 through C–33) used a more advanced testing technique was that of obtaining actual voltage and electric current flow characteristics as the electrostatic discharge was fined into the sample powders. From this, exact initiation threshold electrostatic spark energy values could be established. The following table shows the results of their tests on finished black powder from three different sources.

Manufacturer	*Minimum energy to cause initiation (joules)*
Imperial Chemicals Industries of America	1.800
E. I. du Pont de Nemours & Co	1.350
Canadian Industries Limited	1.250

To be a hazard, these charge energies would normally have to come from materials other than the powder since, because of a number of factors, it is highly improbable that the powder itself would create or hold a charge of this magnitude. However, the report also contains the following statement:

"Dust cloud suspensions are much more hazardous, in general, than bulk powders, because the dust motion in air can create significant electrostatic charge engines. Thus, dust clouds are not only more sensitive to initiation, but can generate sufficient electrostatic charge, depending on humidity, motion, etc., to self-initiate an explosion. Also, the output of a dust explosion could cause initiation in bulk materials."

SENSITIVITY TO IMPACT AND FRICTION

One of the more recent series of tests performed on black powder was published by ITT Research Institute in their final report on *ITTRI Project J6289* (April 1973) (3) (pp E–1 thru E–7). Their methods and results of impact and friction sensitivity tests are described below.

"Impact and friction tests were conducted on black powder and its in-process forms to determine the mechanical sensitivity of these materials. These tests simulate the process hazards, such as a tool falling on black powder or metal-to-powder-to-metal friction in a way that decreases the interdependence of parameters."

"The drop test consists of a weighed quantity of sample material placed in a cup-like holder. A plunger is then placed in the holder on top of the sample material. The holder and plunger are shown as Figure E–1. The loaded holder assembly is then placed beneath a 6(lb) drop weight, which is raised to a preselected drop height and released (Figure E–2). The weight falls on the plunger and causes the sample to be impacted. The sample then either fires or becomes crushed. A fire is easily recognized, as the plunger is expelled from the holder with a loud popping sound. The test is then repeated with a new sample and a new plunger at the same drop height. The number of fires per the number of test repetitions indicates the probability of initiation at that specified drop height (impact energy). The impact energy is simply the drop weight times the drop height (ft-lb). In order to correlate the data with other tests, the impact energy is divided by the impact area. This energy density can be used for comparison with other tests. The results of this test are presented as Table E1."

"The number of fires per the number of tests only indicates the probability of initiation. This is caused by the infinite number of tests conducted. Statistics, however, can relate the experimental probability to specified limits into which the actual probability would fall if an infinite number of tests were conducted. These limits are called confidence limits, and are based on what confidence or exactitude is required. Thus, the 90 percent confidence limits are a maximum and minimum probability between which the actual probability will fall 90 percent of the time."

"Ninety percent confidence limits are, therefore, smaller than the corresponding 95 percent limits. The 90 percent confidence levels which correspond to the experimental results of Table E1 are presented as Table E2. These limits were used to plot the graphs of Section 3.4." (Not included)

"The friction tests consisted of placing a material sample on a machined metal groove. A metal scraper or plunger is placed on or slightly behind the sample and preloaded using a second metal plate and bolts. The amount of preload is related to the turning of the bolts through simple stress-strain relationships. A quarter-turn of the bolts after metal-to-metal contact is established yields a 25×10^4 psi normal force. Motion of the plunger is caused by impact of a pendulum weight on the plunger. Displacement of the plunger is noted after impact. Black powder, corning fines, and green grains were tested with no fires being noted at the 25×10^4 psi preload. As this was higher than any expected load in the system, no other preloads were tested. The test setup is presented as Figure E3, and the results are presented as Table E3."

TABLE E3.—FRICTION TEST RESULTS

Material	Number of trials	Normal load (ksi)	Number of fires
Corning fines (DuP)	2	250	0
Final product (ICI)	2	250	0
Green grains (ICI)	2	250	0

Note: While other sources consulted were less precise in their statements concerning sensitivity to impact (e.g. "les sensitive than tetryl" (1)), there was almost universal agreement in the friction tests—no ignition. However, the Encyclopedia of Explosives and related items (7) (p. B178) says that * * * "black powder is very sensitive to sparks, friction and heat * * *." Also, Urbanski (9) P. 34o says that "black powder is highly sensitive to impact and friction."

SENSITIVITY TO HEAT OR FLAME

Most of the literature consulted gave only the ignition temperature of black powder or stated that it was easily initiated by flame. *Modern Pyrotechnics* (6) (p. 119), states that the ignition temperature is 164° to 290° Centigrade, while the *Blaster's Handbook* (5) (p. 26) is more specific, stating the "black powders ignite instantly at about 300° Centigrade (572° Fahrenheit). They should not be exposed for long periods at temperatures above 100° Centigrade (212° Fahrenheit). Ignition can be effected by any flame, . . . hot wire or hot surface . . . " Urbanski (9) (p. 338), in discussing the results of studies published by Blackwood and Bowden states, "It may be concluded from their experiments that burning occurs in a place heated to a temperature of 130° C or higher. Heat may be applied either by the direct effect of flame or by hot metallic surface (e.g. glowing wire) ; heating may also result from impact, adiabatic compression of the

air in the spaces between the grains of powder and finally, by mutual friction between the grains."

The late Julian S. Hatcher, Major General, U.S. Army, (Ret.) recounts in *Hatcher's Notebook* (8) an experiment which is particularly apropos to this report. His account of that experiment follows:

"While experiences . . . had led me to a final opinion that the small 1(lb) cans of powder such as are used by handloaders do not constitute any particular fire hazard, it was felt that it would be desirable to supplement or confirm these opinions by actual tests, so I could say "I have tried it."

"Accordingly a number of 1(lb) cans of small arms powder of various kinds were obtained, including both black and smokeless, and nitroglycerine as well as nitrocellulose varieties, in both rifle and pistol granulations."

General Hatcher then describes the experiment, which consisted of placing a 1(lb) can of powder on top of a stack of kindling and setting fire to the kindling. The various smokeless powders were tested first.

Mr. Hatcher continues, "It was then decided to try the one powder which we had some doubts about, black powder. We tried both DuPonts Fg and DuPont FFg, in the usual DuPont oval cans of flattened elliptical section, about 5-4/4 inches high, 4 inches wide and 1-¾ inches thick, with a screw top. From this we expected more action (than from the smokeless powders), so we stood back farther, but the result, while more pronounced than that with the smokeless powder, was on the whole less than we had feared. After five minutes on the fire, the can exploded with a heavy dull thud, and a dense cloud of white smoke rose upward in a mushroom shape. The can was blown about 35 feet to one side and was opened out nearby flat, separating along the seam and having the bottom blown out. Even so, the pile of sticks was not disturbed."

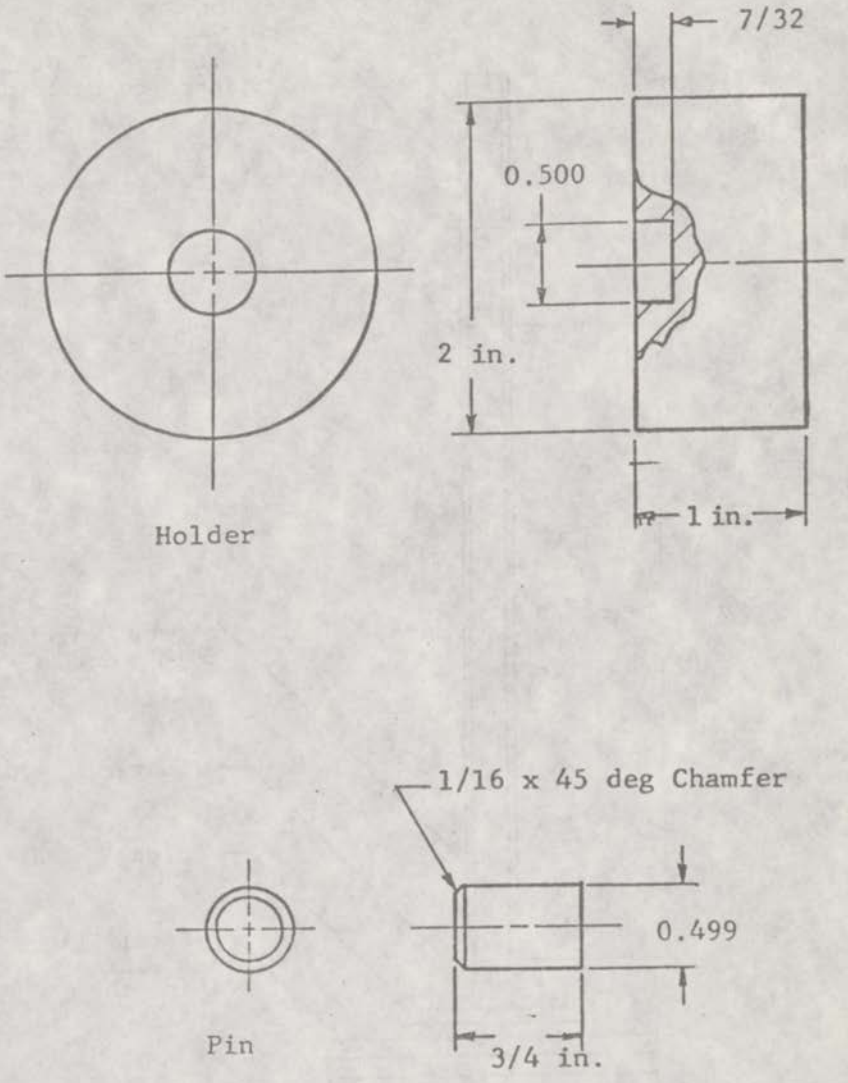


FIGURE E1.—Drop test sample holder.

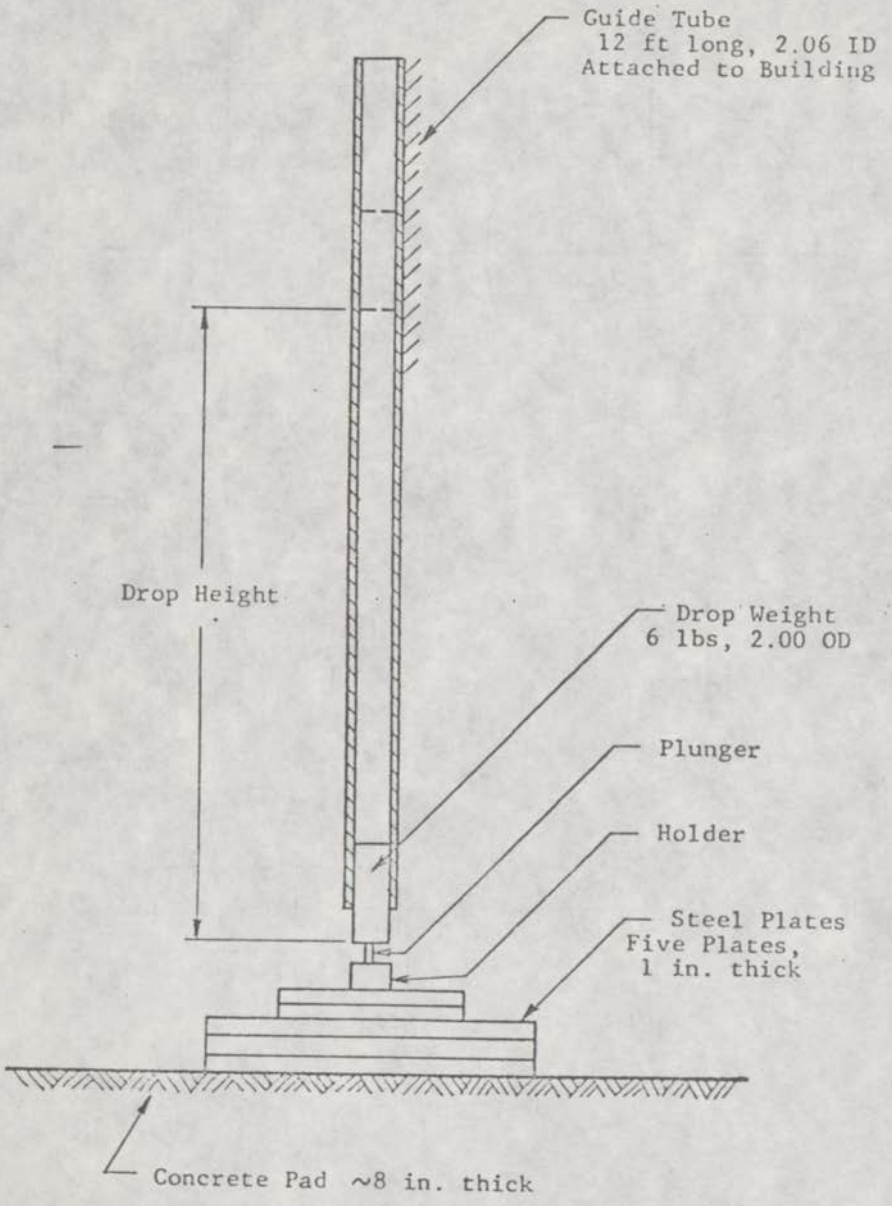


FIGURE E2.—Drop test setup.

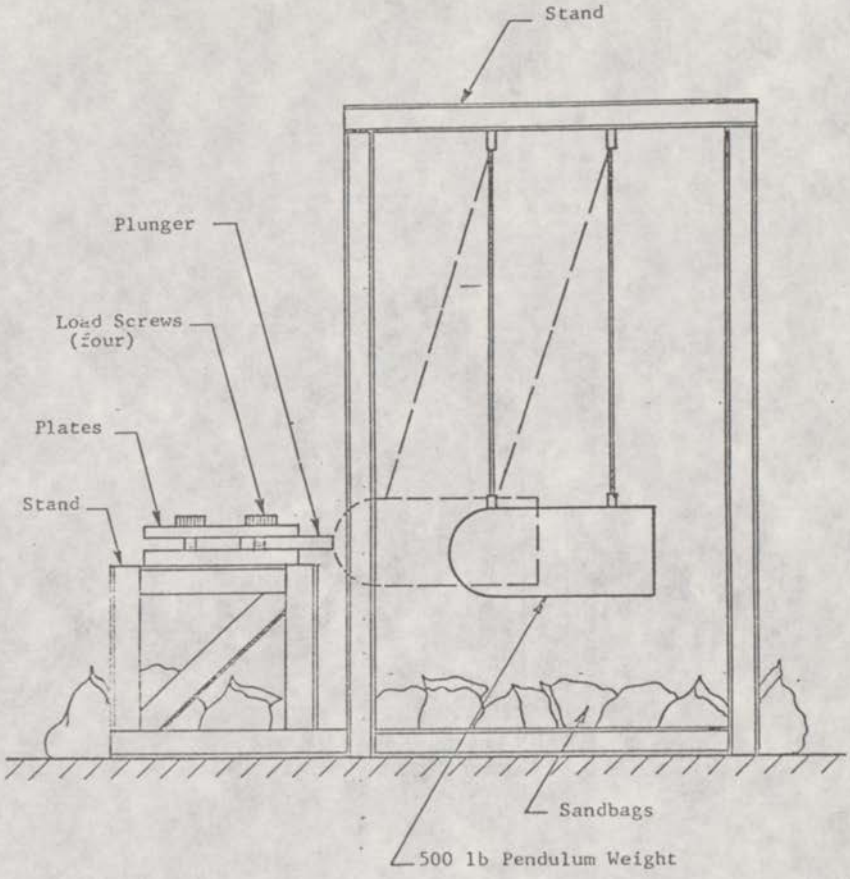


FIGURE E3.—Friction test setup.

TABLE E1.—RESULTS OF FINAL DROP TESTS

Material	Drop height—Number of fires/number of trials									
	12 feet	10 feet	8.5 feet	7.1 feet	6 feet	4.5 feet	3 feet	2 feet	1.5 feet	1 foot
Final product (DuP)	10/10	7/10			9/10	1/1	3/5	1/6		
Final product (ICI)	10/10	9/10			10/10		1/1	1/1	0/7	0/1
Green grains (DuP)	6/10				8/10	0/1	0/2			
Green grains (ICI)	3/10	7/10	4/10							
Jet mill (ICI)	7/10	10/10		9/10	0/2		1/1	0/2		
Corning fines (DuP)	7/10				8/10	1/1	1/2			

Note: Green grains (DuP), green grains (ICI), jet mill (ICI), and corning fines (DuP) do not represent powder as it is normally sold. They represent materials at various stages of the manufacturing process.

TABLE E2.—90 PERCENT CONFIDENCE LIMIT PROBABILITIES FOR DROP TESTS

Drop HT	KE / A	Dupont final product			ICI final product			Dupont green grains			ICI green grains			ICI jet mill			Dupont corning fines		
		Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
1	31				0	0.900	0.450												
1.5	46				0	.316	.158												
2	61	0.017	0.542	0.279	.100	1	.550							0	0.684	0.342			
3	91	.247	.888	.567	.100	1	.550	0	0.684	0.342				0	.900	.450	0.051	0.949	0.50
4.5	138	.100	1	.550				0	.900	.450							.100	1	.550
6	184	.648	.990	.819	.778	1	.889	.500	.945	.722				0	.684	.342	.500	.945	.722
7.1	217													.648	.990	.819			
8.5	260										0.188	0.659	0.432						
10	306	.354	.884	.618	.648	.990	.819				.354	.884	.618	.778	1	.889			
12	368	.778	1	.889	.778	1	.889	.341	.812	.576	.116	.648	.382	.354	.884	.618	.354	.884	.618

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TABLE 19-1

Item	Storage compatibility group	Quantity-distance class
Black powder, in charges or containers	O	7
Blasting caps	P	7
Bombs, chemical filled, assembled with explosive components	A	5
Bombs, demolition	G	7
Bombs, fragmentation	G	[1] 7
Bombs, general purpose	G	7
Bombs, photoflash (except M122, without burster)	Q	7
Bombs, photoflash, M122, without burster	C and Q	2
Boosters	B	[2] 7
Boosters, auxiliary	B	7
Boron potassium nitrate	O	7
Bursters	B	7
Cartridge cases, primed (without propellant)	B, E, N,	1
Cartridge, heavy mortar, over 81 mm (including 81 mm M56), except chemical loaded	G	7
Cartridge, igniter, M2	B, E, N,	1
Cartridge, illuminating	E	4

[1] Use class 7 distances; however, no distance will be less than required for class 5 ammunition.
[2] When stored in stacks containing not more than 5000 lb. of HE that are separated from each other by at least 2 feet safety distances may be based on the quantity of HE in the single stack requiring the greatest distances.

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Table 19-2, Group N
8. Explosives bellows.
9. Firing devices.
10. Fuse lighters.
11. Fuse, safety.
12. Fuzes, class 1.
13. Grenades, illuminating.
14. Grenades, smoke, w/o HE bursters (except HC, WP and PWP).
15. Ignition cartridge for trench mortar ammunition.
16. Illuminating compositions (consolidated in final press operations).
17. Mines, practice, AP, M17.
18. Projectiles, illuminating.
19. Projectiles, w/o HE bursters (except HC, WP and PWP).
20. Simulators, M110, M117, M118 and M119.
21. Spotting charges (cartridge for minature practice bombs).
22. Squibs, commercial.
23. Thruster, cartridge activated, M25.

GROUP O

1. Benite.
2. Black powder, in charges or containers.
3. Boron potassium nitrate.
4. Igniters for rocket motors (e.g., M29).

GROUP P

1. Blasting caps.
2. Detonators (except concussion type, M1).

TABLE 5-6.5.—CLASS 7: INHABITED BUILDING, PASSENGER RAILROAD, AND PUBLIC HIGHWAY DISTANCES

Net pounds of explosives		Distance in feet from explosive hazard			
		To inhabited buildings		To passenger railroads and public highways	
Over	Not over	Barricaded[1,2]	Unbarricaded[1]	Barricaded[1,2]	Unbarricaded[1]
(1)	(2)	(3)	(4)	(5)	(6)
0	1	40	80	25	50
1	2	50	100	30	60
2	5	70	140	40	85
5	10	90	180	55	110
10	20	110	220	65	130
20	30	125	250	75	150
30	40	140	280	85	170
40	50	150	300	90	180
50	100	190	380	115	230
100	200	235	470	140	280
200	300	270	540	160	320
300	400	295	590	175	350
400	500	320	640	190	380
500	600	340	680	205	410
600	700	355	710	215	430
700	800	375	750	225	450
800	900	390	780	235	470
900	1,000	400	800	240	480
1,000	1,500	460	920	275	550
1,500	2,000	505	1,010	305	610
2,000	3,000	580	1,160	350	700
3,000	4,000	635	1,270	380	760
4,000	5,000	685	1,370	410	820
5,000	6,000	730	1,460	440	880
6,000	7,000	770	1,540	460	920
7,000	8,000	800	1,600	480	960
8,000	9,000	835	1,670	500	1,000
9,000	10,000	865	1,730	520	1,040
10,000	15,000	990	1,780	595	1,070
15,000	20,000	1,090	1,950	655	1,170
20,000	25,000	1,170	2,110	700	1,265
25,000	30,000	1,245	2,260	745	1,355
30,000	35,000	1,310	2,410	785	1,445
35,000	40,000	1,370	2,550	820	1,530
40,000	45,000	1,425	2,680	855	1,610
45,000	50,000	1,470	2,800	880	1,680
50,000	55,000	1,520	2,920	910	1,750
55,000	60,000	1,570	3,030	940	1,820
60,000	65,000	1,610	3,130	965	1,880
65,000	70,000	1,650	3,220	990	1,930
70,000	75,000	1,690	3,310	1,015	1,985
75,000	80,000	1,725	3,390	1,035	2,035
80,000	85,000	1,760	3,460	1,055	2,075
85,000	90,000	1,790	3,520	1,075	2,110
90,000	95,000	1,825	3,580	1,095	2,150
95,000	100,000	1,855	3,630	1,115	2,180
100,000	125,000	2,115	3,670	1,270	2,200
125,000	150,000	2,350	3,800	1,410	2,280
150,000	175,000	2,565	3,930	1,540	2,360
175,000	200,000	2,770	4,060	1,660	2,435
200,000	225,000	2,965	4,190	1,780	2,515
225,000	250,000	3,150	4,310	1,890	2,585
250,000	275,000	4,430	4,430	2,660	2,660
275,000	300,000	4,550	4,550	2,730	2,730
300,000	325,000	4,670	4,670	2,800	2,800
325,000	350,000	4,780	4,780	2,870	2,870
350,000	375,000	4,890	4,890	2,935	2,935
375,000	400,000	5,000	5,000	3,000	3,000
400,000	425,000	5,110	5,110	3,065	3,065
425,000	450,000	5,210	5,210	3,125	3,125
450,000	475,000	5,310	5,310	3,185	3,185

TABLE 5-6.5.—CLASS 7: INHABITED BUILDING, PASSENGER RAILROAD, AND PUBLIC HIGHWAY DISTANCES

Net pounds of explosives		Distance in feet from explosive hazard			
Over	Not over	To inhabited buildings		To passenger railroads and public highways	
		Barricaded [1 2]	Unbarricaded [1]	Barricaded [1 2]	Unbarricaded [1]
(1)	(2)	(3)	(4)	(5)	(6)
475,000	[4] 500,000	5,410	5,410	3,245	3,245
500,000	600,000	5,900	5,900	3,540	3,540
600,000	700,000	6,220	6,220	3,730	3,730
700,000	800,000	6,500	6,500	3,900	3,900
800,000	900,000	6,760	6,760	4,055	4,055
900,000	1,000,000	7,000	7,000	4,200	4,200
1,000,000	1,500,000	8,010	8,010	4,805	4,805
1,500,000	2,000,000	8,820	8,820	5,290	5,290
2,000,000	2,500,000	9,500	9,500	5,700	5,700
2,500,000	3,000,000	10,090	10,090	6,055	6,055
3,000,000	3,500,000	10,630	10,630	6,380	6,380
3,500,000	4,000,000	11,110	11,110	6,665	6,665
4,000,000	5,000,000	11,970	11,970	7,180	7,180

[1] For inhabited buildings, public highways, or passenger railroads, igloo or special-type magazines with a door barricade are considered barricaded in all directions. Without a door barricade they are considered barricaded in all directions except for the area between lines drawn from the center of the door and inclined 30° from a perpendicular to the door of the magazine.

[2] For explosion sites other than igloo or special-type magazine use definitions in ch. 2 to determine if barricaded.

[3] The distances for 1 to 50 lb may be used only when structures or blast mats can completely confine fragments and debris Lesser distances in specific cases may only be approved if both blast and fragments can be completely confined as in certain test-firing barricades.

[4] Quantities above 500,000 lb of explosives are authorized only for group IV liquid propellants (see par 8-10E).

5-7. Class 8. CB Agents

The munitions and agent components thereof comprise a group which requires consideration not only of the blast or fragment hazard but of the effect of release of the agent. Depending upon the type of agent, its persistency, volatility, toxicity, or other special feature, the paramount consideration may have to be directed to the area of agent dispersal rather than blast or fragment distance.

CHAPTER 18

STORAGE OF EXPLOSIVES AND AMMUNITION

18-1. General

The types of existing magazines listed below are considered standard for the storage of the types of items specified. New storage magazines should be of the earth-covered, corrugated steel or reinforced concrete arch-type.

18-2. Magazines

a. Earth-covered magazines

Include igloo, steel arch, special type, hillside and subsurface type magazines. Earth-covered magazines are preferred for the storage of all items of ammunition or explosives.

b. Standard ammunition magazines (commonly called "Standard Magazines"), classed as aboveground magazines

These magazines were designed for the storage of fixed rounds or separate loading projectiles. For future use, they should be restricted to the storage of classes 1 through 5 materials (excluding rockets and rocket motors). The magazines measure 51 feet 7 inches by 218 feet 8 inches, are usually spaced 300 feet apart, and have concrete foundation walls and piers, hollow-tile walls, steel frames, and concrete floors. The storage capacity of the magazines is not stated in definite figures since the number of items which can be stored is regulated by the appropriate quantity-distance tables.

c. High explosives and black powder magazines, classed as aboveground magazines

These magazines were designed for the storage of bulk explosives, such as black powder, TNT, Tetryl, and Explosive D, and may be used for this purpose

where more desirable storage space cannot be obtained. They are 27 feet 6 inches wide and 43 feet 4 inches long and are usually spaced 800 feet apart. They have concrete foundation walls and piers, hollow-tile walls filled with sand, steel frames and concrete floors covered with sparkproof, mastic or equal topping. The magazines were originally designed for the storage of 250,000 pounds of explosives but by virtue of aisle space for inspection and shipping and convenient height of piles, the amount of storage is usually limited to approximately 100,000 pounds.

d. Primer and fuze type magazines, classed as aboveground magazines

These magazines were designated for storing primers, primer detonators, adapters and boosters and fuzes of all types. In the future, when it is necessary to use magazines of this type, they should be restricted to the storage of classes 1, 2 (except rockets and rocket motors) and 3 ammunition and explosives. The magazines are 27 feet 6 inches wide, 43 feet 4 inches long and are usually spaced 300 to 400 feet apart. With respect to construction details, they are similar to explosives type magazines.

e. Service magazines and service storage buildings

These buildings are used for intermediate storage of the minimum amount of explosives necessary for safe and efficient manufacturing or processing operations. Construction details of such magazines vary, dependent upon local circumstances. However, consideration should be given to the use of fire-resistant materials and/or fire-resistive construction.

f. Other structures

Structures not of approved magazine type shall not be used for the storage of explosives and ammunition except by special approval of the Commanding General, AMC.

18–3. Preferred magazine usage for explosives and ammunition storage

(*a*) Earth-covered magazines are the preferred type of storage structure for all explosives and ammunition. Ammunition and explosives stored in earth-covered magazines are better protected from external sources of initiation than in than in aboveground magazines. Earth-covered magazines also provide better temperature control than aboveground magazines; particularly desirable for the storage of solid propellants and pyrotechnics.

(*b*) With reasonable care in storage, class 1 materials exclusive of fuzes and 20mm ammunition may be stored in any weatherproof warehouse. Small quantities of ball ammunition (not to exceed 1500 rounds) may be kept in a barracks storeroom or in guard headquarters when properly secured.

18–4. Safety precautions necessary in construction of magazines

(*a*) Wood floors shall not be used in magazines.

(*b*) Construction which might allow the accumulation of explosive dust must be avoided.

(*c*) All doors and door frames to aboveground type magazines must be made of or covered with a fire-resistive material having some insulating value, such as rigid asbestos composition sheet, to fit as tightly as possible to seal the opening. Exteriors of magazines should be kept completely covered with fire-resistive materials, having some insulating value and being easily friable.

(*d*) Magazines usually are not wired for electric lights, but when electricity is used, the installation shall conform to the requirements of Chapter 6.

(*e*) Openings, other than doors, in magazines should be screened to prevent entry of insects, rodents and reptiles.

18–5. Temperature control

(*a*) Sudden changes in temperature may damage airtight containers, or may result in excessive condensation of moisture. If the temperature in a magazine exceeds 100° F. for a period of more than 24 hours, the magazine should be cooled by wetting the exterior of the building with water or by opening the doors and ventilators after sunset and closing them in the morning. If these methods do not prove effective in lowering the temperature, the Commander shall decide whether the materials should be removed to some other magazine.

(*b*) Storage magazines, in general, should not be provided with heat. Exception is made in the case of magazines where heating may be necessary to prevent condensation of moisture, to maintain constant temperature, or other reasons. If

steam or hot water coils are used to heat a magazine, they must be so arranged that explosives material cannot come in contact with the coils. The coils must be kept clean.

18–6. Magazine operational regulations

The following regulations shall be complied with where any ammuntion and explosives are stored:

(*a*) Instructions as printed on magazine placards, DA Label 85, must be posted on or near each door of the magazine so that they are visible when work is being done in the magazine.

(*b*) Loose components or loose rounds of ammunition, packing materials, conveyors, lift trucks, skids, dunnage, empty boxes, and other similar material shall not be stored in a magazine containing ammunition or explosives.

(*c*) Vegetation around all ammunition and explosives storage locations shall be controlled as specified in paragraphs 12–17 and 12–18.

(*d*) Doors and locks must be kept in good working order. Magazines shall be locked at all times except when permitted operations are in progress in the magazine and as provided for in paragraph 18–5*a*. A crew must not be permitted to work in a position in a magazine which requires passing the work aisle or position of a second crew to reach an exit. The number of crews shall not exceed the number of exits. Two or more doors must be unlocked and open when personnel work in magazines having more than one door.

(*e*) Flammable material, such as excess dunnage and boxes, shall be removed from magazines and igloos. Flammable liquids, except when used as the chemical filler of a munition, or as a prepackaged storable liquid propellant, shall not be stored in magazines containing explosives.

(*f*) Except when required for security purposes, service magazines within an operating line need not be locked during shift operations. These magazines must be locked whenever the operating line is shut down; i.e., nights, weekends and holidays.

18–7. Stacking

(*a*) Ammunition and explosives shall be stored in containers as prescribed by approved AMC drawings and specifications and shall be stacked and arranged in a magazine in accordance with instructions set forth in Army regulations and approved AMC drawings and directives. Explosives or ammunition in stacks shall be grouped and identified according to lots. When military explosives or ammunition are not packed in accordance with approved drawings and specifications, they must be stored in accordance with special instructions from the Commanding General, AMC. General rules set forth in paragraphs (*b*) and (*c*) below should be followed in the absence of applicable storage drawings.

(*b*) Methods used for stacking must provide for good ventilation to all parts of the stack. Adequate dunnage shall be used when necessary for this purpose.

(*c*) Aisles shall be maintained so that units in each stack may be inspected, inventoried and removed for shipment or surveillance test. Block storage is permitted, provided adequate ventilation of stacks exists. Unobstructed aisles shall be maintained to permit rapid egress of personnel.

18–8 Loose rounds, damaged containers, etc.

Loose rounds of ammunition, or single fiber containers with rounds therein, shall not be stored in magazines containing ammunition items which are packed in accordance with approved AMC drawings; however, they may be stored in magazines set aside for their exclusive storage. Incomplete boxes of ammunition and explosives may be stored in magazines containing items which are packed in accordance with approved AMC drawings provided the explosives and ammunition are in standard packages. The boxes must be marked conspicuously to identify the contents and quantities and placed in designated locations. Explosives and ammunitions in damaged containers shall not be stored in a magazine with ammunition in serviceable containers. Such containers shall be repaired or the contents transferred to new or serviceable containers. Open containers and containers with covers not securely fastened must not be allowed in magazines. Containers that have been opened shall be properly closed again before being restored. Containers should be free from loose dust and grit when stored.

18–9 Operations permitted in magazines containing explosives and ammunition

(*a*) Operations incident to storage and the following operations when incident to shipping: palletizing, removing and replacing shipping bands on bombs, re-

moving and replacing grommets on separate loading shells, replacing damaged or loose strappings on boxes of ammunition and explosives, air sampling toxic munitions, and placing inner cover retainer springs in one-round metal containers in which the ammunition is overpacked in a fiber container as well as the metal container. If space available for these operations in the magazine is inadequate to prevent crowding, they should be performed immediately outside the magazine.

(*b*) Stenciling or restenciling containers. No open containers of flammable liquids used for stenciling should be permitted in or around magazines. Where essential (as with the use of flammable adhesive for MAP labels), flammable liquids may be used immediately outside of magazines, on aprons or platforms. In such cases, quantities of flammable liquids in open containers shall be the minimum absolutely necessary for the operation.

(*c*) Removal of nose or tail plugs from projectiles and bombs for surveillance purposes, when accomplished without resort to undue force. (See paragraph 25–3c.) Loosening or removal of plugs is not permitted where there is evidence of exposed explosives in the threads or cavities in the form of dust, spillage, or explosives contaminated exudate. When such contamination is encountered, plug removal must be accomplished in a separate area. When there are no exposed explosives, threads and cavities may be cleaned and preservatives applied, provided that power driven tools, highly flammable or toxic solvents, or ferrous brushes are not used. Plugs shall be removed from the magazine for cleaning.

(*d*) Operations incident to the inspection of propelling charges and bulk solid propellants.

(*e*) Air-testing of solid propellants or propelling charge containers. Gasoline-engine driven air compressors shall not be parked closer than 50 feet to a magazine in which explosives or ammunition are stored. Defective gaskets and covers of the containers may be replaced within a magazine but precautions must be taken to guard against sparks and fires. Safety tools shall be used for opening and closing containers. Only the minimum number of containers will be opened and then only for the shortest period of time consistent with safe and efficient operations. No equipment or operation should be permitted between or in the path of inspection personnel and the magazine exit. No other repair operations on solid propellant or propelling charge containers shall be permitted in a magazine containing explosives or ammunition.

(*f*) Adjustment of the level or composition of liquid in which an explosive is stored. Sensitive explosives shall be maintained wet only by adjustment of the level of the liquid. Care shall be taken to guard against use of nondistilled water since bacteria may produce gassing. Explosives, which may become dry due to evaporation of some of the liquid, shall not be pushed or forced down into any liquid remaining in the storage container.

(*g*) Normal maintenance of small arms ammunition, unpacking, linking, and repacking provided there is sufficient room in the magazine and normal precautions are taken.

(*h*) Operations incident to liquid level determination by use of Probe Sensor, and safing procedures for Mines and similar items.

18–10. Operations permitted outside of magazines

Except as enumerated in paragraph 18–9, containers of explosives and ammunition shall not be opened or repaired in any magazine containing explosives or ammunition. If special facilities are not available for this type of work, it may be done in the open midway between igloos or at least 100 feet from magazines (whichever is less) containing ammunition and explosives, but in no case at a distance less than that prescribed in the intraline quantity-distance table for the quantity of explosives involved in the operation.

18–11. Protection from moisture

Ammunition, pyrotechnics, solid propellants, and propelling charges are adversely affected by dampness and extreme heat due to lack of proper ventilation. If either of these conditions exist, layers of boxes shall be separated by dunnage to permit free circulation of air to all parts, and the conditions rectified as may be required.

18–12. Repairs to magazines

(*a*) Magazines must not be repaired until prevailing conditions have been evaluated and it has been decided whether the contents are first to be removed. Under no circumstances shall repairs be made to the interior of magazines con-

taining bulk explosives. Under normal conditions, roofs, ventilators, lightning rods, door and other parts of or appendages to the exteriors of magazines containing bulk explosives may be repaired without first removing the explosives. In addition to repairs of this type, minor repairs may be made to the interiors of magazines containing finished ammunition or ammunition components.

(*b*) When magazines are required, the general safety requirements set forth in this regulation are mandatory—particularly those relating to the elimination of fire hazards. The following special requirements are also applicable:

(1) All work shall be done by competent workmen, under competent supervision.

(2) Safety tools must be used as required by paragraph 16–11.

(3) The floor in the immediate vicinity of the repair must be scrupulously cleaned.

(4) No work requiring soldering, the melting of asphalt, or the use of flame or heat producing equipment shall be done in a magazine containing explosives or ammunition.

(5) Magazines in which repair work has been done shall be inspected by competent authorized personnel after completion of the work.

(6) When melting pots or any other heat producing apparatus are authorized by the Commanding Officer for use in any ammunition and explosives storage area, the equipment must be kept at least 90 feet from the ammunition or explosives location. When necessary, baffles and screens should be used to confine sparks and flames to heating apparatus.

18–13. Permitted outdoor storage

(*a*) When directed by the responsible AMC major subordinate command or Headquarters, AMC (as appropriate), explosives and ammunition other than expressly prohibited herein may be stored outdoors. In addition, outdoor storage of non-AMC stocks requires prior approval from the owning Service. Outdoor storage will comply with the provisions of this regulation.

(*b*) Bulk solid propellants, bagged propelling charges, pyrotechnics, bulk high explosives and critical items shall not be stored outdoors.

18–14. Outdoor storage sites

(*a*) Sites for outdoor storage shall be separated from magazines, other facilities and each other in accordance with the requirements of paragraph 18–15 and chapter 17.

(*b*) The storage sites shall be level, well-drained, and free from readily ignitable and flammable materials. The supporting timbers or platform upon which the ammunition is stored shall be well constructed to prevent falling, sagging and shifting of the ammunition. In order to assure stack stability and free circulation of air, not less than three inches of dunnage should be used between the bottom of the stack and the earth floor. Provisions should be made also for circulation of air through stacks. Non-flammable or fire-resistant, waterproof overhead covers should be provided for all ammunition containing solid propellants, torpex, tritonal, minol or chemical agents, since each of these materials may be adversely affected by exposure to the elements. An air space of not less than 18 inches should be maintained between the top of the stack and the cover. If adequate ventilation is assured, overhead covers are also desirable for outdoor stacks of bombs and shells. Sides of covered stacks also may be protected by non-flammable, fire-resistant, waterproof covers provided air space is maintained between the cover and the ammunition.

(*c*) Frequent inspections shall be made to detect sagging piles and accumulations of trash between or under stacks.

(*d*) If revetments are to be provided around outdoor storage sites, they must comply with the requirements of paragraph 17–23. Stacks of ammunition must be kept at least two feet from the base of the revetment and at least one foot below the top of the revetment.

(*e*) Excess dunnage should not be stored between outdoor sites and magazines nor between magazines. Excess dunnage storage sites should comply with applicable quantity-distance requirements (paragraph 17–11d(2)) except that during outdoor storage operations, service supplies of dunnage may be located not closer than 50 feet from the sack being processed.

(*f*) Suitable types of firefighting equipment and symbols should be provided in accordance with paragraph 12–23.

18–15. Special requirements for outdoor storage

a. Sites between earth-covered magazines

Sites may be located midway between adjacent earth-covered magazines which are 400 feet apart provided the sites are barricaded and are separated from the barricaded sides of the nearest magazine by 185 feet. Ammunition in such sites should not be stored beyond lines drawn through the fronts and backs of magazines in the same row. The barricading of classes 3, 4, 5 and 6 ammunition will not reduce the required unbarricaded inhabited building, public highway/railway distances. The storage of classes 3, 4 and 5 between earth-covered magazines is not desirable and should be resorted to only when necessary. Sites containing classes 4 and 5 may not be located within 800 and 1,200 feet, respectively, of sites containing classes 6 and 7. The limitations of the following quantity-distances also are applicable:

	Maximum pounds of HE	Minimum intersite distance (feet)
Ammunition class:		
1	[1]	400
3	100,000	400
4	100,000	800
5	100,000	1,200
6	250,000	400
7	250,000	400

[1] No limit.

b. Sites not between earth-covered magazines

Sites containing classes 4 and 5 shall not be stored within 800 feet and 1,200 feet, respectively, of sites containing classes 6 and 7. No outdoor storage site shall be located within 1,200 feet of aboveground magazines. The limitations of the following quantity-distances also are applicable:

	Maximum pounds of HE	Minimum intersite distance (feet)
Ammunition class:		
1	[1]	[2] 100
3	[1]	[2] 400
4	500,000	[2] 800
5	500,000	[2] 1,200
6 and 7	100,000	[2] 280
	100,000	[2] 510
	250,000	[2] 380
	250,000	[2] 695

[1] No limit.
[2] Unbarricaded.
[3] Barricaded.

c. General

Inhabited building distance, public railway distance, and public highway distance shall be maintained around outdoor sites as specified in Chapter 17.

18–16. Storage of bulk initiating explosives

Bulk initiating explosives must be stored alone or with similar compatible compounds. They must not be stored dry and shall not be exposed to the direct rays of the sun. Glazed earthenware crocks of ample size to hold the double bag of material, and with covers of the plastic cap type to prevent evaporation and eliminate friction or abrasion when removed, are used for normal storage. Proper selection and use of covers is required to prevent friction and pinch points. If long-term storage in shipping containers is contemplated, the container must be equipped with a cover having a port for observation of the level of liquid therein. The viewing port must be covered with a transparent plastic which is known to be compatible with the initiating explosive being stored. As an expedient only, bulk initiating explosives may be stored in shipping containers that are not so equipped, provided they are stored in frostproof earth-covered magazines, with

containers on end, only one tier high, and with passageways for inspection and handling. Bags of initiating explosives in storage containers must be under distilled water. Alcohol may be added to the distilled water to prevent freezing.

18–17. Solid propellants

Propellants shall not be stored or shipped in damaged containers. When leaking containers are discovered, an examination of the contents shall be made for the nitrous odor of decomposing propellant. If any such conditions are observed, the propellant shall be segregated or disposed of in accordance with current instructions. Propellants and propelling charges in containers should be stored so that they can be readily inspected. They shall not be exposed to the direct rays of the sun.

18–18. Military pyrotechnics

Loaded assemblies shall not be stored in operating buildings except for the minimum quantities necessary to supply the operations. Measures shall be taken to insure that the service supply is not exposed to an incident which may occur during an assembly operation.

18–19. Small arms ammunition

Boxed small arms ammunition shall not be used as barricades or dividing walls between stacks of other types of ammunition.

18–20. Separate loading ammunition, HE loaded except explosive D

(*a*) Separate-loading projectiles must be handled with care. They shall not be stored without fuze-well closing plugs. Metal dunnage should be used where practicable.

(*b*) Class 6 quantity-distances are the minimum acceptable for class 6 items, regardless of the quantities of HE involved. For class 6 separate-loading projectiles, storage must comply with AMC Drawing 4002–2PE1000 in order to limit distance requirements to those prescribed by the class 6 quantity-distance table. If those projectiles are equipped with cored-recess lifting plugs, the class 7 quantity-distance table applies when the total quantity of HE involved exceeds 15,000 pounds, even if storage complies with AMC Drawing 4002–2PE1000.

18–21. Separate-loading ammunition, explosive D Loaded, class 5

Except where permanent block type storage methods are used, this type of projectile may be stored with distances between stacks not more than that required to permit inspections.

18–22. Fixed and semifixed ammunition

Boxed fixed and semifixed ammunition shall not be used as barricades or dividing walls between stacks of other types of ammunition.

18–23. Rockets and rocket motors

(*a*) Whenever practicable, rockets and rocket motors that are in a propulsive state should be stored nose down. If such items cannot be stored nose down, they should be pointed in one direction (not toward the door of the magazine). If they are in a nonpropulsive state, they may be stored without regard to direction in which they are pointed.

(*b*) In aboveground magazines where nose down storage is not practicable, the items shall be pointed in the direction which offers the least exposure to personnel and property in event of fire or explosion.

(*c*) Rockets should be stored in a dry cool magazine, out of the direct rays of the sun. They should not be stored in locations where temperatures exceed 120° F. (paragraph 18–5) Prolonged exposure of rocket ammunition to either high or low temperatures may increase the normal rate of deterioration or render the motors more susceptible to ignition if subsequently handled improperly.

18–24. Dunnage restrictions in storing class 7 ammunition

Steel dunnage should be used where practicable in storing class 7 ammunition. Combustible materials must be held to the minimum.

18–25. Magazines and magazine areas

A segregated area shall be set aside for the exclusive storage of ammunition and explosives, with the following exceptions:

(*a*) All magazines or open revetted sites in the magazine area may be used for the storage of ammunition related inert items.

(*b*) When no other suitable storage space is available, sites located at the appropriate intraline distance (but not less than 800 feet) from magazines and open sites containing ammunition and explosives, may be selected in the magazine area for the storage of motor vehicles, artillery, tanks, etc.

18–26. Telephones in magazine areas

(*a*) Telephone communication should be provided in ammunition and explosives magazine storage areas. All telephones that are located outdoors should be protected from the weather.

(*b*) The following may be used as a guide for telephone locations:

(1) One per magazine block.

(2) One per mile and readily accessible from the installation roadway and railroad systems, especially loading docks.

(3) One per operating building (other than storage magazines) within the magazine area.

(4) One per manned gate entrance or exit.

Mr. CONYERS. Let me ask you about the general question of accidents. If this is so sensitive, do you have any way of measuring the frequency of accidents that hunters and other users of black powder might be involved in?

Mr. DAVIS. We have not made a point of documenting them and many of them we would not hear about. We know that there have been at least two occasions—and I do not know the exact time frame—in which cannoneers were injured or killed at cannon shoots. I have forgotten whether there were any facilities involved in either one of the instances. If I am not mistaken, Mr. Chairman, one of them was in Michigan.

Mr. CONYERS. I will advise Congressman Dingell right away, who has sent a letter strongly in support of the legislation.

In other words, we do not really have a way of measuring, and cannot really speculate at this point about the frequency of injury that may or does occur to citizens that use this in a sporting context?

Mr. DAVIS. No, sir. I do not know that anybody has gathered statistics on black powder accidents.

Mr. CONYERS. Do the National Rifle Association people know anything about that?

TESTIMONY OF RICHARD L. CORRIGAN, NATIONAL COMMANDER, NORTH-SOUTH SKIRMISH ASSOCIATION, INC.; AND ALSO REPRESENTING NATIONAL RIFLE ASSOCIATION OF AMERICA AND SPEAKING FOR ALL USERS OF BLACK POWDER PROPELLANT

Mr. CORRIGAN. My name is Richard Corrigan. I am representing both the North-South Skirmish Association, a primary user of black powder, and the National Rifle Association, and am speaking for all users of black powder propellant.

May I comment briefly on your question, Mr. Chairman, that the National Muzzle Loading Rifle Association, a major muzzle loading shooting group has been in existence for over 40 years. They have a magazine at Friendship, Ind. for the dispensing of powder during their matches and at other times. They have handled literally tons of this material each year and have yet to record their first accident. In the history of the North-South Skirmish Association, which has existed for 25 years, there has been no accident involving black powder propellant.

Mr. CONYERS. That is to your knowledge, or as a matter of recorded fact?

Mr. CORRIGAN. Mr. Chairman, I would have to say that in questioning numerous officers, former officers and other people within both of these associations to determine whether any incidents involving black powder have taken place, to our knowledge, none has.

Mr. CONYERS. Thank you.

Mr. FISH. Can I pursue that, Mr. Chairman?

Are we talking, Mr. Corrigan, of about 100,000 Americans to participate in antique shooting events?

Mr. CORRIGAN. We are talking here, of course, of the formal muzzle-loading shooting organizations which might represent about 100,000. But overall within the United States there is probably far upward of the 100,000 the chairman indicated, perhaps well over 200,000. Some have estimated as high as 500,000. The NRA, while it is not primarily organized for muzzle-loading shooting, is the foremost shooting organization in the country and numbers many muzzle-loaders among its 1 million members. It would be aware of accidents regarding black powder and if there were problems would warn its membership. There has been no need to do so, for such accidents are not noticeable by their absence.

Mr. FISH. Mr. Chairman, now that the North-South Skirmish Association has been mentioned here, I would just like to point out that I understand the association and other witnesses have films on their activities which they would wish to share with the committee at a later date.

Mr. CONYERS. You know, I thought humorously to myself that there might be a counterfilm. I never realized that there was in fact. Perhaps we should have representatives of all sides of this view both films and comment. Or maybe we should have seen the films before we had the hearing.

I would like to see your production. Are there any directors or actors that we might know about?

Mr. CORRIGAN. No, sir.

Mr. Chairman, I might add that the thrust of our films will show the safe handling of our only propellant within the confines of our regular activities. They were not made specifically to influence this committee; they just show the kinds of wholesome historically oriented things that people in the NRA, the National Muzzle-Loading Rifle Association, the North-South Skirmish Association and many other groups and individuals engage in. They show people firing cannons, shooting muskets, pistols, carbines, and so forth. You will have an opportunity to observe this unique historical occasion and to judge for yourself in its normal setting that it is safe and accident-free.

[Mr. Corrigan's statement follows:]

STATEMENT OF RICHARD L. CORRIGAN, NATIONAL COMMANDER, THE NORTH-SOUTH SKIRMISH ASSOCIATION

Mr. Chairman and members of the House Judiciary Subcommittee on Crime, my name is Richard L. Corrigan and I reside in Arlington, Virginia. I am here today as the National Commander (President) of the North-South Skirmish Association to express our support for the proposals contained in H.R. 14549, H.R. 14018, S. 1083 and other like bills. I wish to express our deepest apprecia-

tion to you, Mr. Chairman, for holding these hearings and for affording me the opportunity to express our views and interests in this matter of crucial importance to the entire blackpowder shooting fraternity.

I am a graduate of the University of Wisconsin-Milwaukee where I received a B.S. in History, Political Science and Secondary Education and a Masters Degree in Political Science. While completing my advanced degree, I taught at UWM as a teaching assistant in Political Science.

Having completed Reserve Officer Training as an undergraduate, I received an Army Commission and spent nearly four years on active duty at Fort Knox, Kentucky. Most of my active duty was spent as an educator. I was an Instructor of Political Science in a special University of Kentucky/U.S. Army Armor School university-credit educational program for career officers. I also taught Military History of the Civil War period in a special Seminar Program. In addition, I prepared a Civil War era display for the new Patton Museum of Cavalry and Armor which opened in late 1972. I also was a part-time instructor of Political Science in the evenings at the University of Kentucky Center at Fort Knox, Kentucky.

Since age twelve, I have been a shooter of various types of firearms, including muzzle-loaders. A long and deep interest in American history influenced me to become a student of the American Civil War period; my interest and familiarity with firearms has brought me to study, collect and shoot blackpowder guns. Both caused me to join the North-South Skirmish Association in which I am in my seventeenth year of membership and in my second two-year term as National Commander.

What is the N-SSA? What is Skirmishing? What possible interest can we have in amending Title XI of the Organized Crime Control Act of 1970?

On a Sunday in May of 1950, a group of shooters wearing uniforms of the Union Army met a group of gray-clad Confederates at Berwyn, Maryland for a shooting contest with the original firearms of the Civil War. This unique form of shooting, with participants in Civil War uniforms and shooting old guns at breakable targets, was an instant success.

Today, the N-SSA numbers 160 member organizations. These units consist of a minimum of eight members, though some number fifty or more. They choose to represent a Union or Confederate unit of Cavalry, Infantry, Artillery, Navy or Marines. The firearms used in competition are originals of the Civil War or approved authentic replicas. The uniforms are carefully researched copies for the units represented.

Our members are called "Skirmishers"—a named derived from the forward elements of both armies under the tactics of the day. Whenever the two sides were in close proximity, Skirmishers were in almost constant contact—usually hostile but sometimes approaching fraternization.

Today's Skirmishers are not playing soldier, but are engaging in serious target shooting competitions called Skirmishes. Modern day N-SSA Skirmishes are of two kinds—National and Regional—with the differences being location and size. In May and October of each year, National Skirmishes are held near Winchester, Virginia. Our recent 50th National attracted 208 eight-man teams called "Companies." Approximately fifty Regionals are held each year in the Association's eleven subdivisions to permit localized competition.

The Sunday Company Matches are the main feature of a Skirmish. Uniformed teams fire at "bustables" such as clay pigeons mounted on backers, hanging flower pots, liquid-filled cans, balloons, and a wood stake which is cut on a line by musket fire. All events are timed and the Company with the lowest time for all events (usually five) is the winner, and all others are ranked according to time of finish.

The sight of men wearing the varied uniforms of North and South, the brasswork and ramrods flashing in the sun, the rattle of musketry and the breaking of target provide graphic insight into an earlier chapter of American History.

Though the Company Matches are the heart of Skirmish competition, original and reproduction cannons are fired in colorful and exciting competition. Besides the Company Matches and cannon events, there are Carbine Team Matches and Individual Matches for muskets, carbines and revolvers.

There is, however, much more to Skirmishing than shooting! On the National Skirmish weekends our range near Winchester, Virginia becomes a city of 7,500 people. Friends from different parts of the nation meet once again after months of separation. The campsites, the smell of wood fires and cooking, the period clothing worn by members and their families, the Saturday night Blue-Gray Ball

and the competitive aspects of Skirmishing already described give one a certain feeling of being somewhere in the nostalgic past. Regions are similar, but smaller in scale.

Within the ranks of the N–SSA are persons from all walks of life and from all parts of the nation. They include among them superb competitive shooters, collectors of guns, equipment, uniforms, etc., serious historians, "Civil War buffs" and sutlers who make available a variety of equipment and wares. These individuals and their families are linked by blackpowder shooting to create an Association with richness and diversity equaled by few, if any.

In fairness, I must point out that the N–SSA is but a small part of the whole blackpowder shooting fraternity, which is comprised of many large and small organizations and countless unorganized individuals. These organizations have similar yet distinctive shooting activities. While formal matches constitute but a part of the use of their antique firearms by members of these organizations, the major competitions hold the organizations together. Without the events and attendant activities, they would disintegrate and all of the richness and "living history" that is part of them would be lost.

Historical Institutions, such as Greenfield Village/Henry Ford Museum of Dearborn, Michigan, Shakertown of Mount Pleasant, Kentucky, the Cassius Clay Whitehall Shrine of Lexington, Kentucky and others, regularly hold muzzle-loading shooting events or historical reenactments. Note Appendix I.

While organized shooters often receive public attention, the vast bulk of blackpowder shooters belong to no formal organizations, but use muzzle-loaders for hunting and recreation. All, however, are dependent upon the same "lifeblood"—commercially manufactured blackpowder propellant.

While comprising "living history" and taking great pleasure from our unique forms of recreation, we of the N–SSA and the other members of other blackpowder shooting organizations and unaffiliated individuals make significant contributions to the economy. Years ago, Skirmishers often used Silver Dollars for purchases in communities near Skirmish sites to demonstrate their contributions to local economies with dramatic effect. Appendix II reveals the N–SSA's estimated annual economic contributions which are substantial. Similar estimates could be prepared for both organized groups and unorganized individuals.

It is our concern over the "lifeblood" of the blackpowder fraternity which brings us before this committee to prompt and urge favorable action on H.R. 14549, H.R. 14018 and S. 1083. The amendments to Title XI of the Organized Crime Control Act of 1970 contained in these proposals will remove the harsh and unnecessary restrictions which the act imposes on blackpowder propellant.

Under Title XI, any quantity of blackpowder over five pounds—no matter what its type or intended use—is by definition "an explosive" and is subject to severe and unreasonable restrictions on its purchase, possession, transportation and storage. The present restrictions on ammunition components for antique firearms impose excessive restrictions on honest citizens without placing any real corresponding burdens on potential bombers. The irony of the present law is that it restricts only legitimate users and unnecessarily exempts home-made blackpowder.

Three members of this Subcommittee and twenty-five other members of the House of Representatives of both political parties and various philosophies have sponsored or co-sponsored a total of thirteen relief bills. After extensive hearings before the Senate Judiciary Committee in June of 1973, the Senate acted on July 13, 1973 to provide relief for shooters of antique firearms in passing S. 1083 by the overwhelming margin of 78–8. The seven Senate sponsors, led by Senator Birch Bayh of Indiana, represent persons of various political persuasions.

The legislative history of the Organized Crime Control Act of 1970 reveals that the present law resulted from the prevalence of the then popular myth that "blackpowder" was widely used by terrorists for bombs and from an apparently imperfect understanding of blackpowder shooting sports and the potential impact of the law on them.

The bills before this committee will do more than remove the present unreasonable and discriminatory burdens from those who use blackpowder propellant to shoot antique guns. It substantially strengthens the law's intended purpose by removing an undesireable exemption for home-made blackpowder, of which the Senate Judiciary Committee concluded, "Indeed all evidence would indicate that the few blackpowder bombs are made from home-made blackpowder."

It also removes a discriminatory "bomber's exemption," for under existing law, a bomber can possess the same amount of "blackpowder" as can a shooter. Of

course, the bomber will not be deterred by any law if it stands in his or her way.

In any attempt to deal objectively with this legislation, it is important to deal with two myths about blackpowder—"blackpowder is used for making pipe bombs" and the "Tom Mix Syndrome."

While the myth that "blackpowder is widely used to make pipe bombs" once had widespread acceptance, perhaps due to the unfortunate tendency of the media to refer to every terrorist device which exploded as a "blackpowder bomb" or a "pipe bomb made with blackpowder," evidence is available which thoroughly refutes this incorrect and greatly exaggerated assumption. Information obtained from the Bomb Data Center of the International Association of Chiefs of Police reveals that during the period July 1, 1970 through December 31, 1971—the height of terrorist activity—there were 3,841 bomb devices employed by terrorists in the United States. Of this number ONLY 149 USED WHAT IS TERMED "BLACKPOWDER!" Those who collected the data did not differentiate between "home-made blackpowder," which any of us can make from readily available sources, and the scarce shooting grades. Thus, it cannot be asserted that our propellant alone is the bomb filler. In fact, the 149 cases of blackpowder bomb filler out of nearly four thousand bomb devices clearly establishes the infrequent use of this substance called blackpowder—home-made or commercial—as a bomb filler and provides ample justification for amending Title XI. For further information, please note Appendix III, "Statistical Summary of Bombings and Bomb Device Fillers used by Bombers," Appendix IV, a letter from the then Acting Director of the FBI and Appendices V and VI, the 1972 and 1973 FBI Crime Reports on bombings.

The familiar scene of the villain sprinkling a trail of powder from an XXXX-marked keg, his lighting it and a resulting explosion—the "Tom Mix Syndrome"—has conditioned most Americans to believe that blackpowder is much more dangerous than substances such as nitro-glycerine. The blast, of course, was made by conventional explosives.

At this time, I will illustrate the plight of shooters of antique firearms and the need for prompt action on the blackpowder relief proposals before you.

(1) Commercially manufactured blackpowder propellant is the ONLY propellant which can be used in firearms of antique design. The home-made varieties are unsuitable for they lack the consistency and quality which are required for shooting. There are NO substitutes, for blackpowder propellant alone has the characteristics and low pressures which make it a safe propellant in firearms of antique design. Modern—smokeless—powders create such high levels of pressures upon ignition that they can burst antique gun barrels causing serious injury or death. The present scarcity of blackpowder propellant increases the likelihood that the uninformed or ill-advised will attempt to substitute smokeless powders for the proper ones which they can not obtain.

(2) It is a cruel irony that while the Congress in its wisdom specifically exempted antique firearms and their ammunition from the Gun Control Act of 1968 because of historical, shooting and collecting uses, as well as recognized unsuitability for criminal purposes, that ammunition exemption was removed as one of the unintended effects of Title XI.

(3) Title XI employs the broad generic term "blackpowder," but no differentiation is made between shooting propellants and other substances commonly referred to by the same name, including home-made blackpowder.

(4) Virtually no one except shooters realized that blackpowder propellant is made in four different granulation sizes intended for the various antique rifles, pistols, shotguns and cannons.

(5) The present quantity limitations on the purchase, possession, transportation and storage of blackpowder propellant prevent shooters from obtaining it in sufficient quantities to be able to do so without unreasonable costs and great hardship. Unlike modern powders, where a little goes a long way, large quantities of blackpowder are required for each shot fired. This is especially so when cannons of the Revolutionary and Civil Wars are fired; many of these guns use a pound of powder per round fired. It was certainly not the intent of the Congress that N-SSA gun crews split their match ammunition among three persons in order to legally possess enough ammunition to fire a twelve-shot match at a Skirmish! While the amounts of powder used per year by shooters varies with the individuals and firearms used, all active shooters use far more than the legal limit of five pounds which they may have. During the present energy crisis, one

must seriously question a law which necessitates additional and sometimes lengthy trips to obtain limited amounts of propellants.

(6) Title XI has strained and in some cases all but destroyed the system for distributing blackpowder propellant. Most shooters have been dependent upon an informal system which includes gun shows, hardware stores, cooperatives, fellow shooters and other "courtesy suppliers" who order or stocked limited amounts of propellant more as a service than a money-making item. Because of the permit limitations, the permit fees, the costs of constructing elaborate magazines for even limited storage and the other related expenses, most of the courtesy suppliers have ceased to handle blackpowder propellant. A late spring 1973 survey showed that prices at the few remaining sources had been raised significantly—in some cases five to seven times that prior to Title XI.

(7) It is also important to discuss the sources of production of blackpowder. Because of limited demand for blackpowder propellant in the Twentieth Century, all but one producer—The Dupont Corporation—ceased making it by the time of Title XI's enactment. In 1971, it, too, stopped production. Until recently, American shooters were totally dependent upon a single foreign source, the Curtiss and Harvey plant in Scotland. Recent production by the Gearhart Owens Company, using the old Dupont plant, has helped but it appears that the tremendous increase in interest in shooting muzzle loaders has all but absorbed the additional powder. Regardless of production, however, a mountain of powder at the factory is useless to a shooter who can not obtain satisfactory access to it.

(8) The interstate prohibitions of the act have compounded existing problems. Many users of blackpowder propellant have always had to travel interstate to purchase it from the nearest available sources. While some must go significant distances, for others interstate sources may be but a few miles away. Participation in the North-South Skirmishes and many events of other muzzle-loading organizations nearly always necessitates interstate travel to reach the match site. When families of shooters, team mates or cannon shooters travel to an event in a single vehicle, their total ammunition requirements exceed that permitted under Title XI. Blackpowder, even when prepared as ammunition, does not lose its definition as "an explosive" when the total incorporates over five pounds.

(9) It is significant to note that the problems faced by legitimate users of blackpowder shooting propellant have a serious impact on historical reenactments, pageants and shooting matches to be held in conjunction with the forthcoming celebration of the Bi-Centennial of the American Revolution. This is ironic in several respects. First, our nation won its independence through the use of the very same types of blackpowder firearms that we now term antiques and which modern day shooters fire in historically oriented recreation. Secondly, "the shots heard around the world" were fired during a clash between Colonists and British soldiers marching to seize stores of blackpowder and other munitions stored by the Colonists.

(10) The permit options in the Alcohol, Firearms and Tobacco Regulations which are sometimes cited as evidence of the "flexibility" and the meeting of the needs of legitimate sportsmen are in fact complicated, confusing (to even those of ATF who give conflicting interpretations to bewildered sportsmen trying to comply with the law), and, for the most part, unworkable. Worse yet, they are a "Catch-22!" To purchase and store in quantities of over five pounds, one must have a permit. Before he can obtain a permit, however, he must have a magazine which has to be constructed to exacting specifications and personally inspected by an ATF agent. While there are several permits and licenses, only a dealer's license allows him to sell or give propellant to ANYONE, even members of his immediate family or shooting club. Those who assert that the present law is workable are obviously those who do not purchase or use blackpowder propellant!

(11) Any laws which seek to restrain terrorist bombers must be sufficiently flexible to accomplish their objectives of deterrence and punishment without imposing extreme and unreasonable hardships on the activities of legitimate sportsmen. Title XI discriminates against honest citizens! While bombers face no shortage of materials, antique firearms users do! As I have pointed out earlier, we have but one propellant. Bombers, who are for the most part sophisticated and educated, have numerous potential bomb fillers. In addition to the wide range of commercially made explosives, the terrorists can make bombs from countless materials readily available from the gasoline station, the drug

store, hardware store, grocery, chemistry lab, agricultural cooperative, etc. Knowledge of chemistry, access to the variety of library references or possession of a variety of available manuals—*The Special Forces Handbook, The Anarchists Cookbook* or *The Revolutionaries Formulary*—afford the terrorist bomber many alternatives, while we have but *one!*

Unless Congress is willing to impose similar controls on materials such as gasoline, propane, ammonium nitrate fertilizer, detergents and countless other very readily available potential bomb materials now exempt from control on the basis of "user intent," we respectfully submit that it is futile and grossly unfair to restrict the "lifeblood" of blackpowder shooting sports. Appendix VII shows the explosive effect of $3.00 worth of fertilizer. It was this type of fertilizer bomb which destroyed the Army Mathematics Building at the University of Wisconsin in the fall of 1970. The National Safety Council has repeatedly warned that one gallon of gasoline (unregulated) contains the explosive force of *fourteen* sticks of dynamite! See Appendix VIII.

In addition to considering the plight of the historically-oriented shooter, one must ask some basic questions about the ability of the present law to accomplish its intended purposes.

The admission by ATF Director Rex D. Davis to the Senate Judiciary Committee that it was entirely possible for all reported blackpowder bombs to have been made from either home-made blackpowder or from completely legal purchases under the present five pound exemption, which shooters have correctly termed a "bomber's exemption," suggests to any rational person that the present law is both discriminatory and a farce.

The ATF, in making its emotional appeals against this relief legislation, resorted to the use of selected statistics and when questioned in detail could produce little information to support their claims.

Any presentation on this subject by ATF should be closely scrutinized in light of the statement contained in a letter from Director Davis to Senator Bayh. "However, it should be noted that this Bureau is not in favor of the existing five pound exemption, which is a statutory exemption rather than an ATF concession." In other words, Mr. Davis, if he had his way, would eliminate blackpowder shooting altogether!

The proposed amendment to Title XI offered by the many distinguished Members of the House will obtain greatly needed flexibility for shooters and will substantially strengthen the existing law without weakening in any way the criminal penalties for those who misuse *any* material by employing it as bomb filler.

On behalf of the North-South Skirmish Association and all who make up the fraternity of blackpowder shooters, I ask for you to provide this greatly needed relief for law abiding citizens who enjoy shooting antique firearms and to keep alive significant portions of the heritage of this great nation which are themselves kept alive through the blackpowder shooting sports!

Mr. Chairman, we thank you for the opportunity to present our views on this bill which is vital to us.

APPENDIX I

20TH ANNUAL MUZZLE LOADERS FESTIVAL COMES TO GREENFIELD VILLAGE JUNE 22 AND 23

DEARBORN, MICH.—Muzzle-loading rifle buffs and sharpshooters from all over the midwest are checking their antique guns and putting the last touches on their costumes in preparation for the 20th annual Muzzle Festival at Greenfield Village in Dearborn, Michigan June 22 and 23.

Based on the turkey shoots popular in frontier America, the festival draws more than 600 shooters to compete in the biggest event of its kind anywhere. On Saturday, June 22, individual shooters compete with their antique weapons. Toeing the line together 50 yards from the targets, they present a living panorama of the past dressed appropriately according to their type of weapon as Indians, frontier scouts, minutemen, British redcoats and soldiers from the Revolutionary and Civil wars. There is even a sprinkling of Indian squaws and frontier women.

On Sunday, the military units take over. These are commemorative groups named after actual units in the Civil War, both North and South. They make an

impressive sight gathered on the field at the beginning of the day with flags and colors flying, their uniforms completely authentic down to shoulder patches and belt buckles.

Several times each day, the din from the antique weaponry dies down and the air clears of the blue smoke and the acrid aroma of black powder for a series of special activities. In one of these, the unique First Brigade Band of Milwaukee performs martial music from the Civil War. Using arrangements of a hundred years ago or more, they play stirring marches from the past on authentic antique instruments.

Once each day, there is a special "All Star" Musket Team competition between the Midwest and Northwest Teams of the North-South Skirmish Association. Later, a Civil War cannon and an authentic Gatling gun take to the field as expert teams demonstrate the loading and firing techniques of these relics from America's past.

Near the viewing stand, a group of skilled craftsmen demonstrate the arts essential to the frontiersman or soldier and his weapons. There is a gunsmith, a powder horn carver, a bullet molder and a knife maker. A few steps away, Village officials are busy judging the competitors' costumes for prices which are awarded on the field.

A colorful parade of the competitors, field equipment and three bands marches to the field to begin each day's activities. On Saturday, it leaves from the Village Gatehouse at 9:45 a.m. On Sunday, it leaves from the Village green at 10:30 following the assembly and inspection of military units. Activities continue until approximately 5:00 p.m.

There is no additional charge for the Muzzle Loaders Festival on Saturday and Sunday, June 22 and 23 beyond the regular Greenfield Village admission of $2.50 for adults and $1.00 for children 6 through 14. Children under six are admitted free.

APPENDIX II

Economic Impact of Skirmishing

Mr. Leonard Cooper of Kingston, New York conducted a limited survey in 1973 on the contributions of our blackpowder organization to the nation's economy. This has been updated to take into account the inflation factor.

(1) The approximately 3,000 Skirmishers each attend an average of ten Skirmishes a year.

(2) The calculations here are only for travel, lodging, food and operation of Skirmishes. The following additional items must also be considered part of our economic contribution, but we have not calculated their total:

(a) Fees paid by members using Toll Highways to attend Skirmishes.

(b) The initial investments in firearms (these range from $100.00 to $400.00, with each member owning at least one), uniforms, accoutrements and related uniform equipment (range of costs is from $75.00 to $250.00 per man), and camping equipment (camper vehicles, camper trailers, tents, stoves, ice chests, tent flies, etc.), as well as replacements for these items.

(c) The costs of powder, caps, lead and other ammunition components used in the Skirmishes, practices, demonstrations, hunting, etc.

(d) The 11 percent federal excise tax paid on the sale of our competition firearms.

(e) The expenditures by member organizations and individuals for transportation and other items relating to their meetings, practices, demonstrations and other activities.

(3) The cost of targeting, awards and other materials used for the Skirmishes themselves. Each of our two National Skirmishes cost approximately $6,500 to conduct, while each of the approximately fifty Regionals costs about $1,000—an approximate total of $63,000 annually.

(4) The Skirmisher spends an average of $50.00 per Skirmish weekend for non-travel purchases for himself and his family—approximately $1,500,000 for the membership each year.

(5) Average travel to and from Skirmishes is 4,000 miles per member per year. For the entire membership, it is 12,000,000 miles annually; not counted are individuals who have traveled to Skirmishes from Vietnam, Korea, and Europe.

43-300—75——14

(a) Assuming the life of an automobile to be 50,000 miles; Skirmishers use the equivalent of 240 automobiles per year. At an average cost of $4,500, this amounts to $1,080,000 per year.

(b) Figuring 20,000 miles as the life of a tire, N–SSA members use the equivalent of 600 sets of tires (2,400 tires) per year, and at $40.00 per tire, this amounts to $96,000.

(c) Total expenditure for gasoline is $480,000. Of this amount, $32,000 goes for Federal taxes and approximately $48,000 in taxes goes to the various states.

(d) Thus, total expenditures just to travel to and from Skirmishes amounts to approximately $3,229,000 per year.

While this assessment of the economic impact of Skirmishes is by no means as complete as we would desire, it clearly demonstrates that our historical recreation makes meaningful contributions to our nation's economy and significant contributions to the local economies where Skirmishes are held.

There is no doubt that similar contributions are made by all other black-powder shooting organizations as well as unaffiliated individuals.

APPENDIX III

NORTH-SOUTH SKIRMISH ASSOCIATION, INC.—"STATISTICAL SUMMARY OF BOMBINGS AND BOMB DEVICE FILLERS USED BY BOMBERS"

	Number	Percentage
Bombings in the United States for the period of: July 1, 1970 to June 30, 1971 [1]:		
Total number of bomb devices (all types)	2,352	100.0
Blackpowder devices (home-made and commercial)	96	4.1
Devices employing materials other than blackpowder	2,256	95.9
Bombings in the United States for the period of: July 1, 1971 to December 31, 1971 [2]:		
Total number of bomb devices (all types)	1,489	100.0
Blackpowder devices (home-made and commercial)	53	3.55
Devices employing materials other than blackpowder	1,436	96.45
Bombings in the United States for the period of: July 1, 1970 to December 31, 1971 [3]:		
Total number of bomb devices (all types)	3,841	100.0
Blackpowder devices (home-made and commercial)	149	3.87
Devices employing materials other than blackpowder	3,692	96.13
Use of Smokeless Powder as a Bomb Filler of the above same time periods:		
July 1, 1970 to June 30, 1971 [1]	54	2.3
July 1, 1971 to December 31, 1971 [2]	46	3.1
July 1, 1970 to December 31, 1971 [3]	100	2.6

APPENDIX IV

U.S. DEPARTMENT OF JUSTICE,
FEDERAL BUREAU OF INVESTIGATION,
Washington, D.C., November 17, 1972.

MR. RICHARD L. CORRIGAN,
President, North-South Skirmish Association, Inc.,
Fort Knox, Ky.

DEAR MR. CORRIGAN: This is in response to your letter dated November 7, 1972, in which you requested information regarding bombings, bombs, and fillers used in bombs.

There was a total of 1,486 bombing incidents reported throughout the United States, Puerto Rico, and the Virgin Islands during the first nine months of 1972. Of the 1,486 incidents, 712 involved the use of explosive bombs while 774 were incendiary attacks. During the period January–September, 1972, a total of 1,973 devices was used in connection with the 1,486 bombing situations. Of this number, 803 were explosive in nature and 1,170 incendiary.

Regarding questions two and three, we do not maintain statistics on fillers used in bombs, although some incident reports received do state the types of fillers. There are numerous fillers used, including smokeless powder and black powder. We likewise cannot provide you with accurate statistics concerning the

number of black powder bombs which employed homemade black powder and the number using commercial sporting grades.

Sincerely yours,

L. PATRICK GRAY III,
Acting Director.

APPENDIX V[1]

Bomb summary, Uniform Crime Reports, Federal Bureau of Investigation, National Bomb Data Center—1972

Total number of bombing incidents	1,962
Actual bombings	1,507
Explosive	714
Incendiary	793
Attempted bombings	455
Explosive	237
Incendiary	218

APPENDIX VI[1]

Bomb summary, Uniform Crime Reports, Federal Bureau of Investigation, National Bomb Data Center—January–June, 1973

Total number of bombing incidents	928
Actual bombings	715
Explosive	321
Incendiary	394
Attempted bombings	213
Explosive	123
Incendiary	90

[1] Note: The data published in the Uniform *Crime Reports* does not indicate specific bomb fillers.

APPENDIX VII

[From the Handloader Magazine, November–December 1971]

$3 WORTH OF FERTILIZER

The awesome destructive power so vividly illustrated on these two pages was unleashed by Treasury Department agents in a demonstration for law enforcement officials at Vandenberg Air Force Base, California, in August 1971.

According to the officers conducting the demonstrations, the blast was created with a homemade bomb rigged with $3 worth of common materials. The principal ingredient was ammonium nitrate fertilizer—available at garden supply stores for about $4 per 80-pound bag, or in bulk from farm suppliers for around $60 per ton.

So what has this to do with handloading? A great deal.

As a result of a sharp increase in terrorist bombings by militant radicals in the past few years, there has been an almost constant stream of explosives control bills introduced by city, state and federal lawmakers.

These bills follow one general theme: requiring licenses of all "explosives" dealers, with permits for "explosives" users. "Explosive" is usually defined in these bills to include all commercial "high explosives," such as dynamite and TNT, but only two "low explosives"—the black powder and smokeless propellants used by handloaders and muzzle loaders.

Thanks to the assistance of the Nixon Administration, the federal explosives control law enacted last year exempted smokeless propellants and five-pound quantities of black powder. It is unfortunate that black powder was not ex-

empted, for the five-pound limit is proving inadequate for many shooters, due to a shortage of local suppliers. Also, although black powder suitable for bombs can be made with a junior chemistry set, the high quality black powder used in firearms must be commercially manufactured.

Since the federal law was enacted, many other bills have been introduced in Congress and in state legislatures which would place additional, more stringent controls upon purchasers of "explosives," including smokeless propellant and black powder. Many are poorly drafted, and all would fail to meet their stated objective of reducing terrorist bombings.

The average lawmaker—like the average citizen—has a limited understanding of explosives—and is likely to legislate on the basis of this lack of knowledge, drafting his bill to include "gunpowder." This imprecise term is a holdover from the last century, when black powder similar to that used for guns was the principal blasting agent.

The misunderstanding concerning firearms propellant is furthered by television and movie portrayals of someone blasting his way out of peril with a bomb made with the powder from a half-dozen rifle or pistol cartridges. Like so much else in the movies, "it just don't work that way."

Smokeless propellants are "deflagrants," that is they burn at a high, but controlled, rate, releasing gases which force a bullet out the barrel. A persons with considerable knowledge could make a bomb with smokeless propellant, but it is unlikely that he could produce other than a "low order" detonation.

As a guess, based on a considerable amount of research into explosives, duplicating the $3 ammonium nitrate blast depicted on these pages would require at least $1,000 to $2,000 worth of handloader's smokeless propellant (almost as much black powder), an initiating charge of some type of high explosive, and a skillful explosives man. Even that might not do it; no one knows for sure because smokeless propellants simply aren't used that way.

Wouldn't the fact that smokeless can be made into a bomb, justify its inclusion in anti-bombing laws? *Only if all other materials which can be made into bombs are similarly controlled.* An that's impossible!

In normal use, smokeless is not an explosive. The same is true of Nylon panties, gasoline, propane, hand soap, playing cards, sugar, flour, or ammonium nitrate fertilizer. But with a little knowledge, any of these items—and a long, long list of other materials—may be made into bombs as powerful, or many times more powerful, than any bomb made from either smokeless propellant or black powder.

None of the bills we have seen propose to regulate "low explosive" ammonium nitrate fertilizer, yet according to *The Wall Street Journal*, the same material—mixed with fuel oil—to make it a "high explosive"—is being used for 70 percent of the commercial blasting formerly done with dynamite. That standard mix requires an explosive priming charge to insure detonation, but ammonium nitrate fertilizer may be mixed with other materials in such a way as to be detonated by nothing more than a firecracker. The details of such "high explosive" mixtures are available in almost any public or college library.

Whatever laws are passed, such knowledge cannot be repealed; and it is being used by radicals. For instance, the devastating blast which destroyed the Mathematics Research Center at the University of Wisconsin last year, killing one and injuring several, was caused by a trailer loaded with 1,700 pounds of ammonium nitrate fertilizer mixed with gasoline.

Astonishingly, the Wisconsin tragedy has been cited as evidence of the "need" for new explosives laws regulating smokeless propellants—but such proposed laws do not include ammonium nitrate!

Even if ammonium nitrate were included in the laws, it would accomplish nothing, for how much control could be placed on the millions of tons used by farmers. And even if it could be regulated, all of the other potentially explosive materials would still be available—and the information on how to make them explosive would still be in the libraries.

The only sensible solution is to make explosives laws apply only to commercial high explosives, then outlaw the unauthorized possession of any substance prepared in such a way as to perform as a high explosive or destructive bomb. And that is precisely what the existing federal law does (though it needlessly includes black powder limitations)

When your lawmaker begins to think more laws are needed to control explosives, show him these photos and ask him how he proposes to control such homemade explosives

He may ask, as Rep. Emanuel Celler asked at the explosives hearings last year,

"What legislation can we enact to keep explosives out of the hands of bombers?" And you may answer, as both this editor and a demolition expert answered: "None. Explosives are too easy to make."—Neal Knox

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APPENDIX VIII

[Chicago Tribune, Feb. 5, 1974]

Explosive Danger of Storing Extra Gasoline

By Vernon F. Pechous

(*The author is a Berwyn Fire Department lieutenant and a Berwyn resident*).

In coping with the gasoline shortage, that first thought of "putting some gasoline away for an emergency" is a dangerous one. It may be just that "putting some away" which will cause the emergency.

Would you knowingly store, in your garage, under your porch, or in your cellar, 100 or more pounds of dynamite, with cap set and fuse leading out where any passerby might drop a match or a cigaret butt on it and blow your garage or your house skyhigh, perhaps with you or your family inside?

You would not!

But, you ask, what harm can possibly come of the storing away of a few gallons of gasoline?

What harm? Under certain conditions over which you have little control, one gallon of gasoline and 100 pounds of dynamite have almost the same destructive explosive power. And, worse, it is almost axiomatic that a raging fire immediately follows and completes the destruction begun by a gasoline explosion.

You'll be amazed to discover how much you have either forgotten or never learned about this liquid dynamite you use every day. The flash point of gasoline, the lowest temperature at which it will vaporize in sufficient quantities to create an explosive mixture with air, is —45 Fahrenheit —45 degrees below zero!

And how much gasoline vapor is necessary to create an explosive mixture with air? We know that a concentration of only 1.5 percent to 7 percent by volume is enough. That means that in an average-sized room—a room 12 by 12 by 9—vapor from only three quarts of gasoline would make every cubic foot of the air in that room explosive.

Usually, however, only about one cubic yard of air near to the gasoline container need be so charged to result in an explosion; and to charge that cubic yard, only about two ounces of gasoline must vaporize. These two ounces of gasoline would, in controlled explosions within a motor, drive a large automobile abut 500 feet along a level road.

Imagine the power released when that same vapor-air mixture is exploding all at once! Gasoline vaporizing in air gives off more than one hundred times its bulk in vapor, and converts more than 1,500 times its volume of air into an explosive mixture.

Any igniting agent will cause that explosive mixture to expand, literally "in a flash," to 4,000 times its volume. Well, you may say, who would be so foolish as to light a match or to do anything else to ignite that explosive mixture? Certainly, you would not, if you could possibly help it. But you have little or no control over the conditions that may cause ignition from a spark of static electricity or some other unforseen factor. A static spark may result from no more than pouring gas from one container to another.

In many urban localities, ordinances existing solely for the common good specifically prohibit the storing of gasoline or allow it only upon certain conditions. Storage then, for some future emergency, is direct violation of the law and a thumbing of the nose at the moral responsibility underlying. You endanger not only your own life and property but also your neighbor's.

Additional Material Submitted by Richard L. Corrigan on Behalf of Users of Antique Firearms

In the hearings before this Committee of the House of Representatives, chaired by Representative John Conyers, Jr., and before its counterpart in the Senate,

chaired by Senator Birch Bayh, it has been made abundantly clear that the existing five-pound restriction on the purchase, transportation and storage of "blackpowder" (generic term) does not and can not perform its intended purpose of preventing the activities of terrorist bombers.

Instead, the limitations contained in Title XI of the Organized Crime Control Act of 1970 discriminate against honest citizens who want to pursue unique forms of historical recreation by denying them adequate access to the *only* propellant which can be used in antique firearms.

The opposition to the very reasonable proposed amendment to Title XI before this Committee has been based largely on generalities and fearful assertions by those unable to defend the present law with facts and statistics. The statement that "blackpowder is the most dangerous explosive known to man" flies in the fact of scientific knowledge. It was stated that "blackpowder" has the explosive effect of .55 on a scale of one when compared with TNT; the "expert" did not point out that this is ONLY under maximum containment, approximately 15,000 pounds per square inch.

These and other gross exaggerations were repudiated by a recognized expert thoroughly experienced in all phases of propellant, munitions, and explosives manufacture, use, and handling.

Further, eighteen months after the Senate Judiciary Committee held hearings on this same measure, there is no record of statistics or facts to justify retention of an arbitrary small limitation of ownership of blackpowder propellant. In view of the foregoing, this Committee is urged to act favorable on S. 1083, H.R. 14018, or H.R. 14549 as soon as possible.

AMVETS, DEPARTMENT OF MICHIGAN,
VETERANS MEMORIAL BUILDING,
Detroit, Mich.

RESOLUTION ON LAWS REGULATING THE USE OF BLACKPOWDER PROPELLANT

Whereas, our forefathers fought for and gained the independence of this nation through the use of muzzle-loading firearms,

Whereas, our nation was carved out, settled, and developed by men and women who relied on muzzle-loading firearms for both food and protection.

Whereas, the muzzle-loading shooting activities of the North-South Skirmish Association, the National Muzzle-Loading Rifle Association, and the numerous other organized and unorganized users of blackpowder propellant form a wholesome sport steeped in American heritage,

Whereas, blackpowder is the only propellant (gunpowder) which can be used safely in muzzle-loading and other firearms specifically designed for it,

Whereas, the future use of firearms similar to those used by our forefathers is gravely threatened because blackpowder propellant has been classified as an explosive and severely restricted as such under Title XI of the Crime Control Act of 1970,

Whereas, many state laws and local ordinances restrict the availability and use of blackpowder propellant more severely than does Title XI,

Whereas, terrorist bombers face no shortage of explosive materials, with the wide range of commercially made explosives and the vast numbers of potential bomb ingredients available in drug, grocery, and hardware stores or chemistry laboratories, blackpowder shooters are limited to using commercially manufactured grades of blackpowder:

We, the Michigan Department of AMVETS at our Annual Department Convention, June 25, 1972 in Traverse City, Michigan have passed this resolution unanimously, and do hereby implore national, state, and local elected officials to cease enacting laws and ordinances which threaten the legitimate sport of blackpowder shooting. We further ask that our public officials at all levels of government speedily amend existing laws and ordinances so that the future of blackpowder shooting can be insured.

Sincerely yours,

TED LESZKIEWICZ,
Commander, Department of Michigan.

Mr. CONYERS. Thank you.

Mr. DAVIS. In the Congressional Record of July 13, 1973, there is a report of a 15-year-old boy hospitalized for a black powder and muzzle-loading rifle explosion on January 10, 1973. I am certain that if there were a conscious effort to collect these kind of statistics on a national basis, that there would be some.

But what I would like to point out, Mr. Chairman and members of the committee, I have in my hand a clipping from the Tucson Daily Citizen of August 6, 1974. Agents of the Bureau of Alcohol, Tobacco and Firearms seized 400 pounds of black powder allegedly stored at the home of an employee of Jimson's Custom Ammunition. Now, if this law were changed, there would be no basis for action by the Bureau of Alcohol, Tobacco and Firearms. I suggest that neither you nor I would like to live near a house where they are storing 400 pounds of black powder, because as has been noted already, it would be the equivalent of about 200 pounds of TNT.

Mr. CONYERS. Mr. Davis, if this law were passed we would still have the Department of Transportation regulations. Can we enter into a discussion of what the practical effect of passing the legislation under consideration would be in that situation?

Mr. DAVIS. Yes, sir. It is difficult for me to speak for the Department of Transportation but our informal contacts with them have indicated that if the exception or limitation of the 5 pounds was removed, they would still enforce the Department of Transportation regulations concerning the transportation of black powder. Obviously, we have two different problems here as to the storage requirements. We have an understanding with the Department of Transportation to avoid any duplication of effort, that all of their activities are directed at the actual transportation, and all of our activities are directed at the storage of this material. In my view, the storage represents a much greater threat to the public safety, because generally it is for a longer period of time. It is true that the transportation of an explosive down a highway represents some danger to other travelers on the highway, but it certainly is not nearly as fixed. If an explosion occurred, it is quite conceivable that no other travelers would be injured.

If the limitation were removed, Mr. Chairman, a person who wished to purchase, say, 100 pounds of black powder and transport it to his home or to some other place where he would use it, would be subject to Department of Transportation regulations. Admittedly that law is much more difficult to enforce, because of the transitory nature of it.

Mr. COHEN. Can I ask you this question? Suppose you have a carload of five people, and each go to an ammunition shop and each buy 5 pounds. Is there any prohibition of 35 pounds being carried in the car?

Mr. DAVIS. Mr. Dexter, do you have any idea about that?

I think they are observing the 5-pound limitation. We would consider that acceptable, because in effect, each person was in possession of 5 pounds, even though the cumulative total would be 25 pounds.

Mr. COHEN. Of course, it would not matter for those who wish to use it for criminal purposes. What we are talking about is the balancing of the safety, which is normally a State function. The States usually make the determination as to proper enforcement which protects the health, safety and welfare of their local cities. But the Department uses the law not to maintain safety in lawful use of black pow-

der but also to control crime. And the question should be one of criminal intent, should it not?

Mr. DAVIS. Title XI, of course, confers responsibility not only for the criminal misuse of explosives, but it also has very heavy responsibility in the area of safe storage through Federal regulation of the storage of explosives and the regulations of the explosive industry.

Mr. COHEN. How about nitrate? We are talking about that before, were we not? That is an explosive, is it not?

Mr. DAVIS. Ammonium nitrate is an explosive when it is mixed with fuel and becomes amfo. At that point it would be covered by our regulations. By reason of the operation of title XI, there has been a notable increase in the safe and secure storage of explosives in this country. We did find some appalling situations around the country in terms of storage. We have worked very closely with State authorities. They have regulations that are comparable to ours. Certainly, we accept their inspection to avoid any duplication.

Mr. COHEN. Can I just go back to the point you just made? You said as a result of this legislation you really had a marked increase in the safety and the storage of black powder. I would be interested in having statistical information prior to the enactment of this law where you had explosive situations because of improper storage as opposed to criminal use of bombs. Do we not have to draw the distinction as to whether you have a plant that you mentioned that exploded because it had 200 pounds or a thousand pounds of black powder? How many instances have there been in which commercially manufactured black powder which was being used for lawful purposes, exploded prior to the enactment of this law. Distinguish that from a situation in which there was actual criminal misuse of it. That is the real question. And I do not think you have any statistics prior to enactment of the law. So how can you say it has increased?

Mr. DAVIS. Of course, certainly the safety of the storage facilities has increased. We had no responsibility for explosives, before the 1970 law. So we do not have comparable statistics. But there are really two things about the thrust of the law. One was the safe storage of explosives, and the second was the secure storage of explosives. It was common practice before the law was enacted to have a little shack at a construction site with dynamite in it, and secured by a nail stuck in the hasp. Obviously this was accessible to criminal elements who wish to get it. And in this respect I have to speak of all explosives, not only of black powder. The law has resulted in safe and secure storage of explosives.

Mr. CONYERS. Mr. Fish.

Mr. FISH. Thank you, Mr. Chairman.

Is it not true that Occupational Safety and Health Administration (OSHA) has prescribed regulations concerning the storage of black powder in commercial establishments?

Mr. DAVIS. Yes, sir. In fact, we have had close negotiation with OSHA. They have agreed to enforce our regulations so that there will not be a proliferation of regulations. Of course, OSHA becomes involved in many kinds of occupational health and safety that we are not involved in. But in those cases where it relates to storage of explosives, they have agreed to accept the Bureau of Alcohol, Tobacco and Firearms regulations. We have worked out a similar agreement

with the Bureau of Mines. We defer to them in those mines where they have jurisdiction, and they enforce the law.

Mr. FISH. If the measure before us becomes law, what effect would that have on these OSHA regulations concerning the storage in commercial establishments?

Mr. DAVIS. It is very difficult for me to speak for OSHA. I think it would depend entirely on their view of the public safety aspects.

Now, we have noted that they have in some cases been interested in places, such as ammunition dealers, where the storage of black powder occurs in terms of the safety of the employees.

Mr. FISH. Could I venture, Mr. Chairman, that it would have no effect. The passage of this legislation would have no effect on the OSHA regulations, since the powder intended for commercial use is still covered by the basic act. The storage seems to be a major concern here. I think we have OSHA in the picture.

Am I not correct in this?

Mr. DAVIS. Yes, I think you probably are.

Mr. FISH. Thank you.

Mr. DAVIS. Again, one other thing that was mentioned earlier—and we are talking about the practical effect of this legislation—is that there are State and municipal ordinances relating to black powder. As a result of the passage of Title XI, we did compile all that we could of the State laws and ordinances relating to the storage of explosives, including black powder. Again, the passage of this bill would certainly not remove those limitations, wherever they exist, in terms of black powder.

Mr. CONYERS. Can we get a report of your survey of the States on the law?

Mr. DAVIS. Yes, sir; we have it. Unfortunately, it is now 2 years old. But we certainly will make it available to the committee.

Mr. COHEN. That does not just pertain to black powder, but to the storage of explosives?

Mr. DAVIS. All types. But usually they would specifically include black powder.

Mr. CONYERS. Have you any other points that should be emphasized in your coming before us today, Mr. Davis?

Mr. DAVIS. No, sir; Mr. Chairman, I believe that covers the points we would like to make before the committee.

Mr. CONYERS. Might I ask, is there any need to consider any halfway course or some limitation on the storage if we are to remove the restrictions that are now sought to be eliminated?

Mr. DAVIS. Well, sir; we certainly would be very happy to work with the committee in those terms. We think certainly the storage and the storage requirements relating to them are very important. It would be possible, for example, by regulation, without the need of law, to provide a category of license which could be called a special sporting license, which would be at a minimal cost, and which would permit the licensees—and when I say a minimal cost, say, $1 a year—to purchase up to 50 pounds of black powder at any one time, instead of 5. And then, of course, to maintain the storage requirements that we presently have in effect.

Mr. CONYERS. How would those storage requirements apply if he were living next door to him?

Mr. DAVIS. We have a table of distances. And under the present regulation, from zero to 1,000 pounds of explosive would have to be stored 75 feet from an inhabited building. So that if I lived next door to a person who wished to keep a quantity of black power on hand, the fact that it was located at least 75 feet from your residence—or any other residence—would insure that it certainly would reduce the possibility of damage or injury.

Mr. CONYERS. Under the present restrictions, can 5 pounds be stored in a home?

Mr. DAVIS. Yes, sir.

Mr. CONYERS. We do have another witness, Mr. David Parsons, a field representative of the National Rifle Association, who is also retired from the U.S. Army Ordnance Corps.

Mr. Parsons, would you like to add anything to our hearings today?

TESTIMONY OF DAVID B. PARSONS, FIELD REPRESENTATIVE, NATIONAL RIFLE ASSOCIATION

Mr. PARSONS. There are a few statements that, frankly, kind of confuse me. I have heard twice now the statement that black powder is "the most sensitive material." There are some real lulus in the world of explosives that are far more sensitive than black powder, and we have worked with them by the millions of pounds, particularly lead styphnate, lead azide, haleite, nitroglycerine, et cetera. And these things are handled daily on a multi-pound basis, and they are treated with all the care deserving of class 7 explosives.

I am also wondering about this zero to 1,000 pounds 75-foot intraline distance that Mr. Davis was quoting. Is that barricaded or unbarricaded? I do not quite correlate that to the Army Manual, frankly.

[Mr. Parsons' statement follows:]

STATEMENT OF DAVID B. PARSONS, PRIVATE CITIZEN, BURLINGTON, IOWA, REPRESENTING THE FLINT CREEK MUZZLE-LOADING RIFLE CLUB

Mr. Chairman, I am David B. Parsons and I have been invited to furnish a statement to this committee on behalf of S. 1083. I willingly undertake this task.

As for my background, I served as Chairman of the Army-Industry Small Arms Ammunition Committee for three years dealing with every North-American producer of small arms ammunition and its components, with the Committee reports going to the Attorney General of the United States. I was Director of Quality Assurance for the Ordnance Ammunition Command dealing with over 600 contractors and 27 government-owned plants involved in the production of ammunition, ammunition components and explosives. I was commanding officer of Lake City Army Ammunition Plant during the period of the Vietnam buildup, going from 1,100 employees to over 11,000 employees in a six month period and bringing production up to over 248 million rounds a month, while at the same time setting a new National Safety Council record of accident-free hours. During this time, I served as United States Contracting Officer for over 200 million dollars worth of ammunition contracts. Of the 27 plant commanders in the ammunition field, I was honored to be rated as the top plant C.O. I further served as Inspector General for the Ammunition Procurement and Supply Agency, inspecting the operation of the aforementioned 27 plants.

Upon retirement, I was employed as Director of Quality Control by the Federal Cartridge Company of Anoka, Minnesota for the purpose of establishing a sophisticated quality control system which subtended the entire spectrum of small arms propellants and metal parts manufacturing process. Later I was hired as Director of Quality Control for the Amron Corporation, a company involved in the production of aircraft cannon ammunition components and of loaded small arms ammunition of 42 types.

Subsequently, I was hired as Senior Engineer by the Iowa Army Ammunition Plant, Burlington, Iowa, which involved the processing of all types of high and low explosives, using same in the formulation and production of the entire spectrum of conventional and nuclear ammunition. During this period, I was co-designer of the Ammunition Demilitarization Facility under construction for the Navy at Hawthorne, Nevada. This is the first facility specifically designed for reducing ammunition back to its component parts and disposing of all types of explosives under conditions of absolute freedom from pollution. I am quite proud of certain of the design characteristics incorporated in this facility.

I have been privileged to have worked with some of the finest explosives talents in the industry, have been associated with, visited in and observed the processes of every ammunition facility in the United States and many of those in the free world.

I hold with pride the Legion of Merit, the Bronze Star, the Distinguished Marksman's Badge and the Distinguished Marksman's Badge in grade of Master from the Republic of Colombia. I served my country in the United States Army as a Bomb Disposal Officer in World War II and retired from same as a Lieutenant Colonel in 1967.

On June 12, 1973, your Senate counterpart was given much testimony pertaining to S. 1083. This testimony covered practically the entire spectrum of parameters which could be considered pertinent to this bill; and I am, therefore, going to border on redundancy in my statement. In other words, what I have to say has in large part been covered previously, but my reiteration of previous statements is no less valid.

It would appear that the events which led to passage of Title XI of the Organized Crime Control Act of 1970, with the resultant restrictions on blackpowder, appealed more to the emotions than the real world. The restrictions on blackpowder were undoubtedly well intended, but I must state that the orientation of those who imposed such restrictions was out of polarity with reality. The apparent goal of precluding criminal bombing is admirable. Yet the available data relating the use of "commercially produced blackpowder" in such acts are at best too inconclusive to support restrictions on such a product (blackpowder). But of more importance is the abject fact that it would be a long and tedious effort to list substances and their ignition techniques that would render explosions of equal or greater force than that derived from blackpowder.

The datum introduced to this committee previously, showing that approximately 4% of the bombings during a certain period of time were accomplished with blackpowder, failed to indicate whether or not such explosive was "commercially produced" or home-made. The fabrication of home-made blackpowder is within the creative talents of the average high school student; indeed, I made my first batch of same when I was no more than twelve or thirteen years old. The success of my product was somewhat indigerent, but of a sufficiently high order that it could have been used for grave mischief if so desired. And there are a number of more efficient, more powerful and, above all, more easily obtained explosive materials than "commercially produced blackpowder." At the risk of appearing overly repetitious, I would name such materials as ammonium nitrate commercial fertilizer, the FBI School standard of brake fluid and Joy dishwashing liquid and, of course, one must not forget the bomber's pet source—stolen explosives of any type, such as dynamites (the dynamite industry has almost been put out of business by the substitute use of ammonium nitrate), TNT, nitro glycerine, etc. Laundry detergents, starches, chalk dust, grain dust, etc. can be and have been sources of explosions past and present. I would also state that, with the possible exceptions of brake fluid and Joy, the above types of materials are in the main far less expensive than is "commercially produced blackpowder." In fact, the last pound of blackpowder I bought cost me $4.30. This is of dramatic import when compared to the current cost of ammonium nitrate at something like seven cents a pound, which pound, if suitably blended with a combustible petroleum product, could equal or better the power of a pound of TNT. And all this for change back from a quarter. Yet I am certain that such data are old hat to the members of this committee.

For many purposes, there truly is no reasonable alternative to the use of blackpowder in military ammunition items. There is certainly no alternative to the use of blackpowder in muzzle-loading firearms. And it is the users of the latter-named firearms that have had to bear the brunt of Title XI. The fellows who have adopted muzzle-loading shooting as their chosen recreational activity do

not deserve the onus of being treated like probable law-breakers. They are not the kind of people who have denied the use of the streets to the honest citizen at night, nor that cause their neighbors to live in fear of their potential for violence. They are basically like the vast majority of their fellow Americans—honest, trying to meet mortgage payments, trying to raise their kids in the right, paying their bills, etc. All in all, they are representative of the most law abiding people in the world, bar none.

I most respectfully submit that the crime problems of this nation are not related to the possession of propellants in the hands of the honest citizen. The crime problems of this nation may more realistically be attributable to the failure of our courts to insure swift and sure punishment for the wrong doer. We have more than enough laws on the books now that prohibit the illicit ownership and use of explosives.

There are an estimated half a million citizens in this country that engage in the shooting of blackpowder muzzle-loading firearms. They do so in part for recreation, in part to sustain the heritage of this country, but in total, they do so for the sheer pleasure of such activity. And the shortage of authorized dealers of their chosen propellant coupled with the five pound limitation imposes a severe deterrent on their sport.

The ease with which cheap and powerful explosives can be fabricated would tend to make the federal explosives law of 1970 appear to be overly restrictive on the valid sportsmen who favor blackpowder. It is for the aforementioned reasons that I respectfully urge favorable passage of those bills which would ease the restrictions on the possession of blackpowder.

I want to thank you gentlemen for your time and consideration in this matter.

Mr. PARSONS. I have heard also the statement that black powder has the explosive effect equal to 50 percent of TNT. Well, under a close confinement, where you have a rupturing vessel which is going to confine to many thousands of p.s.i., it might approximate that. Yet in T.M. 9–1300–214, the Brisance tables show an equivalency value for black powder of 6.3 percent of TNT using the Ottawa sand test.

We have used black powder many, many years, and in many, many gadgets, for such things as time fuses for the artillery, igniter bags for the artillery, and so forth. These black powders are not all strictly the 75–15–10 mix of potassium nitrate, sulphur and charcoal under discussion. Ofttimes those are sodium nitrate mixes, and sometimes bituminous coal is substituted for charcoal. It is possible by the addition of boron and certainly metallic oxides to take black powder and raise it up to at least three times the burning rate of the so-called black powder of which we speak. But these variants we must eliminate since they are not used in muzzle-loading firearms.

I have also heard a comment made about cannoneers being injured by black powder. I co-authored a portion of Technical Bulletin 9–1860–2, and personally investigated many ruptured cannons during the Korean war. And not once did I ever find black powder to be contributory to such a rupture.

Frankly, with the extent of black powder in the hands of the private citizens of this country, accidents are in my opinion, notable by their absence. I do not know how else to put it. Black powder is unstable to the point where you do not want to get it around any luminescence. But the U.S. Army is unable to create friction ignition on a standard ballistic pendulum friction shoe test. In the Trauzl lead block test, we have a Brisance rate that is something on the order of 5.7 percent of TNT.

Black powder is, of course, an explosive. But what is an explosive? You have a fellow working out in your hallway whom I saw this morning, that is carrying quite highly intensive explosive on his belt.

He appears to be an electrician. And he happens to have screwdrivers on him with insulating handles that are undoubtedly made of nitrated nitrocellulose, readily converted to an explosive state.

Mr. CONYERS. Let us get hold of that chap right away. We have got a very important hearing going on in the next room, if not in this one. We have a Vice Presidential confirmation hearing underway, and it could have very serious implications.

Mr. PARSONS. Yes, sir. You can buy such screwdrivers in any hardware store. And maybe some of the girls here are wearing something of nylon, which can also serve as a basis for explosives.

Mr. CONYERS. Let us check that out, too.

Mr. PARSONS. It is kind of difficult to escape the conclusion that maybe the private citizen in this country is not always liked by the fellows in Washington, because I see in Mr. Davis' testimony that we, the citizens, would probably not know what we were doing with black powder, and would usually not store it properly. Frankly, black powder costs six or eight times the price of sugar. And I know the care that my wife gives that stuff. It is a bit of a hassle for people who are pursuing his hobby of muzzle-loading shooting to always worry about crossing a State line, or trying to find a dealer that will sell it to them, et cetera. We do try to keep our 5 pounds on hand. People like me use about 30 or 40 pounds of the stuff a year. But we are all basically good citizens. I think 999 out of 1,000 people in this country are probably the most law-abiding people on the face of the world, barring none. But we do not like being treated like potential criminals. Just consider us as being adults that know what we are doing when we are working with black powder.

I have commanded a couple of ammo plants, and I have never had an incident yet with black powder. And we have used much of the stuff. We have gone through about 25 million pounds of explosives a year; and if you treat explosives with respect, they can be handled safely. And black powder is not the most sensitive explosive in the world, nor is it not the most unstable. It undergoes a very rapid self-propagating transformation into more stable substances, but so does every other explosive. It does generate heat. But so does every other explosive. It does generate gas, practically all explosives do. That is black powder. I am sure that the movie that we are going to see would probably be of more than academic interest to a veteran of Napoleon's army but I doubt if it would show us any new phenomena.

Mr. CONYERS. Mr. Davis, does your expert have any closing observations?

Mr. DAVIS. Yes, sir. I will let him speak for himself.

Mr. DEXTER. It is an established fact that as far as black powder is concerned, it depends upon who you are talking to, whether it is Army, Navy, Air Force, or whatever part of the military service and the DOD. You can talk to a group of pyrotechnicians, people involved in the manufacture of pyrotechnic explosives, or other pyrotechnic materials, or the fireworks industry, and you can go to a dozen military manuals and find various statistics and figures on black powder, as well as current studies made by reputable civilian contractors in the R. & D. establishment today. And I think you will find as I have with the people I have talked to, that they consider black powder as one of

the, if not the most dangerous explosives known to man today. There is not a black powder manufacturer in the world today that has not blown up at least once. And I think it is one of the reasons we have our own plants in other countries, and why we do not manufacture black powder in this country. As a matter of fact, the manufacturer right now, Gearhart-Owen, is the only manufacturer for the military, and they produce a million pounds a year.

As far as the relative effectiveness of black powder, what the gentleman states in this manual is true. However, another military manual, Field Manual 5-25, "Explosives and Demolition", gives the relative effectiveness factor of explosives, and it gives TNT a factor of one, which has been known ever since my association with explosives, which has been some 30 years. And black powder is given a relative effectiveness factor of 5.5. And that is the way we came up with our figures on the power of black powder.

And, of course, black powder is not used in military cannons. It is probably used in the fuses and things like that. But they use other high explosives.

And it is true what he said about other high explosives having a sensitive factor, like lead styphnate. But they have produced a very small quantity. And they use a high detonator. And they are not accessible to the average layman.

Mr. CONYERS. Thank you very much.

Mr. DAVIS. May I make a few observations?

I certainly hope that we did not impugn the capability of the sporting user of black powder. It is certainly not our purpose to do that. We start on the assumption and accept the fact that they are law-abiding citizens, and have a legitimate use for black power.

Our concern, of course, is for the safe storage not only for their protection, but the safety of other people who are in the vicinity.

And so I certainly did not want to give that impression.

In the storage of black powder we are talking about distances. The type of storage facility is elsewhere in the regulations and does specifically identify the type of storage facility that would be located at that 75 foot distance.

In closing, Mr. Chairman and members of the committee, I want to thank you for the opportunity to present the Department of the Treasury's views on this legislation.

Mr. CONYERS. I am grateful to you all.

Do any of the subcommittee members have any observations they want to make?

[No response.]

Mr. CONYERS. Are there any members of the general community or citizens that are here that would like to be heard?

If not, I want to thank everybody that has participated. I am going to ask the subcommittee members to give consideration to this testimony in the next few days, so that we can do whatever we are going to do as expeditiously as possible.

I think the hearings have been fair in terms of the witnesses and the viewpoints they have presented, even though they are quite contrasting. Presented within these hearings is the classic kind of question that the Federal legislature is frequently called upon to resolve; I think it is fair to say that it is really a classic kind of question.

And that is why, Mr. Davis, I am very, very hopeful that Treasury will begin keeping some statistics so that we can come out of the guesstimates and begin to really keep track of the kind of problems that arise in terms of the subject matter under discussion.

So on that note, the subcommittee stands adjourned.

Thank you very much.

[Whereupon, at 10:10 a.m., the subcommittee was adjourned.]

APPENDIXES

APPENDIX 1

CONGRESS OF THE UNITED STATES,
COMMITTEE ON THE JUDICIARY,
HOUSE OF REPRESENTATIVES,
Washington, D.C., May 22, 1974.

Mr. REX D. DAVIS,
Director, Bureau of Alcohol, Tobacco and Firearms, Department of the Treasury, Washington, D.C.

DEAR MR. DAVIS: The Subcommittee on Crime of the House Judiciary Committee was recently referred a bill, S. 1083, together with a number of House versions that would exempt commercially-made black powder from Federal controls set forth in Title XI of the Organized Crime Control Act of 1970.

The Subcommittee staff is now reviewing the testimony, records and evidence adduced by the Senate Judiciary Committee during last year's hearing. As the principal witness against relaxation of such controls, you contributed much valuable information; it would be of great aid to our study of this proposal if you could update that information. Specifically, we would be interested to know first:

(1) For Fiscal Year 1974 (July 1, 1973–June 20, 1974): (a) Under Title XI provisions, how many licenses and permits, by category, were issued? (b) Under Title XI provisions, how many licenses and permits, by category, were denied? (c) The number of criminal cases perfected. (d) The number of persons arrested. (e) The number of pounds of explosives recovered. (f) The number of pounds of explosives voluntarily surrendered to ATF.

(2) More detail on incidents involving explosives and incendiaries, including: (a) A summary of cases involving stolen explosives. (b) A summary of cases involving the regulation of explosives. (c) A summary of cases involving black powder.

Second, it would help us immeasurably if you could supply detailed answers to the questions submitted to you by Senator Bayh last June 28. [See Exhibits 12 and 13 from hearing record, *infra.*] We are particularly interested in receiving responses to those questions that you answered in the asterisked footnote at the conclusion of your report.

Thank you for your assistance.

Sincerely,

JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime.

EXHIBIT NO. 12

JUNE 19, 1973.

Mr. REX DAVIS,
Director, Bureau of Alcohol, Tobacco, and Firearms, Department of Treasury, Washington, D.C.

DEAR MR. DAVIS: On behalf of the members of the Senate Judiciary Committee, I would like to take this opportunity to express my sincere appreciation for your appearance before us on June 12, 1973. Your testimony on the proposed legislation, S. 1083, a bill to exempt commercially produced black powder from the regulatory provisions of Title XI of the Organized Crime Control Act of 1970, is a valuable contribution to our efforts to learn more about the impact of the black powder restrictions.

Enclosed is the transcript of your remarks at the Committee hearing. Please make all corrections in *red ink directly onto the* transcript attached. Kindly return the transcript within ONE WEEK to the Senate Subcommittee to Investigate Juvenile Delinquency, Room 302 Senate Annex, Washington, D.C. 20510. Attn: Mathea Falco.

In addition to responding to questions raised in the course of your testimony, I would appreciate receiving your written responses to the questions set forth below *no later than June 28, 1973.* These questions and your responses will be included in the final printed copy of the hearings.

1. Under Section 842 of Title 18, any person in the business of importing, manufacturing or dealing in explosive materials must obtain a license in accordance with regulations prescribed by the Secretary of the Treasury. Beginning on page 3 of your statement, you provide the total numbers of licenses and permits issued for Fiscal years 1971, 1972, and 1973.

(*a*) How many of these licensees are licensed to manufacture explosives?
How many are licensed to import explosives?
How many are licensed to deal in explosives?

(*b*) How many of these licensed manufacturers manufacture black powder?
How many import black powder?
How many deal in black powder?

(*c*) How many permits have been issued to users of black powder?

2. Since the effective date of Chapter 40 of Title 18 (February 12, 1971), how many licenses or permits have been revoked?

How many of these revocations have been based on violations involving black powder?

Of this total, how many licenses were revoked? How many permits?

Can you tell us the specific reasons for these revocations?

3. How many spot checks of the records required to be maintained under Chapter 40 were conducted in the past year? How many spot checks have been conducted since the effective date of the regulatory provisions of Chapter 40 (February 12, 1971)?

How many of these spot checks were of licensees?

How many were of permittees?

How many specifically involved licensees who import, manufacture, or deal in black powder?

How many involved permittees who use black powder?

4. Under Section 842(f), failure to keep the required records is punishable by a fine of $10,000 or imprisonment for 10 years, or both.

How many cases based on violations of Section 842(f) has your Division forwarded to the Justice Department since the effective date of Chapter 40 (February 12, 1971)?

How many of these cases involved black powder?

5. In your prepared testimony, you provided statistics regarding the number of criminal cases perfected and the number of persons arrested for Fiscal Years 1971, 1972, and 1973 under Title XI of the Organized Crime Control Act.

How many of these cases and arrests involved black powder?

Under what sections of Title 18 were each of these cases involving black powder brought?

How many of these black powder cases were brought *only* for violations of the regulatory provisions of Chapter 40?

How many of these black powder cases were brought *only* for violations of the criminal misuse provisions of Section 844(d)-(i)?

How many of these black powder cases also involved violations of Title II of the National Firearms Act (Section 5861 of Title 26)?

6. You testified that one important feature of Title XI is Section 842(h), making the receipt, concealment, and transportation of stolen explosives a Federal violation.

Of the 1,213 thefts of explosive materials you have investigated since August 1971, how many involved thefts of black powder?

How many cases "regarding the possession of stolen explosives," which you testify that you have made, have been brought under Section 842(h)?

How many of the cases brought under Section 842(h) involved black powder?

7. Under Section 842(j) of Title 18, failure to store explosive materials in a manner not in conformity with regulations promulgated by the Secretary is punishable by a fine of $1,000 or imprisonment for one year, or both.

How many cases involving violations of the storage requirements has your Division forwarded to the Justice Department since the effective date of Section 842(j) (February 12, 1971)?

How many of these storage violations cases involved black powder?

8. How many times and in what specific cases have you been able to alert law enforcement agencies of illegal activities involving black powder by reviewing records of transactions in black powder in amounts greater than five pounds?

9. On page 5 of your prepared statement, you indicate that the five pound black powder limitation applies to the amount in the possession of a single individual. At our June 12 hearings, you heard the testimony of the representatives of muzzle loading organizations which attested to their confusion about the interpretation of the five pound limit.

Would six people travelling in the same car to a meet be allowed to carry a total of 30 pounds of black powder with them?

Would they be required to comply with the storage requirements applicable to black powder in amounts greater than five pounds?

10. On page 11 of your prepared testimony, you provided statistics relative to the number of bombing incidents for Fiscal Years 1972 and 1973. These statistics vary considerably from those supplied by the National Bomb Data Center study which was conducted from July 1970 through February 1972 by the International Association of Chiefs of Police. This study was based on newspaper reports of bombings and field reports from law enforcement personnel, including FBI and ATF agents. According to their reports, during the period July 1, 1971–February 28, 1972 a total of 66 black powder bombs were reported out of a total of 1,634 bombs, or about 4.04%. The LAGP has informed me that data regarding black powder bombs for the remaining four months of Fiscal 1972 are not available. Furthermore, I understand that the FBI took over the contract for the National Bomb Data Center study in Fiscal 1973. Their official reports do not break down bombs by types of explosive filler, particularly black powder.

Why do your figures differ substantially from those supplied by the National Bomb Data Center?

Doesn't the Center have access to the field reports of your agents?

Are your percentages, shown on page 11, based on the total number of *explosive* bombs reported by your agents?

What about the total of all types of bombs, including incendiary devices?

Have you included all bombs reported, including those which never detonated?

What percentage of *all* bombs reported in Fiscal years 1972 and 1973, including explosive and incendiary bombs and bombs which never detonated, did black powder bombs comprise?

Based on the answers to the above questions, how accurate is your statement that "one out of every five bombing incidents reported to ATF involve the use of black powder?"

11. Of the 100 black powder bombs which you report for Fiscal Year 1972 and the 79 black powder bombs which you report for Fiscal Year 1973, how many contained black powder in amounts of five pounds or less?

12. Your testimony stated that "ATF does not keep statistics on the actual number of cases brought and convictions obtained under Title XI which involve black powder because such statistics have little or no impact in the law enforcement area.

Without these statistics, how can you maintain that the regulatory restrictions on black powder are a necessary law enforcement tool?

What other hard data, if any, do you have to substantiate your position?

13. As you know, S. 1083 does not propose the removal of all restrictions on black powder under Section 844, nor does it exempt black powder from the Department of Transportation Regulations issued pursuant to Section 834 of Title 18. Neither does S. 1083 affect in any way Title II of the National Firearms Act. State laws regarding the possession, purchase, storage, and use of black powder would also be unaffected by S. 1083.

Why are those regulations not adequate to protect the public safety?

14. Attachment No. 1 to your prepared testimony describes about a dozen cases "involving stolen explosives."

How many of these cases involved black powder?

How many of these black powder cases involved violations of Section 842(h) of Title 18?

Of those black powder cases involving violations of Section 842(h), how many were also brought under other provisions of law?

Please enumerate these other provisions.

15. Attachment No. 2 to your prepared testimony presents a summary of representative cases involving the regulation of explosives.

How many of these cases involved black powder?

For violations of what provisions of law were these cases involving black powder forwarded to the Justice Department?

16. Attachment No. 3 to your prepared testimony presents a summary of representative cases involving black powder.

For violations of what provisions of law were these cases forwarded to the Justice Department?

Thank you for your assistance.

Sincerely,

BIRCH BAYH, *U.S. Senator.*

Enclosure.

EXHIBIT NO. 13

DEPARTMENT OF THE TREASURY,
BUREAU OF ALCOHOL, TOBACCO AND FIREARMS,
Washington, D.C., June 28, 1973.

Hon. BIRCH BAYH,
U.S. Senate,
Washington, D.C.

DEAR SENATOR BAYH: This is in response to your request of June 19, 1973, asking certain questions concerning black powder in furtherance of S. 1083. I am also enclosing a copy of my statement which I have read and marked as you requested. The numbers below correspond to the numbered questions in your letter.

1. Under Section 842 of Title 18, any person in the business of importing, manufacturing or dealing in explosive materials must obtain a license in accordance with regulations prescribed by the Secretary of the Treasury. Beginning on Page 3 of your statement, you provide the total numbers of licenses and permits issued for Fiscal years 1971, 1972, and 1973.

A. How many of these licensees are licensed to manufacture explosives?

There are 537 licensees for manufacturing explosives.

How many are licensed to import explosives?

See asterisk at conclusion of report regarding licensees for importing explosives.

How many are licensed to deal in explosives?

All explosives manufacturers are permitted to deal in explosives from their manufacturing premises without obtaining an additional dealer's license.

B. How many of these licensed manufacturers manufacture black powder?

To our knowledge only one of these licensees manufactures black powder, but all could manufacture black powder, if they so choose.

How many import black powder?

See asterisk at conclusion of report for response to how many licensees import black powder.

How many deal in black powder?

No statistics are kept of those who deal in black powder.

C. How many permits have been issued to users of balck powder?

See asterisk at conclusion of report for response to this question.

2. Since the effective date of Chapter 40 of Title 18 (February 12, 1971), how many licenses or permits have been revoked?

There have been no revocations of licenses and permits; however, all new applicants for licenses and permits are visited and their storage facilities are examined prior to the issuance of a license or permit.

How many of these revocations have been based on violations involving black powder?

None.

Of this total, how many licenses were revoked? How many permits?

None.

Can you tell us the specific reasons for these revocations?

There were no revocations; however, in fiscal year, 1972, there were 150 licenses and 230 permits denied. Improper storage facilities and unqualified applicants were the specific reasons for most of these denials.

3. How many spot checks of the records required to be maintained under Chapter 40 were conducted in the past year? How many spot checks have been conducted since the effective date of the regulatory provisions of Chapter 40 (February 12, 1971)?

There were 1,141 spot checks from July 1, 1972 to April 1973, and 4,072 since February 12, 1971.

How many of these spot checks were of licensees?

No specific statistics are kept on the spot checks of licensees, but the ratio is approximately two permittees to each licensee.

How many were of permittees?

See above response for how many were of permittees.

How many specifically involved licensees who import, manufacture or deal in black powder?

See asterisk at conclusion of report.

How many involved permittees use black powder?

See asterisk at conclusion of report.

4. Under Section 842(f), failure to keep the required records is punishable by a fine of $10,000 or imprisonment for 10 years, or both.

How many cases based on violations of Section 842(f) has your Division forwarded to the Justice Department since the effective date of Chapter 40 (February 12, 1971)?

See asterisk at conclusion of report.

How many of these cases involved black powder?

See asterisk at conclusion of report.

5. In your prepared testimony, you provided statistics regarding the number of criminal cases perfected and the number of persons arrested for Fiscal years, 1971, 1972 and 1973 under Title XI of the Organized Crime Control Act.

How many of these cases and arrests involved black powder?

See asterisk at conclusion of report.

Under what Sections of Title 18 were each of these cases involving black powder brought?

See asterisk at conclusion of report.

How many of these black powder cases were brought *only* for violations of the regulatory provisions of Chapter 40?

See asterisk at conclusion of report.

How many of these black powder cases were brought *only* for violations of the criminal misuse provisions of Section 844(d)–(i)?

See asterisk at conclusion of report.

How many of these black powder cases also involved violations of Title II of the National Firearms Act (Section 5861 of Title 26)?

See asterisk at conclusion of report.

6. You testified that one important feature of Title XI is Section 842(h), making the receipt, concealment, and transportation of stolen explosives a Federal violation.

Of the 1,213 thefts of explosive materials you have investigated since August, 1971, how many involved thefts of black powder?

These statistics are not subdivided; however, from May 6, 1972 to May of 1973 there were nine significant incidents involving the theft of 981 pounds of black powder.

How many cases "regarding the possession of stolen explosives," which you testify that you have made, have been brought under Section 842(h)?

See asterisk at conclusion of report.

How many of the cases brought under Section 842(h) involved black powder?

See asterisk at conclusion of report.

7. Under Section 842(j) of Title 18, failure to store explosive materials in a manner not in conformity with regulations promulgated by the Secretary is punishable by a fine of $1,000 or imprisonment for one year, or both.

How many cases involving violations of the storage requirements has your Division forwarded to the Justice Department since the effective date of Section 842(j) (February 12, 1971)?

See asterisk at conclusion of report.

How many of these storage violations cases involved black powder?

See asterisk at conclusion of report.

8. How many times, and in what specific cases have you been able to alert law enforcement agencies of illegal activities involving black powder by reviewing records of transactions in black powder in amounts greater than five pounds?

None. The Bureau of ATF is a law enforcement agency, and, as such, is authorized and capable of taking appropriate action when illegal activities are uncovered through records checks.

9. On Page 5 of your prepared statement, you indicate that the five pound black powder limitation applies to the amount in the possession of a single individual. At our June 12 hearings, you heard the testimony of the representatives of muzzle loading organizations which attested to their confusion about the interpretation of the five pound limit.

Would six people travelling in the same car to a meet be allowed to carry a total of thirty pounds of black powder with them?

Yes, six people travelling in the same car to a meet would be allowed to carry a total of thirty pounds of black powder with them.

The statutory and regulatory exemptions of five pounds of black powder has been interpreted by ATF as applying to the individual, as indicated on Page 5 of my June 12, 1973 statement before your Committee.

Would they be required to comply with the storage requirements applicable to black powder in amounts greater than five pounds?

If each person had possession of his five pounds or less after arriving at the meet, he would not be required to meet the storage requirements, however, individuals in possession of five pounds or more would be required to meet the storage requirements, after the meet is over.

10. On Page 11 of your prepared testimony, you provided statistics relative to the number of bombing incidents for Fiscal years, 1972 and 1973. These statistics vary considerably from those supplied by the National Bomb Data Center study which was conducted from July, 1970 through February, 1972 by the International Association of Chiefs of Police. This study was based on newspaper reports of bombings and field reports from law enforcement personnel, including FBI and ATF agents. According to their reports, during the period July 1, 1971–February 28, 1972, a total of 66 black powder bombs were reported out of a total of 1,634 bombs, or about 4.04%. The IACP has informed me that data regarding black powder bombs for the remaining four months of Fiscal, 1972 are not available. Furthermore, I understand that the FBI took over the contract for the National Bomb Data Center study in Fiscal, 1973. Their official reports do not break down bombs by types of explosive filler, particularly black powder.

Why; do your figures differ substantially from those supplied by the National Bomb Data Center?

Our bombing statistics differ from those of the National Bomb Data Center (NBDC) figures quoted by you for several reasons.

The NBDC is a statistics gathering agency which depends upon newspaper reports, and upon law enforcement agency reports whose participation up to July 1, 1972 was limited to members of the International Association of Chiefs of Police.

NBDC has no black powder bomb statistics available for March 1, 1972 through June 30, 1972, as you point out in your inquiry. AFT is not, and has not been a participant in the NBDC reporting system. ATF is a law enforcement agency, whose statistics represent participation in a bombing incident investigation by our own special agents, and ATF special agents are specially trained in the explosives area, enabling them to be more skilled in identifying components of bombing devices.

Doesn't the Center have access to the field reports of your agents?

See answer above.

Are your percentages, shown on Page 11, based on the total number of explosive bombs reported by your agents?

These totals do not include incendiary bombs.

What about the total of all types of bombs, including incendiary devices?

See answer above.

Have you included all bombs reported, including those which never detonated?

Undetonated bombs are included in the totals.

What percentage of all bombs reported in Fiscal years, 1972 and 1973, including explosive and incendiary bombs and bombs which never detonated, did black powder bombs comprise?

ATF statistics on Page 11 of our statement do not include incendiary bombs, but do include both detonated and undetonated bombs in the summary. No estimate is included in the number of black powder bombs which conceivably are a part of the "other" category.

Based on the answers to the above questions, how accurate is your statement that "one out of every five bombing incidents reported to ATF involves the use of black powder"?

11. Of the 100 black powder bombs which you report for Fiscal year 1972, and the 79 black powder bombs which you report for Fiscal year 1973, how many contained black powder in amounts of five pounds or less?

A complete record search would be required to determine whether any of our reported black powder bombs contained more than five pounds of black powder, but we concede that probably none of them did. However, it should be noted that this Bureau is not in favor of the existing five-pound exemption, which is a statutory exemption rather than an ATF concession.

12. Your testimony stated that "ATF does not keep statistics on the actual number of cases brought and convictions obtained under Title XI which involve black powder because such statistics have little or no impact in the law enforcement area".

Without these statistics, how can you maintain that the regulatory restrictions on black powder are a necessary law enforcement tool?

Our determination that black powder should remain under control as a necessary enforcement tool is based on several factors. It is our experience that bombers ordinarily use an inexpensive, readily available explosive material. The Committee hearing emphasizes the scarcity of black powder, and even NBDC statistics show better than 4% of all kinds of bombs contain black powder. We believe that relaxed controls coupled with the anticipated increase in black powder supplies will cause a rise in the number of bombs containing black powder. Additionally, a lack of statutory controls will present serious safety and storage problems.

What other hard data, if any, do you have to substantiate your position?

See asterisk at conclusion of report.

13. As you know, S. 1983 does not propose the removal of all restrictions on black powder. It does not affect the criminal penalties for criminal misuse of black powder under Section 844, nor does it exempt black powder from the Department of Transportation Regulations issued pursuant to Section 834 of Title 18. Neither does S. 1083 affect, in any way, Title II of the National Firearms Act. State laws regarding the possession, purchase, storage, and use of black powder would also be unaffected by S. 1083.

Why are these regulations not adequate to protect the public safety?

State and local laws in some jurisdictions are adequate to safeguard the public from the misuse or unsafe and insecure storage of black powder. However, this is not uniformly true. In addition, the storage requirement provisions aid ATF as a law enforcement tool when other Federal violations are known or suspected to exist.

14. Attachment No. 1 to your prepared testimony describes about a dozen cases "involving stolen explosives".

How many of these cases involved black powder?

Attachment No. 1 includes two incidents in which black powder had been stolen. However, the first two attachments were not specifically intended to show the utilization of black powder, but were intended to indicate a cross-section of successful prosecutions under T–XI. This information was provided in direct response to your inquiry dated June 1, a copy of which is enclosed.

It is interesting to note that the 1972 NBDC Bomb Summary issued by the FBI includes two outstanding bombing incidents against the law enforcement community for each month of the year. Of the 24 cases highlighted for the year, five involved the use of black powder bombs, or about 20%.

How many of these black powder cases involved violations of Section 842(h) of Title 18?

See asterisk at conclusion of report.

Of those black powder cases involving violations of Section 842(h), how many were also brought under other provisions of law?

See asterisk at conclusion of this report.

15. Attachment No. 2 to your prepared testimony presents a summary of representative cases involving the regulation of explosives.

How many of these cases involved black powder?

As explained in response to your question No. 14, the four representative cases were selected to show the effectiveness of Title XI enforcement. None of the four cases were selected because of the type bomb filler used. These cases did not include black powder.

For violations of what provisions of law were these cases involving black powder forwarded to the Justice Department?

See answer above.

16. Attachment No. 3 to your prepared testimony presents a summary of representative cases involving black powder.

For violations of what provisions of law were these cases forwarded to the Justice Department?

Most of the cases cited in Attachment No. 3 involve black powder pipe bombs manufactured by juveniles, involved school buildings, and were either presented in State Court or no charges were filed at all. ATF includes Title XI violations where applicable in drawing charges for presentation to the appropriate U.S. Attorney.

* This paragraph is in response to a number of preceding questions to which the following is equally pertinent. ATF is involved in both the regulatory and enforcement areas concerning explosive materials. While certain statistics are the natural consequence of maintaining these functions, there are many more which may be generated, but do not have a meaningful impact upon effective enforcement. While it is impractical to extract the statistics you have requested at this time, we are pleased to say that we are in the process of becoming computerized, and will, in the near future, be able to comply with requests such as yours.

The following is a summary of the Bureau of ATF's views and position concerning the black powder exemption proposed in S. 1083. Under the circumstances we feel that the Bill, at best, is premature. The scarcity of black powder is conceded by all parties involved, yet, ATF is put in the unenviable position of defending the regulation of black powder while being asked, at the same time, to justify our position by providing supporting statistics showing that black powder has been a problem. We call your attention to the last page of Attachment No. 3 of my original statement, which reproduces an article by Sportswriter George Huber, taken from the October 3, 1971 Edition of the Washington Star. Mr. Huber accurately describes the true reasons for the shortage of black powder. Removal of black powder from regulation, as proposed by S. 1083, will also place the burden of establishing intended use of the power on the Government in connection with criminal investigations, as well as allow the possible indiscriminate storage of black powder in homes and dwelling places, presenting a threat to the safety of the public.

Finally, we do not feel that compliance with the current explosives regulations works an undue hardship on the sporting user of black powder. Other users of explosives, as well as the manufacturers of explosives, have been happy to comply with the regulations and have been most cooperative.

We, therefore, respectfully request that favorable consideration not be given to passage of Bill S. 1083.

Sincerely yours,

REX D. DAVIS.

Attachments.

DEPARTMENT OF THE TREASURY,
Washington, D.C., August 22, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime, House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your letter of May 22, 1974, requesting additional information on black powder in preparation for your consideration of Senate Bill S. 1083, and even though Mr. Hart and Mr. McConnell, of our respective staffs, have conferred several times during the intervening weeks, we want to apologize for the delay in answering.

We have attached a listing of the questions asked in items (1) and (2) of your letter, and our answers to each. We regret that we are unable to supply you with the detailed answers to the questions submitted to us by Senator Bayh, as you requested. We had hoped at that time we would be able to acquire computer capabilities which would permit the ready recall of data of that nature,

but the severe budget restrictions under which we have been required to function have not made this possible.

We feel you should know that our basic position in relation to the black powder issue has not changed from the testimony given at the Senate Judiciary Committee hearing. We are continuing to study ways in which the laws and regulations presently controlling black powder can be administered with a minimum of inconvenience to the legitimate black powder user.

One of our concerns is the danger to the community which arises when quantities of black powder are improperly stored. While the storage problem was touched on briefly during the Senate hearings, it was not full developed and must not be overlooked since black powder remains a highly untrustworthy explosive material.

Our ordnance experts have prepared a film and slide demonstration which clearly indicates the explosive force of black powder, and this is available to the Committee. As a matter of information, the present storage requirements for black powder contained in the regulations which implement Title XI, Regulation of Explosives, are less stringent than those currently required by our military forces.

Please let us know if we can provide addtional information.

Sincerely yours,

REX D. DAVIS,
Director, Bureau of Alcohol, Tobacco, and Firearms.

Enclosure.

ATTACHMENT

Question 1. For Fiscal Year 1974 (July 1, 1973–June 20, 1974) :

a. Under Title XI provisions, how many licenses and permits, by category, were issued?

Answer. 1,896 explosives licenses; 2,815 explosives permits.

b. Under Title XI provisions, how many licenses and permits by category were denied?

Answer. 120 explosives licenses; 21 explosives permits.

c. The number of criminal cases perfected.

Answer. 123.

d. The number of persons arrested.

Answer. 166.

e. The number of pounds of explosives recovered.

Answer. During the period of January 1, 1974, through June 15, 1974, a total of 10,400 pounds of explosives were recovered.

f. The number of pounds of explosives voluntarily surrendered to ATF.

Answer. Our statistical reporting system does not provide us with this information.

Question 2. More detail on incidents involving explosives and incendiaries, including:

a. A summary of cases involving stolen explosives.

Answer. In May, 1974, three persons were convicted in Federal court in Kentucky for breaking into a construction company magazine and stealing over 500 pounds of explosives which were subsequently recovered at a "hippy" commune.

Four persons were sentenced in Federal court in West Virginia in February, 1973, for their theft of explosives valued at over $50,000 from numerous mining company storage bunkers. A portion of the explosives were subsequently used in a bombing in Dayton, Ohio. The sentences ranged from five to eight years.

ATF special agents, investigating several bombings in Oklahoma, were able, in 1973, to trace the explosives used to two construction companies in Tulsa, Oklahoma, from whom the explosives had been stolen. Both companies were convicted and fined in Fedeal court for explosives storage violations.

b. A summary of cases involving the regulation of explosives.

Answer. In April, 1973, ATF special agents uncovered an interstate conspiracy involving the unlawful importation, manufacture and distribution of explosive materials among several fireworks companies. One company unlawfully imported 5,000 pounds of black powder from Canada, and another suffered a tremendous explosion in Massachusetts where three lives were lost at an unlawful fireworks plant.

In May, 1974, a Columbia, South Carolina construction company was found guilty and fined for improperly storing dynamite. The explosives had been stored for a week in a pre-cast concrete man hole before being discovered by a group of high school students who distributed the dynamite to friends throughout the area.

In April, 1973, ATF special agents, investigating the illegal sale of a machine gun by a Federal firearms licensee, seized 108 pounds of black powder and charged the licensee with a violation of the licensing and storage requirements of Title XI, Regulation of Explosives.

ATF agents in Michigan, in January, 1973, charged four motorcycle gang members with explosives storage violations. A liquid type explosive was involved as well as a quantity of blasting caps.

c. A summary of cases involving black powder.

Answer. In February, 1974, an Indiana man was arrested for possessing a black powder pipe bomb. A subsequent search of his garage disclosed a second pipe bomb and twenty-five pounds of black powder which was stored unlawfully.

A Dallas, Texas, high school student was apprehended in March, 1973, after he made several black powder pipe bombs which had sophisticated triggering mechanisms. The young man is currently confined in a private institution.

In June, 1974, in Oregon, a hand grenade, filled with black powder, was thrown onto the porch of a dwelling. Minor property damage resulted and the incident is attributed to hostility between rival motorcycle gangs.

In January, 1973, an Ohio citizen was arrested for possessing two black powder pipe bombs. An additional twenty pounds of black powder was seized at his home.

In another incident in Oregon in June, 1974, a flashlight casing was filled with black powder and the bomb detonated against the door of a private dwelling. Minor damage resulted to the building and the case is still being investigated.

The statistics which are retrievable from our present computer capabilities show that during calendar year 1973, there were a total of 1,085 incidents involving explosives. These are broken down as follows:

Accidental explosions	26
Bombings	345
Incendiary bombings	119
Threats	168
Attempted bombings	136
Recovery of explosives	111
Deaths from these incidents	25
Injuries from these incidents	114

In calendar year 1974, from January 1 through May 15, there were a total of 485 incidents involving explosives. These are broken down as follows:

Accidental explosions	8
Bombings	155
Incendiary bombings	58
Threats	65
Attempted bombings	50
Recovery of explosives	79

The number of incidents involving black powder for calendar years 1972, 1973 and from January 1 through May 15, 1974, are as follows:

	1972	1973	1974
Accidental explosions	0	2	1
Bombings	63	20	13
Incendiary bombings	1	0	0
Attempted bombings	7	10	6
Recovery of explosives	7	3	0
Threats	7	3	0

COMMITTEE ON THE JUDICIARY,
U.S. HOUSE OF REPRESENTATIVES,
Washington, D.C., May 22, 1974.

Mr. HARROLD D. OWEN,
President, Gearhart-Owen Industries,
Moosic, Pa.

DEAR MR. OWEN: The Subcommittee on Crime of the House Judiciary Committee was recently referred a bill, S. 1083, which would exempt commercially-manufactured black powder from controls placed on "destructive devices" by Title XI of the Organized Crime Control Act of 1970. As you know the bill passed the Senate, 68–0, last summer.

The subcommittee staff is now studying the correspondence, testimony and evidence adduced by the Senate Judiciary Committee in its public hearings on S. 1083. The record indicated that your firm was the only such manufacturer that had committed itself to production of significant amounts of the propellant for recreational consumption. The principal question that now remains unanswered at this time is, "How much commercially-made black powder is *now* available to the sportsman, from what sources and at what price?". It would greatly aid our study if you would supply us with such information; of primary interest is: Actual gross production for fiscal 1974 and anticipated output for fiscal year 1975; suggested retail price(s) for the same period, including any fluctuations; and a cataloging of wholesale and/or retail distributorships in the United States, as of the end of this fiscal year. Any other information germane to this inquiry that you might be able to proffer would be welcome.

Thank you for your assistance.

Sincerely,

JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime.

GEARHART-OWEN INDUSTRIES, INC.,
BELIN PLANT,
Moosic, Pa., October 30, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime, House of Representatives,
Washington, D.C.

DEAR SIR: Mr. Harrold Owen asked me to reply to your letter requesting information concerning the quantities of commercially-made black powder which are now available to sportsmen and others. Please excuse the delay. We were awaiting additional information from the field on which to base forecasts.

Our Belin Plant is the last remaining facility in the United States for producing all of the grades of black powder required for military and commercial applications. The plant was built by E. I. du Pont de Nemours and Company which company operated the plant from start-up in 1912 until April, 1973 when the facility was sold to Gearhart-Owen Industries, Inc.

In 1971 du Pont discontinued manufacture of all commercial grades of black powder. Plant operations were continued up until the time of sale, but the output was limited to military grades of powder manufactured on a Government contract.

During the approximate two-year period immediately prior to the change in ownership, requirements for commercial grades of black powder were met in part by C–I–L (Canadian Industries Limited) who imported, through their distribution facility in Plattsburg, New York, powder from Scotland and from their own plant in Canada. Black sporting powder and "A" blasting powder, manufactured by Imperial Chemical Industries, was imported from Scotland. Commercial grades of fuse powder, for the safety fuse industry, were brought into this country from C–I–L's plant in Canada. We do not know the quantities that were imported.

Attached is a listing by months of all black powder produced and shipped from the Belin Plant since its acquisition last year by Gearhart-Owen Industries, Inc. As you requested, sporting powder for recreational consumption is shown separately. The blasting grades of black powder are used both by the quarrying and the public display fireworks industries.

Another black powder product used in quantity is commercial fuse powder which is manufactured to burn at various specific speeds. This grade is used in

the manufacture of safety fuse for blasting operations. It is not included in the attached list for reason that we have not yet recovered this business which was picked up by C–I–L when production of commercial grades of black powder were discontinued at this plant in 1971. C–I–L's Beloil Plant near Montreal is presently on strike so we may again have an opportunity to participate in this market. It is estimated that current requirements of the Ensign Bickford Company's safety fuse manufacturing subsidiary in Mexico, amount to about 500,000 pounds per year.

Although we do not have information on the amount of powder still being imported, we believe we have recovered the major portions of the domestic markets for black blasting and black sporting powders.

The quantities of powder shipped to date in 1974 provide a more accurate picture of the market than do the quantities shipped during 1973 when we were just re-entering the commercial markets. Shipments of sporting powder in 1973 were abnormally high due to necessary establishment of inventories at the distributor level, and normal production of blasting grades had not yet been resumed.

Attached is our production forecast for fiscal 1975. Also attached is a copy of the list of our Black Powder Master Distributors who are responsible for developing qualified jobbers and retailers. Also attached are our price lists for "A" and "B" Blasting, Fireworks, Commercial Fuse and Black Sporting Powders. A distributor's price only is listed for black sporting powder as this product is sold only through distributors. We have not published suggested retail prices, and these vary considerably depending on the availability of the product in an area. We are informed that retail prices vary from 40 percent above our price to distributors to as much as $6.00 to $6.50 per pound in some areas.

Please contact us if we can supply any additional information.

Very truly yours,

P. G. DALMAN, *Manager.*

GEARHART-OWEN INDUSTRIES, INC., BLACK POWDER SHIPMENTS—BELIN PLANT

[Pounds]

	Military	"A" and "B" blasting	Sporting	Total
April 1973				
May	121,875			121,875
June	115,315	22,400		137,715
July	195,165			195,165
August			118,850	118,850
September	67,650	100	62,075	129,825
October	135,575		78,400	213,975
November	131,925	825	76,000	208,750
December	35,250	400	31,500	67,150
9 months, 1973	802,755	23,725	366,825	1,193,305
January 1974	100,000	39,795	3,875	143,850
February	107,275	64,950	24,025	196,250
March	89,825	65,665	47,600	203,090
April	118,850	1,850		120,700
May	29,080	2,445	30,000	61,525
June	150,220	41,000	22,500	213,720
July	123,060	33,650		156,710
August	127,150	103,700	20,000	250,850
September	35,705	53,300	21,300	110,305
9 months, 1974	881,165	406,535	169,300	1,457,000

GEARHART-OWEN INDUSTRIES, INC., BELIN PLANT—PRODUCTION FORECAST FOR FISCAL 1975

Type of black powder	Estimated production (thousand pounds)	Notes
Military	1,000	Government contract.
"A" and "B" blasting	500	If a suggested form of cartridge packaging proves satisfactory, this quantity could be increased by 250,000 pounds as a result of reopening of some quarries in Ohio.
Sporting	200–225	Demand appears to be higher than this, but retail sales regulations restrict availability.
Fuse	(1)	It is hoped that at least half of this market, which is estimated at 500,000 pounds per year, can be recovered.

[1] Unavailable.

GEARHART-OWEN INDUSTRIES, INC., BELIN PLANT, MOOSIC, PA., JULY 1, 1974

BLACK POWDER MASTER DISTRIBUTORS

Alamo Explosives Co., Inc., P.O. Box 393, New Braunfels, TX 78130, 512–625–1111;
Bingham & Parks Lumber Co., Route 1, Advance, NC 27006, 919–998–8183;
C & M Gun Works, 2603 41st Street, Moline, IL 61265, 309–762–5879;
Davis Explosives, Inc., 335½ East Main Cross Street, P.O. Box 743, Findlay, OH 45840, 419–422–2221;
Eastern Sports Distributors Co., Inc., Old Wilton Road, Milford, NH 03055, 603–673–4967;
Hall Explosives, Inc., 24 West Main Street, P.O. Box K, Hummelstown, PA 17036, 717–566–2576;
Hodgdon Powder Co., Inc., 7710 West 50 Hi-Way, Shawnee Mission, KS 66202, 913–362–5410;
Margraf Explosives, Inc., P.O. Box 367, 3166 Fitzgerald Road, Rancho Cordova, CA 95670, 916–635–8112;
Roundup Powder Co., Inc., 119 South Merriam, Miles City, MT 59301, 406–232–1632;
Wampum Hardware Co., R.D. #1, New Galilee, PA 16141, 412–336–4501.

GEARHART-OWEN SUPERFINE BLACK SPORTING POWDER

Standard granulations		U.S. standard testing sieves (number)	
		Min 97 percent through	Min 95 percent through
	Cannon (life saving)[1]	6	12
Fg	Musket	12	16
FFg	Rifle	16	30
FFFg	Pistol	20	50
FFFFg	Priming (flash pan)	40	100

[1] Available on special order.

Note: Distributor Price Schedule S–5, Effective Nov. 1, 1974.

Standard containers:
16 oz. canisters, 25 per case ..... (gross case wt. 32¼ lbs.)
25 lb. metal kegs ..... (gross keg wt. 28 lbs.)
Powder in canisters limited to one granulation per case.

Prices per pound F.O.B. the Belin Plant at Moosic, Pa. (Truckload, 20,000 lbs. and over):

1 lb. canisters	$1.33
25-lb. kegs	1.04

The published minimum prices for all regularly produced grades of black powder will apply to shipments of any combination of grades totaling 20,000 lbs. or more.

For unusual situations or inventory adjustments, shipments of less than truckload quantities of 20,000 lbs. can be made available at an impost of 5¢ per pound over the minimum published prices. The minimum quantity for a less truckload shipment is 5,000 lbs.

Terms of sale: Net 30 days, with interest of 1.5 percent per month on all accounts past due.

Documents required:
(1) For all sales
(a) License, Bureau of Alcohol, Tobacco and Firearms.
(2) For Powder Delivered or Picked up by Purchaser in Pennsylvania.
(a) Pa. Form ER–QE–348 "Permit for the Purchase of Explosives" (Forms can be supplied by the Belin Plant)
(b) Pa. Sales Tax "Blanket Exemption Certificate" Form RTE–355 (Forms can be supplied by the Belin Plant)

D. O. T. classification: Black Powder, Explosives Class A (Explos. A.). Penn-

sylvania permits a maximum of 50 lbs. of explosives to be transported in a passenger car.

Prices subject to change in accordance with distributors' contract.

GEARHART-OWEN BLACK POWDERS—PRICES PER 100 POUNDS FOB THE BELIN PLANT AT MOOSIC, PA.

	30,000 lb.	20,000 lb.	2,000 lb.	Less than 2,000 lb.
"B" blasting	65.50	71.50	77.50	83.50
"A" blasting, fireworks "A" and commercial fuse	69.50	75.50	81.50	87.50
Fireworks meal D, fine meal, and extra fine meal	77.50	83.50	89.50	95.50

The price of powder is determined by the size of the order covered by a single invoice which is delivered or picked up as a single load.

Terms of sale: Net 30 days, with interest of 1.5% per month on all accounts past due.

Documents required:

(1) For all sales:

(a) License, Dept. of the Treasury, Bureau of Alcohol, Tobacco and Firearms.

(2) For powder delivered or picked up by purchaser in Pennsylvania:

(a) Pa. Form ER–QE–348 "Permit for the Purchase of Explosives" (Forms can be supplied by the Belin Plant)

(b) Pa. Sales Tax "Blanket Exemption Certificate" Form RTE–355 (Forms can be supplied by the Belin Plant)

D.O.T. classification: Black Powder—Explosives Class A (Explos. A.) Pennsylvania permits a maximum of 50 lbs. of explosives to be transported in a passenger car.

Standard packaging:[1] 50-lb. fiberboard cases containing two 25-lb. bags. Special packaging in steel kegs (25 lbs. net) may be specified at an additional cost of $3.60 per 100 lbs. of powder.

We shall not be liable for failure to perform or for delay in performance when any such failure or delay is caused by acts of God, war, riots, strikes, failure or shortage of transportation facilities, governmental regulations, reservations or requisitions, priorities, accidents or other cause or causes beyond our control.

Prices subject to change without notice.

GEARHART-OWEN BLACK POWDER—"B" BLASTING, "A" BLASTING, FIREWORKS AND COMMERCIAL FUSE POWDERS—SPECIFICATIONS

"B" BLASTING POWDER

"B" Blasting (Sodium Nitrate) Powder is available in six standard granulations and RR or Railroad Powder, which is a blend of several granulations to obtain increased loading density. All granulations are manufactured glazed.

Granulations		Density		Grain sizes			
				Through		On	
Number	Name	Approximately	Pounds per cubic foot	Sieve[1]	Opening (inches)	Sieve[1]	Opening (inches)
Standard No. 2	CC	1.08	67.4	36/64	0.5625	24/64	0.375
Standard No. 3	C	1.10	68.7	27/64	.4219	18/64	.2812
Standard No. 4	F	1.11	69.3	20/64	.3125	No. 5	.157
Standard No. 5	FF	1.13	70.5	No. 4	.187	No. 8	.0937
Standard No. 6	FFF	1.15	71.8	No. 6	.132	No. 16	.0469
Standard No. 7	FFFF	1.22	76.1	No. 12	.0661	No. 40	.0165
Special No. 57	RR	1.34	83.6	No. 4	.187	No. 40	.0165

[1] U.S. standard testing sieve.

Note: Tolerances: 7½ percent maximum on "through" sieve; 7½ percent maximum through "on" sieve.

[1] Fine meal and extra fine meal granulations are packed 40-lbs. per fiberboard case.

"A" BLASTING AND FIREWORKS POWDERS

"A" Blasting (Potassium Nitrate) Powder is available in seven standard granulations. Fireworks Powder is available in ten standard granulations. All except Meal granulations are manufactured glazed or unglazed. Unless specified, glazed powder will be supplied. Meal granulations only are manufactured unglazed.

Granulations		Grain sizes			
		Through		On	
"A" blasting	Fireworks	Sieve [1]	Opening (inches)	Sieve [1]	Opening (inches)
FA	FA	20/64	0.3125	No. 5	0.157
2FA	2FA	No. 4	.187	No. 12	.0661
3FA	3FA	No. 10	.0787	No. 16	.0469
4FA	4FA	No. 12	.0661	No. 20	.0331
5FA	5FA	No. 20	.0331	No. 50	.0117
6FA	6FA	No. 30	.0232	No. 50	.0117
7FA	7FA	No. 40	.0165	No. 100	.0059
	Meal D	No. 40	.0165		
	Fine meal	No. 100	.0059		
	Extra fine meal	No. 140	.0041		

[1] U.S. standard testing sieves.

Note: Tolerances: 3 percent maximum on "through" sieve; 12 percent maximum through "on" sieve.

COMMERCIAL FUSE POWER AVAILABLE IN TWO BURNING SPEEDS

Speeds [1]	Grain sizes			
	Through		On	
	Sieve [2]	Opening (inches)	Sieve [2]	Opening (inches)
116 seconds per yard	No. 30	0.0232	No. 100	0.0059
140 seconds per yard	No. 30	0.0232	No. 100	0.0059

[1] Lead tube fuse burning speed test.
[2] U.S. Standard Testing Sieves.

Note: Tolerances: 4 seconds per yard; 7 percent maximum on "through" sieve; 2 percent maximum through "on" sieve.

HODGDON POWDER CO., INC.,
Shawnee Mission, Kans., November 15, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman of House Judiciary Subcommittee on Crime,
Washington, D.C.

HONORABLE SIR: We wish to make a statement in support of the proposed black powder exemption bill which will be heard November 21 before your committee.

By way of introduction, our companies are engaged exclusively in wholesaling black and smokeless powders, firearms, ammunition, and components of ammunition. We employ 42 people and sell nationwide and to Canada, Australia, and Europe. We are currently the second largest supplier of black powder in the country.

Sporting black rifle powder is included in 18 U.S.C. Chapter 40, Explosives.

Since this law became effective (our calendar year of 1972, 1973, and 1974), we have sold about 240,000 pounds. Keeping records on this has been difficult and expensive. Every pound of every transaction has to be logged into our magazine and logged out. Every shipment requires a detailed form (#4721) to be filled out by the common carrier. If the buyer lives in our state, yet another form has to be filled out unless he has an explosive license, with copies sent to the Alcohol, Tobacco and Firearms Bureau within 24 hours.

The best reasons to take black powder out of the explosives law are:

(1) There has been no effort by any agency of the government to trace any powder in our records. As we are a major supplier with a great deal of exposure, this proves to us the futility of such a law.

(2) Anyone can make an explosive black powder with ingredients available at his local drug store. Yet, black powder is the material used in only 4% of bombing incidents, including home made and commercial.

(3) This law has added cost and restrictions to the degree that very few dealers go to the expense of providing a required magazine and purchasing the license required. Less than 3% of our dealers who hold firearms licenses also hold federal explosives licenses to be able to sell black powder.

This has resulted in high cost and scarcity, thus hurting the use of black powder for the sport of muzzle loading old style firearms.

Black powder wholesales for as little as $1.50 per pound, but by the time it reaches the consumer, prices are commonly over $4.00, with powder selling in certain areas over $7.00.

(4) Far more violent and easily accessible explosives are not under control of this law; for example, ammonium nitrate fertilizer. No attempt by law has been made to keep records of who buys it, or for what purpose.

Enclosed is a documented experiment by U.S. Treasury Officials with three dollars worth of fertilizer.

(5) There is less hazard in handling small quantities (say under 200 lbs.) of black powder than for the store or individual handling Coleman fluid or gasoline.

Black powder has no fumes as does gasoline or camping fuel, and can be ignited only by a flame or hot spark. Black powder is considered a low grade explosive as compared to dynamite, TNT, or ammonium nitrate; which are high explosives.

Muzzle loading firearms represent a real part of American History, and of recent years interest in them has been rekindled to the degree that they represent a major sport. We feel that releasing black powder from the control of Federal Law should represent no threat to anyone, would make the business of selling these items much less time consuming and, therefore, lower prices to the consumer.

Respectfully,

R. E. HODGDON,
Vice President.

[From the Handloader Magazine, November–December 1971]

$3 WORTH OF FERTILIZER

According to the officers conducting the demonstrations, the blast was created with a homemade bomb rigged with $3 worth of common materials. The principal ingredient was ammonium nitrate fertilizer—available at garden supply stores for about $4 per 80-pound bag, or in bulk from farm suppliers for around $60 per ton.

So what has this to do with handloading? A great deal.

As a result of a sharp increase in terrorist bombings by militant radicals in the past few years, there has been an almost constant stream of explosives control bills introduced by city, state and federal lawmakers.

These bills follow one general theme: requiring licenses of all "explosives" dealers, with permits for "explosives" users. "Explosives" is usually defined in these bills to include all commercial "high explosives," such as dynamite and TNT, but only two "low explosives"—the black powder and smokeless propellants used by handloaders and muzzle loaders.

Thanks to the assistance of the Nixon Administration, the federal explosives control law enacted last year exempted smokeless propellants and five-pound quantities of black powder. It is unfortunate that black powder was not exempted, for the five-pound limit is proving inadequate for many shooters, due to a shortage of local suppliers. Also, although black powder suitable for bombs can be made with a junior chemistry set, the high quality black powder used in firearms must be commercially manufactured.

Since the federal law was enacted, many other bills have been introduced in Congress and in state legislatures which would place additional, more stringent controls upon purchases of "explosives," including smokeless propellant and black powder. Many are poorly drafted, and all would fail to meet their stated objective of reducing terrorist bombings.

The average lawmaker—like the average citizen—has a limited understanding of explosives—and is likely to legislate on the basis of this lack of knowledge, drafting his bill to include "gunpowder." This imprecise term is a holdover from the last century, when black powder similar to that used for guns was the principal blasting agent.

The misunderstanding concerning firearms propellants is furthered by television and movie portrayals of someone blasting his way out of peril with a bomb made with the powder from a half-dozen rifle or pistol cartridges. Like so much else in the movies, "it just don't work that way."

Smokeless propellants are "deflagrants," that is, they burn at a high, but controlled rate, releasing gases which force a bullet out the barrel. A person with considerable knowledge could make a bomb with smokeless propellant, but it is unlikely that he could produce other than a "low order" detonation.

As a guess, based on a considerable amount of research into explosives, duplicating the $3 ammonium nitrate blast depicted on these pages would require at least $1,000 to $2,000 worth of handloader's smokeless propellant (almost as much black powder), an initiating charge of some type of high explosive, and a skillful explosives man. Even that might not do it: no one knows for sure because smokeless propellants simply aren't used that way.

Wouldn't the fact that smokeless can be made into bomb, justify its inclusion in anti-bombing laws? *Only if all other materials which can be made into bombs are similarly controlled.* And that's impossible!

In normal use, smokeless is not an explosive. The same is not true of Nylon panties, gasoline, propane, hand soap, playing cards, sugar, flour, or ammonium nitrate fertilizer. But with a little knowledge, any of these items—and a long, long list of other materials—may be made into bombs as powerful, or many times more powerful, than any bomb made from either smokeless propellant or black powder.

None of the bills we have seen propose to regulate "low explosive" ammonium nitrate fertilizer, yet according to *The Wall Street Journal*, the same material—mixed with fuel oil—to make it a "high explosive"—is being used for 70 percent of the commercial blasting formerly done with dynamite. That standard mix requires an explosive priming charge to insure detonation, but ammonium nitrate fertilizer may be mixed with other materials in such a way as to be detonated by nothing more than a firecracker. The details of such "high explosive" mixtures are available in almost any public or college library.

Whatever laws are passed, such knowledge cannot be repealed; and it is being used by radicals. For instance, the devastating blast which destroyed the Mathematics Research Center at the University of Wisconsin last year, killing one and injuring several, was caused by a trailer loaded with 1,700 pounds of ammonium nitrate fertilizer mixed with gasoline.

Astonishingly, the Wisconsin tragedy has been cited as evidence of the "need" for new explosives laws regulating smokeless propellants—but such proposed laws do not include ammonium nitrate!

Even if ammonium nitrate were included in the laws, it would accomplish nothing, for how much control could be placed on the millions of tons used by farmers. And even if it could be regulated, all of the other potentially explosive materials would still be available—and the information on how to make them explosive would still be in the libraries.

The only sensible solution is to make explosives laws apply only to commercial high explosives, then outlaw the unauthorized possession of any substance prepared in such a way as to perform as a high explosive or destructive bomb. And that is precisely what the existing federal law does (though it needlessly includes black powder limitations).

When your lawmaker begins to think more laws are neded to control explosives, show him these photos and ask him how he proposes to control such homemade explosives.

He may ask, as Rep. Emanuel Celler asked at the explosives hearings last year, "What legislation can we enact to keep explosives out of the hands of bombers?" And you may answer, as both this editor and a demolition expert answered: "None. Explosives are too easy to make."—Neal Knox

APPENDIX 2

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., July 20, 1973.

Hon. PETER W. RODINO, Jr.,
Chairman, House Judiciary Committee,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am writing to request your assistance in expediting action on H.R. 5964, legislation that I have co-sponsored on March 21, relating to an exemption from federal explosives laws for commercially manufactured black powder, percussion caps, safety and pyrotechnic fuses, quick and slow matches and friction primers.

It is my understanding that the Senate version of this legislation, S. 1083 has now been approved by the other body by a margin of 78 to 8. As this bill is very important to sportsmen and "skirmish" participants in my State I would request early affirmative action by your Committee on this matter.

Sincerely,

ROGER H. ZION, M.C.,
Indiana's 8th District.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., September 26, 1973.

Hon. PETER W. RODINO, Jr.,
Chairman, House Judiciary Committee,
Washington, D.C.

DEAR MR. CHAIRMAN: I respectfully urge you to consider scheduling hearings on H.R. 5964, legislation which would exempt from Federal control black powder use for sporting purposes. Similar legislation (S. 1083) has been passed by the Senate and has also been referred to the Committee. I would hope that some action may be scheduled on this legislation.

Sincerely yours,

JEROME R. WALDIE,
U.S. Congressman, 14th District.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., January 22, 1974.

Hon. PETER W. RODINO, Jr.,
Chairman, Committee on the Judiciary,
Washington, D.C.

DEAR MR. CHAIRMAN: I have received word from the Wyoming State Shooting Association that its membership is most desirous to see S. 1083 receive attention by the House during the 93d Congress.

It is my hope that your committee can find the time to give consideration to this bill and to report it out for a Floor vote.

Respectfully yours,

TENO RONCALIO,
Wyoming.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., March 28, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime,
House Judiciary Committee,
Washington, D.C.

DEAR MR. CHAIRMAN: I have sponsored H.R. 5964—to provide an exemption for commercially manufactured blackpowder propellant to be used in antique, muzzle-loading firearms. This bill and several similar measures, including S. 1083, which passed the Senate last July, have been referred to your Subcommittee.

I would respectfully request that this legislation be expedited as soon as possible by your Subcommittee and that this matter be brought to the full House as soon as possible for action. I have many "Skirmish" and "Re-enactment" enthusiasts in my District who would be interested in having prompt action on this bill.

Sincerely,

ROGER H. ZION, M.C.,
Indiana's 8th District.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., April 3, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, House Subcommittee on Crime,
House Committee on the Judiciary, Washington, D.C.

DEAR MR. CHAIRMAN: I am enclosing for your reference a copy of H.R. 5964, a bill to which I am a co-sponsor. This legislation would amend certain provisions of Federal law relating to explosives.

This is to request respectfully that you conduct hearings on H.R. 5964, thereby setting the stage for an evaluation of the merits of this legislation, and I would appreciate being advised as to the prospects for such hearings.

Your prompt, and I hope positive, response to this communication will, indeed, be very much appreciated.

Sincerely yours,

GEORGE A. GOODLING,
Member of Congress.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., September 16, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, Subcommittee on Crime, House Committee on the Judiciary, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I know that your Subcommittee has been studying the provisions of H.R. 11643 as well as the record of the Senate hearings on similar legislation.

As you know, I wrote to you back in April urging prompt action on this measure.

In view of the correspondence I have received urging the passage of this legislation, I would certainly appreciate your efforts in disposing of this bill prior to adjournment of this Congress.

Thank you for your kind cooperation, and with every best wish, I remain

Sincerely yours,

JAMES M. HANLEY,
Member of Congress.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., September 16, 1974.

Hon. PETER RODINO,
Chairman, House Judiciary Committee,
Washington, D.C.

DEAR MR. CHAIRMAN: I write in regard to S. 1083, which would remove the restriction on black powder shooting propellant.

Passage of this bill would mean much to the many antique firearm enthusiasts in Wyoming.

I hope that the Judiciary Committee will find time to consider this bill before the end of the 93d Congress.

Most respectfully yours,

TENO RONCALIO,
Wyoming.

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., September 25,1974.

Hon. PETER RODINO,
Chairman, Committee on the Judiciary, House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: I have today introduced legislation which would exempt blackpowder shooting propellant for use in antique firearms from the provisions of the Organized Crime Control Act of 1970.

My proposal is not new. Identical legislation was passed by the Senate (S. 1083) on July 13, 1973, and similar bills are now pending before your Committee.

Restrictions on the use of commercially produced blackpowder has not significantly deterred terrorists from making bombs, which was the purpose of the restriction. These criminals almost always use home-made blackpowder. They have, however, been a hardship to those who use antique firearms for recreation. Should the present law remain unchanged, the many historical pageants planned for our Bicentennial will not be able to feature any programs that include the firing of antique weapons.

I realize that you and the other members of your Committee have been dealing with a staggering workload for over a year. I do hope, however, that you will be able to report this legislation out during this session of Congress.

Your consideration is deeply appreciated.

Sincerely,

WILLIAM M. KETCHUM,
Member of Congress.

APPENDIX 3

FORT ERIE MUZZLE LOADERS,
Erie, Pa.

Hon. PETER W. RODINO, Jr.

DEAR SIR: I am writing to request your committee to hold hearings and report favorably on (H.R. 5964 Black Powder Relief Bill).

Thank you.

Sincerely yours,

JAMES GUCKERS.

FORT ERIE MUZZLE LOADERS,
Erie, Pa., September 1, 1973.

Hon. PETER W. RODINO, Jr.,
U.S. House of Representatives,
Washington, D.C.

DEAR SIR: The Fort Erie Muzzle Loaders request hearings and early favorable action on Hamilton bill HB 5964, the Black Powder Relief Bill.

We are backing this bill because it will liberalize quantity restrictions for the sportsman and put a stricter control on unlawful use of black powder.

Thank you for your support of the sportsman in the past. Please remember us in future gun legislation.

Sincerely,

JUD TURNER,
Secretary, Fort Erie Muzzle Loaders.

TIFFIN, OHIO, *September 2, 1973.*

Hon. PETER W. RODINO, Jr.,
Chairman, Judiciary Committee, U.S. House of Representatives, House Office Building, Washington, D.C.

DEAR SIR: I solicit earnestly your support of pending legislation, H.R. 5964, H.R. 1901, and H.R. 5497, providing relief for those of us engaged in the sporting use of black gunpowder.

Original legislation restricting purchase and possession by individuals to a maximum of five pounds per item was designed to keep quantities larger than this from the hands of terrorist bombers; yet it is recorded that very little of this low explosive has ever been the ingredient of bombs so made. In reality, the terrorist has had readily available, at far lower cost, and of much higher explosive value, several materials not even restricted by law, nitrogen-based fertilizers being a notable example.

On the other hand, present restrictive law has tended to dry-up the supply of black powder to we shooters of historical weapons. We've used these traditionally in sporting competitions, commemorating various periods in the history of our country, notably revolutionary and civil wars, and pioneering expansion. Our ancient weapons, frequently originals, together with modern replicas, cannot use any substitute propellant; modern smokeless powder, with its high explosive effect, would destroy them.

Please consider these points when proposed legislation comes under study. Your help toward preservation of our wholesome, historically oriented sport will be appreciated very much, not alone by we shooters, but by members of our families, who've become equally involved.

Sincerely yours,

GEORGE W. THOMSON,
Member, North-South Skirmish Association, National Muzzle Loading Rifle Association, Ohio Gun Collectors' Association, National Rifle Association.

C.S.S. "VIRGINIA" LANDING PARTY, C.S.N.,
September 6, 1973.

Hon. PETER W. RODINO, Jr.,
Chairman, U.S. House of Representatives,
House Office Building, Washington, D.C.

DEAR REPRESENTATIVE RODINO: This is a request to favorably report HR–5964 to the House for action as soon as possible.

SB–1083 recently passed with a 78 to 8 margin vote, request your support and necessary actions to pass in the House. If you are currently not in favor of HR–5964, please write me explaining why not. I will be glad to communicate with you further.

Thank you for your attention and your support.

Sincerely,

DAVID ANTEMANN,
Adjutant, Ship's Scribbler.

118TH PENNSYLVANIA VOLUNTEER INF.,
Maple Shade, N.J., September 11, 1973.

DEAR MR. RODINO, Jr.: I am writing to you with hope that you will understand how much Bill Number 5964 Black Powder Relief means to me as a blackpowder sportsman.

This is the only sport in which I am involved in and love. It is getting harder to purchase enough powder to use in our sporting events. I hope you can see my problem and give some good thought in a way you can help relieve this situation.

Thank you,

ALBERT E. GIBSON.

OLD WESTMORELAND RIFLES,
Pittsburgh, Pa., September 17, 1973.

Mr. RODINO,
Washington, D.C.

DEAR SIR: I am writing to express my support of H.R. 5964 to remove the restrictions from the purchase and possession of sporting grades of blackpowder.

Those of us who shoot muzzle-loading guns cannot use modern smokeless powder for reasons of safety, and the existing restrictions are greatly hampering a wholesome, traditional sport.

Hoping to see H.R. 5964 brought to the floor of the House this session, I am

Sincerely yours,

J. SCOTT JOHNSTON.

THE POTOMAC ARMS COLLECTOR'S ASSOCIATION,
September 24, 1973.

Hon. PETER W. RODINO, Jr.,
House Office Building,
Washington, D.C.

DEAR CONGRESSMAN RODINO: May I take a minute of your time to refer to H.R. 5964, the so called black power bill, now before the House Judiciary Committee for hearings. As you will recall the Senate version of this bill passed the Senate by the overwhelming vote of 78 to 8.

This bill, H.R. 5964, is of vital importance to me, as a black powder shooter active in the North-South Skirmishes and as a hunter using black powder weapons. As you may know, Virginia, for the 1st time this year declared a special hunting season for those who hunt with black powder weapons. Several other states have followed the same pattern. This shows that our fraternity is not of insignificant numbers.

There is another reason which appears to speak for and favor the passage of this legislation. The American Revolution Bi-Centennial Celebration, which is just over the horizon, will suffer considerably if black powder is unavailable to use in the Revolutionary muskets and cannons as they were used two hundred years ago.

I hope you can give your full support to get the bill on the floor of the House and secure its passage.

With kindest regards,

GEORGE S. KNIGHT.

ILLINOIS STATE MUSEUM,
DEPARTMENT OF ANTHROPOLOGY,
QUATERNARY STUDIES CENTER,
Springfield, Ill., October 6, 1973.

Hon. PETER W. RODINO, Jr.,
U.S. House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN RODINO: I would like to urge your support for House bill H.R. 5964 exempting black powder from the five pound limit per shooter. Those of us who are preserving part of our nations heritage by our interest in muzzle loading firearms are finding supplies of black powder extremely short. The present five pound limit has prompted many dealers to cease handling it and unfortunately black powder is the only safe propellant for muzzle loading firearms. Unless the present restrictions are modified I am afraid interest in this historical early American sport will severly diminish.

Your support to bring H.R. 5964 to a committee hearing and for its eventual passage will help preserve one of the oldest American sports, marksmanship with the muzzle loading rifle.

Sincerely,

JAMES E. KING, Ph. D.
Associate Curator.

McNEILL'S RANGERS, C.S.A.,
Baltimore, Md., March 30, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, House Judiciary Subcommittee on Crime, U.S. House of Representatives, Washington, D.C.

DEAR SIR: I am writing in regard to the black powder relief bill, House bill #HR5964. It has been quite some time now since I have heard any word on this bill. As Commander of McNeill's Rangers C.S.A., a 22-member blackpowder shooting team within the ranks of the North South Skirmish Association, this bill is of great importance to me and the members of our organization.

The results of recent black powder bills have already curtailed some of the activities in our type of sport and could easily eliminate it forever.

I would like to suggest that a hearing on this bill be set up. If such a hearing has already been scheduled, would you please advise me of the date and time.

Respectfully,

WESLEY E. COLEMAN,
Commander.

108TH NEW YORK VOLUNTEER INFANTRY REGIMENT,
Rochester, N.Y., September 2, 1974.

Hon. JOHN CONYERS, Jr.,
House of Representatives,
Washington, D.C.

DEAR SIR: Even though none of our members is a part of your constituency, you are a very important person to us. As chairman of the Subcommittee on Crime of the Judiciary Committee, your choice may decide whether a black powder exemption bill is reported to the floor of the House this session. We certainly hope it will. Therefore, I am writing on behalf of the whole group urging you to take action on S. 1083 or a similar bill which you may be considering, so that this matter may leave your committee and be considered by the entire House of Representatives.

Let me explain why we feel this way. Our group is made up of people interested in the Civil War.

Along with reading about this period we also enjoy the chance to participate in a little "living history" by firing the muzzle-loading weapons used at that tie in competition. All weapons of this type can be fired *only* with black powder. As the law now reads it is difficult for us to obtain and use this very necessary propellant. This new bill would ease these restrictions and make it possible for us to enjoy our sport without any problems. This, I hope, explains our interest in this matter.

Thank you for taking the time to read this letter and we hope you will decide in our favor.

Sincerely yours,

ORTON BEGNER, *Adjutant.*

CONSOLIDATED SPORTSMEN OF LYCOMING COUNTY,
Williamsport, Pa., September 10, 1974.

Hon. JOHN CONYERS, Jr.,
U.S. House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN CONYERS: At a meeting of the Consolidated Sportsmen of Lycoming County it was pointed out the Black Powder Bill, S. 1083, has been in the Sub-Committee on Crime since July.

By a unanimous motion the Secretary was instructed to contact you and urge a favorable report to the House of Representatives.

There is a growing use of black powder by Sportsmen using muzzle loader rifles for sport and hunting and the restricting of the use of black powder would prove hardships on these Sportsmen.

The Sportsmen of Lycoming County strongly urge you and your committee to find favorable the S. 1083 Bill and inform them of your action.

Very Sincerely,

CHARLES A. NUSS, *Secretary.*

MOSBY'S RANGERS, C.S.A.,
43RD BATTALION, 1ST VIRGINIA CAVALRY,
Wicomico, Va., September 10, 1974.

Hon. JOHN CONYERS, Jr.,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN: I am writing in behalf of our blackpowder organization, Mosby's Rangers. We are members of the North-South Skirmish Association. We are asking for your help and support in bringing Bill S. 1083 up for a vote before this congressional session ends. We need help in getting this bill out of the Subcommittee on Crime. Your support for this bill will benefit many of our local citizens enjoy a hobby that is as old as our country itself.

As you may know, this Bill passed in the Senate by a margin of 78–8. Many of our people have worked hard to bring this this far, please don't let it die in some committee.

This Bill would ease some of the restrictions on commercially manufactured blackpowder. This is the only type of propellent that we can use in our Civil War period arms. Modern smokeless types of powder would destroy these old

arms. The current restrictions were placed on the sale and possession of blackpowder during the period of bombings that were so popular a few years ago. The truth was that blackpowder was not used in these bombings, because of its low explosive yield.

Passage of this Bill would be a big relief to thousands of blackpowder users country wide. Should more information be desired please call or write me at the above address.

Most sincerely,

B. H. HARRIS, Jr.

56TH PA. VOL. INFANTRY,
September 16, 1974.

Hon. JOHN CONYERS, Jr.,
House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN: We, as members of the 56th Pa. Volunteer Infantry associated with the North-South Skirmish Association, ask your immediate consideration to bill S. 1083. We feel it is imperative to have this bill be passed to protect the sportsmens position; and to uphold the historical value which the NSSA lends to our past.

It is unfortunate that the law abiding citizens and shooters must bear a greater punishment than the criminal. We all know the criminal is not the least bit hampered with allowable amounts of, or the transporting of black powder. We know the criminal is little concerned about NSSA reenactments, demonstrations, etc. much less a concern about recreational shooting by sportsmen.

We deeply appreciate any action you and your committee take to protect our sports oriented position.

Very truly yours,

ROBERT HAMILTON, *Adjutant.*

17TH VIRGINIA INFANTRY,
September 19, 1974.

Hon. JOHN CONYERS, Jr.,
U.S. House of Representatives,
Washington, D.C.

DEAR CONGRESSMAN CONYERS: This letter is addressed to you in your capacity as Chairman of the Subcommittee on Crime. I took the liberty of calling the Subcommittee office this morning and learned that S. 1083 still had not been acted upon.

Since this is the case, I would like to express the concern of both myself and the organization I represent over the future of this bill. The enclosed article reprint tells the story of our growth and present status, but in brief, we are a large group of Americans who are trying to keep alive some of the traditions and heritage of our country. A basic ingredient in our observance of an important aspect of our history is black powder propellant. The focus of our association is musket competition with small arms of the Civil War era, and even though we adopt the names and uniforms of Civil War regiments, I can assure you that we are not a group of adolescents, acting out some half remembered roles. Our membership includes scholars, corporate executives, farmers and laborers—and is extremely family oriented.

The problem is, with the current restrictions on black powder propellant it is very difficult for many units to either buy or transport the substance, and if the restrictions continue, or increase, the primary reason for our being, namely the many "Skirmishes" that are held, will cease to be, and in a short time, so will we.

With regard to the initial reason for legislation against black powder, namely the terrorist bombings of the late sixties and early seventies, a study by the International Chiefs of Police showed that only 149 out of 4000 bomb devices used black powder—and even then there was no distinction between home-made and commercial black powder. A small number indeed to warrant such stringent measures.

In addition, we are fast approaching the celebration of this nation's Bicentennial. The order of the day in many communities throughout the country will be re-enactments of various historic battles. If you have access to the July

Master Reference of the American Revolution Bicentennial Administration you will note on page 54 a large number of musket firing demonstrations—and this is the tally to date with over a year to go before the Bicentennial really swings into action.

What I am trying to say is that the restrictions on black powder will not really deter anyone if he wants to blow something up. A bag of certain types of commercial fertilizer equipped with fuze and blasting cap will serve just as well as black powder.

The fact is simply that there is a vast segment of the public that derives a great deal of enjoyment and family participation through observances of our historic past and these observances employ the use of black powder propellant. From what I have been able to learn, there are just no valid reasons why any obstacles should be placed in the way of our being able to continue and add to these observances. I therefore urge you to use the authority granted you as Chairman of your Subcommittee and direct S. 1083 to the Floor as soon as possible.

Sincerely,

JONATHAN F. ABEL, *Adjutant.*

The Story of:

North-South Skirmish Assoc.

Founded 1950

By Jon Abel

NORTH MEETS SOUTH

TWICE A YEAR, over 2,000 dedicated black powder shooters assemble with their families at a scenic spot called Fort Shenandoah outside of Winchester, Virginia. There they spend a few days in marksmanship competition while keeping alive some of the most noble traditions of the American Civil War.

What started as a friendly, but determined, musket match between two five-man teams has grown into an association of over 150 teams or "regiments" that represent major Civil War units from the states that participated in the conflict.

The North/South Skirmish Association had humble beginnings. In 1949, some publicity was given a months-leading match that was held at the Berwyn Rod and Gun Club in Maryland. This attracted the attention of the Norfolk Long Rifles who wrote and asked if a competition could be arranged between the Yankee team and the Norfolk shooters. A match was agreed upon for spring of the following year.

During the months prior to the shoot, preparations were made for entry into this new field of military musket shooting. Hardware and accoutrements were searched out and found. Musket bayonets were 50 cents, cartridge boxes were $1.25 and cap boxes ran 25 cents apiece. A mint musket from Bannerman's in New York cost $25 to $30. The Library of Congress yielded information on the manual of arms, instructions on making cartridges and the loading methods for the musket.

A drizzly Sunday in May, 1950, found the Berwyn Bluteliter and the Norfolk Gray Backs assembled at Berwyn with a crowd of about a hundred spectators gathered to witness this tribute to history. The competitors dressed in uniforms of the period marched on the field to the tune of "Dixie" and faced two groups of bales, fifteen each, which had been arranged on the twenty five-yard line. Loading was completed "by the numbers", the command to fire was given, and when the smoke cleared, fifteen ballons stared back at the "Yankee" team while only two remained before the Confederates. Firing and loading continued at fast as possible from the offhand position with the cry of "cease fire" clearly showing the Confederates to be the winners.



With all ranges hot, marksmen are keen to finished to signal timer; 17th Va. Inf. firing.

The second event of the day was fired at standard match targets from fifty yards with the Confederates again taking the field. This was followed by a drill and manual of arms demonstration, and after the presentation of awards, the event was ended and the seeds of an organization were planted.

Certain lessons were learned that day. More balls could not be made out of just any old lead. It had to be pure. Rounds created from melted fan weights create some interesting flight patterns. Also, the lubricant had to be soft. Someone had poured the wool to the Berwyn team to smooth their rounds with melted Detaghouse records!

Today the spirit of competition runs just as high, but the preparations are a little more knowledgeable and sophisticated – up to a point. The script of competition has widened to include pistols and carbines, with authenticity as a prime factor. Weapons must be those manufactured prior to the Civil War, or N.S.S.A. approved replicas like those currently being reproduced in Italy such as the replica Remington Zouave and many varieties of pistols. A reproduction of the Mississippi rifle is now on the market; however, a replica of the Springfield, the most widely used weapon of the war, has yet to be manufactured and accepted. Practically all carbines are originals or modified approved replica muskets.

Membership in the association also brings about some old and searching on the part of the collector/shooter. Mixed feelings are just part of the reaction upon seeing authentic Harper's Ferry, Robbins & Lawrence, Enfield and Sawtelle pieces being put through the rigors of continuous competition.

However, the many cleaners, solvents and preservatives that are available today do much to prolong the life of the weapon. Blakite is a popular bore cleaner, Hoppe now has a black powder and there is always the old reliable – hot, soapy water.

Bullet lubricants range from Crisco, to ready-made specialties, to home-made mixtures of tallow, beeswax and other animal and industrial products. Many an experiment has resulted in a fouled bore and a gooey cartridge box – especially when the temperature goes over ninety degrees on the line.

Lead, as stated before, must be pure. It can be bought at a hardware store, but the vast majority of it is scrounged from junk yards, plumbing scraps and other sources where purity is assured and the grain of the lead runs high. There are also the pickers who converge on the battle after a shoot and dig out the spent rounds, relying on the oldest shovel knowledge as a guarantee of quality. Many a housewife has encountered strange arrivals coming from the kitchen or basement as her husband melts down some load of dubious origin.

Although other calibers and shapes are shot, the most prevalent bullet is the .58 Minie ball with moulds available from Lyman. Powder is either FFg or FFFg, depending on the preference of the shooter. The number of grains in the load is also up to the individual and ranges between forty to sixty grains.



Authentic CW Springfields share the back with Remington Zouave replicas as well units to sure to fire in competition.



The Washington Blue Rifles at Prewett Arms during opening ceremonies. Rain is rare on the Sunday range shoot, though there are right that it was a soggy Saturday!

Timer and safety officer manage line firing. Some competitors is permitted if a man does not have a team to shoot with or a team is short by a man or two. Every shooter gets to shoot.



A friend spots hits in individual competition. Fifty-yard marks (right) call for five shots in two shots being used for sighter. Ten go in 100-yard target, with second half being the sighter.



The pow-der is measured out and put into a small cardboard tube with one end sealed. The lubricated bullet is then worked into the open end down to about the first to second lubricating ring from the bottom and the cartridge is complete.

Caps are readily available and are primarily of European manufacture.

The loading procedure, much like the Civil War manual, is to pull the bullet from the tube with the teeth, pour the powder down the barrel, place the bullet in the muzzle, ram it home, place a cap on the nipple, aim and fire. A good shooter can load and get an accurate shot off in twenty seconds or less.

Authenticity is also prevalent in the selection and manufacture of uniforms. A few uniforms can be purchased from outfitters and specialty firms with caps or "kepis" being readily available at dealers' counters at the matches. The vast majority of the teams have home-made clothing, many of them with moths in various stages of disrepair giving the wearer the look of the veteran. At the twice-yearly Nationals held at Winchester there is even a costume competition for the women which is judged with fierce attention to authentic detail.

Practically all shoots are family affairs featuring every variety of tent and trailer. Campgrounds in "tent fits" provide souvenirs and a vast array of hardware, weapons and shooting supplies.

A typical weekend match would consist of individual competition on Saturday fired at match targets at fifty and a hundred yards with the musket and/or carbine and pistol competition at twenty five and fifty yards.

Sunday is the team competition, a team consisting of a regimental organization of eight men. A regiment may have as many as four eight-man teams, however, most units field only an "A" and "B" team.



Reloading before the big day features a warm-up drill for individual shooters and modern scopes are okay for spotting.



Hair and hearth lend authentic touch in 27th Virginia Infantry. Few Looks for Jeff, but played Lincoln on TV often.

Targets for the team shoot vary, but a typical selection starts at the hundred foot with five shot volley fire at a silhouette, with points given for the number of hits, followed by eight man fusee pots fired at against time.

Moving to the fifty yard line, all targets are fired at against time. For the first event there might be sixteen small clay pots suspended in a frame, followed by sixteen water-filled beer cans on styrofoam cups. Then there would be thirty-two clay pigeons mounted on a sheet of cardboard, and the finale would be the state cutting event where a length of composition board is suspended in the frame. A thick line is painted vertically in the middle of the board, and the object is to shoot the board in half using the line as an aiming point. This one can really burn up the ammunition.

The team with the shortest amount of time spent busting all targets and with the most shots in the silhouettes is the winner.

One aspect of the competition which deserves mention, if not a separate article in itself, is the artillery shoot. The cannoneers are as dedicated a group as ever graced a skirmish, with loading and aiming procedures down to a fine science. Many a trampike driver has been startled to find himself peering down the muzzle of a trailer-mounted field piece as an artillery unit takes to the road for a shoot.

If authenticity is the keynote of the NSSSA, then safety is the watchword. Ar Fort Shumenhoh, the overall umpire of the competition is governed from a control tower where the range officer directs the smoke and relays through a public address system. Behind each firing line the line officer is a safety officer who ensures that all precautions are enforced. Before each relay starts the order is given to "snap caps" to make sure the muskets are clear. Then the order is given to "load and come to the ready." Firing commences when the range officer blows a whistle into the Public Address system. "Cease fire" comes with another whistle blast after which each shooter must snap a cap and spring his ram rod down the barrel in the presence of the safety officer to prove his musket is empty. Then he may retire from the line. The range boasts an automatic timing system and there is a back-up man behind each target with a stop watch. No cartridges may be assembled on the range.

Practically all regiments require their shooters to wear glasses and almost all cars are protected with some sort of metal suppressor.

Conduct of competition varies as some of the regional matches, however because of the nature of this type of shooting, with the many steps taken to load and fire, all units are extremely safety conscious.

Regional shoots are held from spring through fall wherever a sufficient number of teams can participate. For most members this is an opportunity to sharpen their skills for the fall or spring Nationals. For all it is a chance to escape the mess of modern life and relive a part of our American past.

Muzzleloader shooters are a minority within a minority - the shooting fraternity of the United States - and lack the influence of even that small group. In this age, when so much emphasis is being placed on the preservation of our heritage, it would be a shame to see this continuing tribute to our past disappear, because some well meaning people and a few criminals use black powder as a weapon against society.

For the members of the North/South Skirmish Association, the organization becomes a part of their lives. Perhaps this is because they do more than simply get together and shoot. In a sense they weave themselves into the historical fabric of the affairs. You cannot become an active member of the 57th Virginia Infantry, the Old Dominion Dragoons, the Lionel Brigade or the 24th Michigan Volunteers without some feeling of what it must have been like at Shiloh, Antietam, Bull Run or Gettysburg. ●



The Commander's art is not neglected. Compares R. 10th Alcock Carolina Artillery, take positions as prescribed in the manual, waiting for the shot to touch off their authentic period piece.



Original Enoch carbines back and back along the line as competitors vie at shattering clayboids on frames.



Physical handicaps are cheerfully ignored by this shooter taking aim on the line. Note authenticity of the uniforms.



Competitors engage in a re-hash of the match and, believe it or not, all are in uniform of reasonable authenticity!

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CITIZENS COMMITTEE FOR THE
RIGHT TO KEEP AND BEAR ARMS,
Bellevue, Wash., November 11, 1974.

Hon. JOHN CONYERS, Jr.,
House Committee on the Judiciary,
Rayburn House Office Building,
Washington, D.C.

DEAR REPRESENTATIVE CONYERS: On behalf of the 50,000 plus members of the Citizens Committee for the Right to Keep and Bear Arms I wish to submit the following statement for the record with respect to the hearings on exempting commercially manufactured black powder used in antique weapons from regulatory provisions of title XI of the Organized Crime Control Act of 1970 before the Subcommittee on Crime of the House Committee on the Judiciary to be held on Thursday, November 14th.

THOUGHTS ON THE BLACK POWDER ISSUE

Under present Federal law, the purchase, possession, storage and transportation of black powder is subject to extensive regulation. The result is serious hardship for the many thousands of Americans who legitimately use black powder for everything from target shooting to the actual cannon blast necessary for the finale of Tchaikowsky's "1812 Overture". Legislation to remove the five pound limitation on commercially produced black powder was passed in the Senate by a margin of 78–8 on July 13. At least four similar bills await action in the House.

Opponents of this legislation have suggested that lifting the five pound limitation on black powder would "open doors" for terrorists and bombers. This grim picture plays on the fears of the crime-sensitive public and obscures the real issues. Certainly, questions must be asked. But the answers must be based on fact, not emotion.

How do Americans use commercially produced black powder? Some 500,000 people are involved with the increasingly popular sport of muzzle loading, collecting and shooting antique and replica firearms. Thousands gather at numerous competitive target shooting events all over the country, the largest of which, at Friendship, Indiana, attracts over 15,000 participants and spectators each year. Additional thousands have been drawn by the challenge of hunting with muzzle hunting with muzzle loading rifles and shotguns; so many that 39 states now permit hunting with black powder guns. In short, black powder is a necessity for the wholesome recreation of a multitude of sportsmen.

Other users include the Boy Scouts, historical and veteran's groups. Black powder is employed in a variety of ceremonies, flag-raisings, centennials and patriotic occasions.

Here are some more answers to questions on the black powder issue:

Question. Isn't five pounds enough for the legitimate user of black powder?

Answer. Blackpowder sportsmen have reached a degree of sophistication where as many as four different kinds of black powder are needed. Buying these four different kinds within the five pound-lot limitation causes a serious inconvenience, if not a prohibition.

Question. Have the restrictions on commercial black powder affected its availability?

Answer. Due to the five pound limitation and resulting expense and inconvenience many dealers have been forced out of business. In some communities it is very difficult to get any black powder. The Cincinnati Symphony Orchestra is now unable to perform the "1812 Overture"; they have no source of commercial black powder for the cannon blast finale.

Question. Has black powder been extensively used in bombing incidents?

Answer. Studies conducted by the National Bomb Data Center reveal that black powder is used actually in only an insignificant number of bombings. During the period July, 1970, through June, 1971, 2,352 bombings were recorded by the Center. Of these only 96 involved black powder. Even more significant, homemade black powder (which, as any high school student knows, can easily be made from sulfur, saltpeter, and charcoal) is well suited for bombs but is useless as a shooting propellant.

Question. Would lifting the present restrictions on commercial black powder encourage its illegal use?

Answer. A comparison of the bombing reports for the eight month period preceding the effective date of the Federal law which imposed restrictions on black

powder, and the eight month period following that date, reveals that the number of black powder bombings actually increased. Moreover, highly explosive devices can inexpensively be made from a variety of materials which are not regulated or restricted by any law. For example, ammonium nitrate fertilizer may be mixed with other commonly available materials and detonated by nothing more than a firecracker. The recipe for this "high explosive" can be found in many public and college libraries. The tragic blast which destroyed the Mathematics Research Center at the University of Wisconsin was caused by a trailer loaded with 1,700 pounds of ammonium nitrate fertilizer mixed with gasoline. Clearly, it is impossible to restrict the ingredients for such homemade devices.

Based on the facts, it is clear that legislation to remove black powder restrictions is not a threat to public safety. And judging from the strong support that sportsmen have given to like-spirited legislation in the past, it is hoped that Congressman Hamilton's Black Powder Relief Bill (H.R. 5964) will be favorably acted on during this session of Congress.

Sincerely yours,

ALAN M. GOTTLIEB,
Executive Director.

BATTERY E, 4TH. UNITED STATES ARTILLERY,
November 15, 1974.

To: Congressman John J. Conyers, Jr., Subcommittee Chairman, House Judiciary Committee, Subcommittee on Crime.

From: Ord. Sgt. Joe Turner, Commander, Battery E, 4th. U.S. Artillery CWSA and Adjutant, Elect, CWSA.

Subject: Support of bills; SB 1083, HR 14549 and HR 14018.

DEAR SIR: This letter is being written to request your favorable endorsement of the above listed bills which in effect would, upon passage, lift the federal restrictions on commercially produced Black Powder used for sporting purposes. As a member of a black powder shooting team and organization the Civil War Skirmish Association, Inc., The American Mountain Men and the National Muzzle Loading Rifle Association I can say that the lifting of the restriction on black powder as it relates to the legal use of that substance for sporting purposes would be a most welcome event and would greatly enhance retail sales as well as encourage more individuals to come into the ranks of organized and supervised shooting clubs such as ours. Most of the functions of our organization revolve around the use of muzzle loading weapons and it is the supervised and competitive use of these weapons that draw together the families of the participants at the matches which we call skirmishes. Being a historically oriented shooting organization we are also cognizant of our responsibility to protect our sport through the traditional and willing respect for reasonable laws, especially those that pertain to our sport. We also feel that since we consider ourselves good citizens and through our examples while on the firing line are a good representation of the black powder shooter that we are responsible enough not to lose those material advantages granted through the lifting of the federal restriction on black powder.

As responsible citizens as well as responsible skirmishers we request your fair and hopefully favorable consideration of the black powder bills before you and your committee.

Respectfully submitted,

JOE TURNER, *Adjutant.*

THE NATIONAL SOCIETY OF THE
SONS OF THE AMERICAN REVOLUTION,
NATIONAL HEADQUARTERS,
Washington, D.C., November 19, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, House Judiciary Subcommittee on Crime, U.S. House of Representatives, Washington, D.C.

DEAR MR. CONYERS: Our great nation has already begun to celebrate its Bi-Centennial and will soon observe the 200th anniversary of the Declaration of Independence.

The Bi-Centennial is and will be commemorated in many ways, including celebrating the anniversaries of prominent events of the War for Independence and of the Revolutionary period.

The Sons of the American Revolution are of course very concerned with properly commemorating the great events which resulted in the achievement of Independence for the United States of America.

The muskets, pistols and cannons used in historical Bi-Centennial re-enactments and shooting matches are all muzzle-loaders. Only one form of propellant—commercially manufactured blackpowder—can be used to fire them. Because of the restrictions on blackpowder propellant imposed by Title XI of the Organized Crime Control Act of 1970, we are concerned about the availability of blackpowder for Bi-Centennial activities.

It is most ironic that "the shots heard 'round the world" were fired in a clash between the Colonists and British troops marching to seize stores of blackpowder and arms accumulated by the Colonists.

In accordance with the enclosed resolution passed at their February 2, 1974 meeting, the Sons of the American Revolution express their support for the blackpowder ammunition exemption amendments before your committee. We deeply appreciate your holding hearings on the matter and urge you to do all in your power to bring this important legislation to a vote before the adjournment of the 93rd Congress.

We would appreciate very much your making this letter and resolution part of the hearing record.

Sincerely,

WARREN S. WOODWARD, *Executive Secretary.*

Enclosure.

RESOLUTION ON LAWS REGULATING THE USE OF BLACKPOWDER PROPELLANT

Whereas, our forefathers fought for and gained the independence of this nation through the use of muzzle-loading firearms; and

Whereas, our nation was carved out, settled, and developed by men and women who relied on muzzle-loading firearms for both and protection; and

Whereas, the muzzle-loading shooting activities of the National Rifle Association, the North-South Skirmish Association, the National Muzzle-Loading Rifle Association, the numerous other organized and unorganized users of blackpowder propellant form a wholesome sport steeped in American heritage; and

Whereas, the problems faced by the legitimate users of blackpowder shooting propellant will have a serious impact on historical reenactments, pageants, and shooting matches to be held in conjunction with the forthcoming celebration of the Bicentennial of the American Revolution; and

Whereas, commercially manufactured blackpowder is the only propellant (gunpowder) which can be used safely in muzzle-loading and other firearms specifically designed for it; and

Whereas, the future use of firearms similar to those used by our forefathers is gravely threatened because blackpowder propellant has been classified as an explosive and severely restricted as such under Title XI of the Crime Control Act of 1970; and

Whereas, the present restrictions on ammunition components for antique firearms impose excessive restrictions on honest citizens without placing any real corresponding burdens on potential bombers; and

Whereas, terrorist bombers face no shortage of explosive materials, with the wide range of commercially made explosives and the vast numbers of potential bomb ingredients available in drug, grocery, and hardware stores or chemistry laboratories, blackpowder shooters are limited to using commercially manufactured grades of blackpowder; and

Whereas, the United States Senate has already acted to provide an exemption for commercially manufactured blackpowder propellant through the overwhelming passage (78–8) of S. 1083;

Therefore, be it hereby resolved that the Trustees of the National Society of the Sons of the American Revolution assembled in Washington, D.C. the second day of February, 1974, do approve and endorse Senate Bill No. 1083 as being essential to one of the objects of said Society, namely "to celebrate the anniversaries of the prominent events of the war and of the Revolutionary period."

THOMPSON/CENTER ARMS,
Rochester, N.H., November 25, 1974.

Hon. JOHN CONYERS, Jr.,
Chairman, House Judiciary Subcommittee on Crime, U.S. House of Representatives, Washington, D.C.

DEAR SIR: We are deeply concerned over Senate bill S. 1083 which is presently under consideration by your committee. We urge the passage of this bill as quickly as possible.

The 5 pound restriction on the purchase and storage of black powder for use in sporting black powder guns is a distinct handicap to the growth of the sport of muzzle loading.

We manufacture completely in our plant in Rochester, New Hampshire, high quality muzzle loading rifles. To give you an idea of the increasing popularity of this sport, since the introduction of our first muzzle loading rifle just 5 years ago, we have since produced and sold muzzle loading rifles and accessories that have exceeded 20 million dollars in retail sales. We have doubled our production capacity each year for the past 5 years.

We understand other manufacturers of muzzle loaders are experiencing a similar trend. In addition many of the State Fish & Game Commissions are recommending and implementing special muzzle loading hunting seasons which will increase the popularity of the sport even further.

Since most muzzle loading shooters use at least two different granulations of powder and many smaller sporting goods dealers do not handle black powder due to the 5 pound restrictions and the complexities of handling, storage and shipping, the individual is seriously handicapped in obtaining his basic needs in pursuing the sport of muzzle loading shooting.

We realize information relative to the popularity and magnitude of the muzzle loading sport may be difficult to obtain and we hope that this information may be helpful to you and your committee in analyzing the importance and magnitude of this bill.

Respectfully,

R. GUSTAFSON, *Vice President.*

APPENDIX B—CURRENT LAW

Following is Title XI of the Organized Crime Control Act of 1970, Pub. L. 91–452, Oct. 15, 1970, 84 Stat. 952, 18 U.S.C. Chapter 40. H.R. 5964, *et al.* would amend section 845(a) by striking the current 5 pound limitation.

PUBLIC LAW 91–452, 91ST CONGRESS, S. 30—OCTOBER 15, 1970

TITLE XI. REGULATION OF EXPLOSIVES

PURPOSE

SEC. 1101. The Congress hereby declares that the purpose of this title is to protect interstate and foreign commerce against interference and interruption by reducing the hazard to persons and property arising from misuse and unsafe or insecure storage of explosive materials. It is not the purpose of this title to place any undue or unnecessary Federal restrictions or burdens on law-abiding citizens with respect to the acquisition, possession, storage, or use of explosive materials for industrial, mining, agricultural, or other lawful purposes, or to provide for the imposition by Federal regulations of any procedures or requirements other than those reasonably necessary to implement and effectuate the provisions of this title.

SEC. 1102. Title 18, United States Code, is amended by adding after chapter 39 the following chapter:

"Chapter 40.—Importation, Manufacture, Distribution and Storage of Explosive Materials

"Sec.
"841. Definitions.
"842. Unlawful acts.

"843. Licensing and user permits.
"844. Penalties.
"845. Exceptions; relief from disabilities.
"846. Additional powers of the Secretary.
"847. Rules and regulations.
"848. Effect on State law.

"§ 841. Definitions

"As used in this chapter—

"(a) 'Person' means any individual, corporation, company, association, firm, partnership, society, or joint stock company.

"(b) 'Interstate or foreign commerce' means commerce between any place in a State and any place outside of that State, or within any possession of the United States (not including the Canal Zone) or the District of Columbia, and commerce between places within the same State but through any place outside of that State, 'State' includes the District of Columbia, the Commonwealth of Puerto Rico, and the possessions of the United States (not including the Canal Zone).

"(c) 'Explosive materials' means explosives, blasting agents, and detonators.

"(d) Except for the purposes of subsections (d), (e), (f), (g), (h), (i), and (j) of section 844 of this title, 'explosives means any chemical compound mixture, or device, the primary or common purpose of which is to function by explosion; the term includes, but is not limited to, dynamite and other high explosives, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter, and igniters. The Secretary shall publish and revise at least annual in the Federal Register a list of these and any additional explosives which he determines to be within the coverage of this chapter. For the purposes of subsections (d), (e), (f), (g), (h), and (i) of section 844 of this title, the term 'explosive' is defined in subsection (j) of such section 844.

"(e) 'Blasting agent' means any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive: *Provided*, That the finished product, as mixed for use or shipment, cannot be detonated by means of a numbered 8 test blasting cap when unconfined.

"(f) 'Detonator' means any device containing a detonating charge that is used for initiating detonation in an explosive; the term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses and detonating-cord delay connectors.

"(g) 'Importer' means any person engaged in the business of importing or bringing explosive materials into the United States for purposes of sale or distribution.

"(h) 'Manufacturer' means any person engaged in the business of manufacturing explosive materials for purposes of sale or distribution or for his own use.

"(i) 'Dealers' means any person engaged in the business of distributing explosive materials at wholesale or retail.

"(j) 'Permittee' means any user of explosives for a lawful purpose, who has obtained a user permit under the provisions of this chapter.

"(k) 'Secretary' means the Secretary of the Treasury or his delegate.

"(l) 'Crime punishable by imprisonment for a term exceeding one year' shall not mean (1) any Federal or State offenses pertaining to antitrust violations, unfair trade practices, restraints of trade, or other similar offenses relating to the regulation of business practices as the Secretary may by regulation designate, or (2) any State offense (other than one involving a firearm or explosive) classified by the laws of the State as a misdemeanor and punishable by a term of imprisonment of two years or less.

"(m) 'Licensee' means any importer, manufacturer, or dealer licensed under the provisions of this chapter.

"(n) 'Distribute' means sell, issue, give, transfer, or otherwise dispose of.

"§ 842. Unlawful acts

"(a) It shall be unlawful for any person—

"(1) to engage in the business of importing, manufacturing, or dealing in explosive materials without a license issued under this chapter;

"(2) knowingly to withhold in formation or to make any false or fictitious oral or written statement or to furnish or exhibit any false, fictitious, or misrepresented identification, intended or likely to deceive for the purpose of ob-

taining explosive materials, or a license, permit, exemption, or relief from disability under the provisons of this chapter; and

"(3) other than a licensee or permitee knowlingly

"(A) to transport, ship, cause to be transported, or receive in interstate or foreign commerce any explosive materials, except that a person who lawfully purchases explosive materials from a licensee in a State contiguous to the State in which the purchaser resides may ship, transport, or cause to be transported such explosive materials to the State in which he resides and may receive such explosive materials in the State in which he resides, if such transportation, shipment, or receipt is permitted by the law of the State in which he resides; or

"(B) to distribute explosive materials to any person (other than a licensee or permittee) who the distributor knows or has reasonable cause to believe does not reside in the State in which the distributor resides.

"(b) It shall be unlawful for any licensee knowingly to distribute any explosive materials to any person except—

"(1) a licensee;

"(2) a permittee; or

"(3) a resident of the State where distribution is made and in which the licensee is licensed to do business or a State contiguous thereto if permitted by the law of the State of the purchaser's residence.

"(c) It shall be unlawful for any licensee to distribute explosive materials to any person who the licensee has reason to believe intends to transport such explosive materials into a State where the purchase, possession, or use of explosive materials is prohibited or which does not permit its residents to transport or ship explosive materials into it or to receive explosive materials in it.

"(d) It shall be unlawful for any licensee knowingly to distribute explosive materials to any individual who:

"(1) is under twenty-one years of age;

"(2) has been convicted in any court of a crime punishable by imprisonment for a term exceeding one year;

"(3) is under indictment for a crime punishable by imprisonment for a term exceeding one year;

"(4) is a fugitive from justice;

"(5) is an unlawful user of marihuana (as defined in section 4761 of the Internal Revenue Code of 1954) or any depressant or stimulant drug (as defined in section 201(v) of the Federal Food, Drug, and Cosmetic Act) or narcotic drug (as defined in section 4721(a) of the Internal Revenue Code of 1954); or

"(6) has been adjudicated a mental defective.

"(e) It shall be unlawful for any licensee knowingly to distribute any explosive materials to any person in any State where the purchase, possession, or use by such person of such explosive materials would be in violation of any State law or any published ordinance applicable at the place of distribution.

"(f) It shall be unlawful for any licensee or permittee willfully to manufacture, import, purchase, distribute, or receive explosive materials without making such records as the Secretary may by regulation require, including, but not limited to, a statement of intended use, the name, date, place of birth, social security number or taxpayer identification number, and place of residence of any natural person to whom explosive materials are distributed. If explosive materials are distributed to a corporation or other business entity, such records shall include the identity and principal and local places of business and the name, date, place of birth, and place of residence of the natural person acting as agent of the corporation or other business entity in arranging the distribution.

"(g) It shall be unlawful for any licensee or permittee knowingly to make any false entry in any record which he is required to keep pursuant to this section or regulations promulgated under section 847 of this title.

"(h) It shall be unlawful for any person to receive, conceal, transport, ship, store, barter, sell, or dispose of any explosive materials knowing or having reasonable cause to believe that such explosive materials were stolen.

"(i) It shall be unlawful for any person—

"(1) who is under indictment for, or who has been convicted in any court of, a crime punishable by imprisonment for a term exceeding one year;

"(2) who is a fugitive from justice;

"(3) who is an unlawful user of or addicted to marihuana (as defined in section 4761 of the Internal Revenue Code of 1954) or any depressant or stimulant

drug (as defined in section 201(v) of the Federal Food, Drug, and Cosmetic Act) or narcotic drug (as defined in section 4731(a) of the Internal Revenue Code of 1954); or

"(4) who has been adjudicated as a mental defective or who has been committed to a mental institution; to ship or transport any explosive in interstate or foreign commerce or to receive any explosive which has been shipped or transported in interstate or foreign commerce.

"(j) It shall be unlawful for any person to store any explosive material in a manner not in conformity with regulations promulgated by the Secretary. In promulgating such regulations, the Secretary shall take into considertaion the class, type, and quantity of explosive materials to be stored, as well as the standards of safety and security recognized in the explosives industry.

"(k) It shall be unlawful for any person who has knowledge of the theft or loss of any explosive materials from his stock, to fail to report such theft or loss within twenty-four hours of discovery thereof, to the Secretary and to appropriate local authorities.

"§ 843. Licenses and user permits

"(a) An application for a user permit or a license to import, manufacture, or deal in explosive materials shall be in such form and contain such information as the Secretary shall by regulation prescribe. Each applicant for a license or permit shall pay a fee to be charged as set by the Secretary, said fee not to exceed $200 for each license or permit. Each license or permit shall be valid for no longer than three years from date of issuance and shall be renewable upon the same conditions and subject to the same restrictions as the original license or permit and upon payment of a renewal fee not to exceed one-half of the original fee.

"(b) Upon the filing of a proper application and payment of the prescribed fee, and subject to the provisions of this chapter and other applicable laws, the Secretary shall issue to such applicant the appropriate license or permit if—

"(1) the applicant (including in the case of a corporation, partnership, or association, any individual possessing, directly or indirectly, the power to direct or cause the direction of the management and policies of the corporation, partnership, or association) is not a person to whom the distribution of explosive materials would be unlawful under section 842(d) of this chapter;

"(2) the applicant has not willfully violated any of the provisions of this chapter or regulations issued hereunder;

"(3) the applicant has in a State premises from which he conducts or intends to conduct business;

"(4) the applicant has a place of storage for explosive materials which meets such standards of public safety and security against theft as the Secretary by regulations shall prescribe; and

"(5) the applicant has demonstrated and certified in writing that he is familiar with all published State laws and local ordinances relating to explosive materials for the location in which he intends to do business.

"(c) The Secretary shall approve or deny an application within a period of forty-five days beginning on the date such application is received by the Secretary.

"(d) The Secretary may revoke any license or permit issued under this section if in the opinion of the Secretary the holder thereof has violated any provision of this chapter or any rule or regulation prescribed by the Secretary under this chapter, or has become ineligible to acquire explosive materials under section 842(d). The Secretary's action under this subsection may be reviewed only as provided in subsection (e)(2) of this section.

"(e)(1) Any person whose application is denied or whose license or permit is revoked shall receive a written notice from the Secretary stating the specific grounds upon which such denial or revocation is based. Any notice of a revocation of a license or permit shall be given to the holder of such license or permit prior to or concurrently with the effective date of the revocation.

"(2) If the Secretary denies an application for, or revokes a license, or permit, he shall, upon request by the aggrieved party, promptly hold a hearing to review his denial or revocation. In the case of a revocation, the Secretary may upon a request of the holder stay the effective date of the revocation. A hearing under this section shall be at a location convenient to the aggrieved party. The Secre-

tary shall give written notice of his decision to the aggrieved party within a reasonable time after the hearing. The aggrieved party may, within sixty days after receipt of the Secretary's written decision, file a petition with the United States court of appeals for the district in which he resides or has his principal place of business for a judicial review of such denial or revocation, pursuant to sections 701–706 of title 5, United States Code.

"(f) Licensees and permittees shall make available for inspection at all reasonable times their records kept pursuant to this chapter or the regulations issued hereunder, and shall submit to the Secretary such reports and information with respect to such records and the contents thereof as he shall by regulations prescribe. The Secretary may enter during business hours the premises (including places of storage) of any licensee or permittee, for the purpose of inspecting or examining (1) any records or documents required to be kept by such licensee or permittee, under the provisions of this chapter or regulations issued hereunder, and (2) any explosive materials kept or stored by such licensee or permittee at such premises. Upon the request of any State or any political subdivision thereof, the Secretary may make available to such State or any political subdivision thereof, any information which he may obtain by reason of the provisions of this chapter with respect to the identification of persons within such State or political subdivision thereof, who have purchased or received explosive materials together with a description of such explosive materials.

"(g) Licenses and permits issued under the provisions of subsection (b) of this section shall be kept posted and kept available for inspection on the premises covered by the license and permit.

"§ 844. Penalties

"(a) Any person who violates subsections (a) through (i) of section 842 of this chapter shall be fined not more than $10,000 or imprisoned not more than ten years, or both.

"(b) Any person who violates any other provision of section 842 of this chapter shall be fined not more than $1,000 or imprisoned not more than one year, or both.

"(c) Any explosive materials involved or used or intended to be used in any violation of the provisions of this chapter or any other rule or regulation promulgated thereunder or any violation of any criminal law of the United States shall be subject to seizure and forfeiture, and all provisions of the Internal Revenue Code of 1954 relating to the seizure, forfeiture, and disposition of firearms, as defined in section 5845(a) of that Code, shall, so far as applicable, extend to seizures and forfeitures under the provisions of this chapter.

"(d) Whoever transports or receives, or attempts to transport or receive, in interstate or foreign commerce any explosive with the knowledge or intent that it will be used to kill, injure, or intimidate any individual or unlawfully to damage or destroy any building, vehicle, or other real or personal property, shall be imprisoned for not more than ten years, or fined not more than $10,000, or both; and if personal injury results shall be imprisoned for not more than twenty years or fined not more than $20,000, or both; and if death results, shall be subject to imprisonment for any term of years, or to the death penalty or to life imprisonment as provided in section 34 of this title.

"(e) Whoever, through the use of the mail, telephone, telegraph, or other instrument of commerce, willfully makes any threat, or maliciously conveys false information knowing the same to be false, concerning an attempt or alleged attempt being made, or to be made, to kill, injure, or intimidate any individual or unlawfully to damage or destroy and building, vehicle, or other real or personal property by means of an explosive shall be imprisoned for not more than five years or fined not more than $5,000, or both.

"(f) Whoever maliciously damages or destroys, or attempts to damage or destroy, by means of an explosive, any building, vehicle, or other personal or real property in whole or in part owned, possessed, or used by, leased to, the United States, any department or agency thereof, or any institution or organization receiving Federal financial assistance shall be imprisoned for not more than ten years, or fined not more than $10,000, or both; and if personal injury results shall be imprisoned for not more than twenty years, or fined not more than $20,000, or both; and if death results shall be subject to imprisonment for any term of years, or to the death penalty or to life imprisonment as provided in section 34 of this title.

"(g) Whoever possesses an explosive in any building in whole or in part owned, possessed, or used by, or leased to, the United States or any department or agency thereof, except with the written consent of the agency, department, or other person responsible for the management of such building, shall be imprisoned for not more than one year, or fined not more than $1,000, or both.

"(1) uses an explosive to commit any felony which may be prosecuted in a court of the United States, or

"(2) carries an explosive unlawfully during the commission of any felony which may be prosecuted in a court of the United States, shall be sentenced to a term of imprisonment for not less than one year nor more than ten years. In the case of his second or subsequent conviction under this subsection, such person shall be sentenced to a term of imprisonment for not less than five years nor more than twenty-five years, and, notwithstanding any other provision of law, the court shall not suspend the sentence of such person or give him a probationary sentence.

"(i) Whoever maliciously damages or destroys, or attempts to damage or destroy, by means of an explosive, any building, vehicle, or other real or personal property used in interstate or foreign commerce or in any activity affecting interstate or foreign commerce shall be imprisoned for not more than ten years or fined not more than $10,000, or both; and if personal injury results shall be imprisoned for not more than twenty years or fined not more than $20,000, or both; and if death results shall also be subject to imprisonment for any term of years, or to the death penalty or to life imprisonment as provided in section 34 of this title.

"(j) For the purposes of subsections (d), (e), (f), (g), (h), and (i) of this section, the term 'explosive' means gunpowders, powders used for blasting, all forms of high explosives, blasting materials, fuzes (other than electric circuit breakers), detonators, and other detonating agents, smokeless powders, other explosive or incendiary devices within the meaning of paragraph (5) of section 232 of this title, and any chemical compounds, mechanical mixture, or device that contains any oxidizing and combustible units, or other ingredients, in such proportions, quantities, or packing that ignition by fire, by friction, by concussion, by percussion, or by detonation of the compound, mixture, or device or any part thereof may cause an explosion.

"§ 845. Exceptions; relief from disabilities

"(a) Except in the case of subsections (d), (e), (f), (g), (h), and (i) of section 844 of this title, this chapter shall not apply to:

"(1) any aspect of the transportation of explosive materials via railroad, water, highway, or air which are regulated by the United States Department of Transportation and agencies thereof;

"(2) the use of explosive materials in medicines and medicinal agents in the forms prescribed by the official United States Pharmacopeia, or the National Formulary;

"(3) the transportation, shipment, receipt, or importation of explosive materials for delivery to any agency of the United States or to any State or political subdivision thereof;

"(4) small arms ammunition and components thereof;

"(5) black powder in quantities not to exceed five pounds; and

"(6) the manufacture under the regulation of the military department of the United States of explosive materials for, or their distribution to or storage or possession by the military or naval services or other agencies of the United States; or to arsenals, navy yards, depots, or other establishments owned by, or operated by or on behalf of the United States.

"(b) A person who had been indicted for or convicted of a crime punishable by imprisonment for a term exceeding one year may make application to the Secretary for relief from the disabilities imposed by this chapter with respect to engaging in the business of importing, manufacturing, or dealing in explosive materials, or the purchase of explosive materials, and incurred by reason of such indictment or conviction, and the Secretary may grant such relief if it is established to his satisfaction that the circumstances regarding the indictment or conviction, and the applicant's record and reputation, are such that the applicant will not be likely to act in a manner dangerous to public safety and that the granting of the relief will not be contrary to the public interest. A licensee or permittee who makes application for relief from the disabilities incurred under this chapter by reason of indictment or conviction,

shall not be barred by such indictment or conviction from further operations under his license or permit pending final action on an application for relief filed pursuant to this section.

"§ 846. Additional powers of the Secretary

"The Secretary is authorized to inspect the site of any accident, or fire, in which there is reason to believe that explosive materials were involved, in order that if any such incident has been brought about by accidental means, precautions may be taken to prevent similar accidents from occurring. In order to carry out the purpose of this subsection, the Secretary is authorized to enter into or upon any property where explosive materials have been used, are suspected of having been used, or have been found in an otherwise unauthorized location. Nothing in this chapter shall be construed as modifying or otherwise affecting in any way the investigative authority of any other Federal agency. In addition to any other investigatory authority they have with respect to violaions of provisions of this chapter, the Attorney General and the Federal Bureau of Investigation, together with the Secretary, shall have authority to conduct investigations with respect to violations of subsection (d), (e), (f), (h), or (i) of section 844 of this title.

"§ 847. Rules and regulations

"The administration of this chapter shall be vested in the Secretary. The Secretary may prescribe such rules and regulations as he deems reasonably necessary to carry out the provisions of this chapter. The Secretary shall give reasonable public notice, and afford to interested parties opportunity for hearing, prior to prescribing such rules and regulations.

"§ 848. Effect on State law

"No provision of this chapter shall be construed as indicating an intent on the part of the Congress to occupy the field in which such provision operates to the exclusion of the law of any State on the same subject matter, unless there is a direct and positive conflict between such provision and the law of the State so that the two cannot be reconciled or consistently stand together."

(b) The title analysis of title 18, United States Code, is amended by inserting immediately below the item relating to chapter 39 the following:

"40. Importation, manufacture, distribution and storage of explosive materials . . . 841."

SEC. 1103. Section 2516(1)(c) of title 18, United States Code, is amended by inserting after "section 224 (bribery in sporting contests)," the following: "subsection (d), (e), (f), (g), (h), or (i) of section 844 (unlawful use of explosives)".

SEC. 1104. Nothing in this title shall be construed as modifying or affecting any provision of—

(a) The National Firearms Act (chapter 53 of the Internal Revenue Code of 1954);

(b) Section 414 of the Mutual Security Act of 1954 (22 U.S.C. 1934), as amended, relating to munitions control;

(c) Section 1716 of title 18, United States Code, relating to nonmailable materials;

(d) Sections 831 through 836 of title 18, United States Code; or

(e) Chapter 44 of title 18, United States Code.

SEC. 1105. (a) Except as provided in subsection (b), the provisions of chapter 40 of title 18, United States Code, as enacted by section 1102 of this title shall take effect one hundred and twenty days after the date of enactment of this Act.

(b) The following sections of chapter 40 of title 18, United States Code, as enacted by section 1102 of this title shall take effect on the date of the enactment of this Act: sections 841, 844(d), (e), (f), (g), (h), (i), and (j), 845, 846, 847, 848, and 849.

(c) Any person (as defined in section 841(a) of title 18 United States Code) engaging in a business or operation requiring a license or permit under the provisions of chapter 40 of such title 18 who was engaged in such business or operation on the date of enactment of this Act and who has filed an application for a license or permit under the provisions of section 843 of such chapter 40 prior to the effective date of such section 843 may continue such business or operation pending final action on his application. All provisions of such chapter

40 shall apply to such applicant in the same manner and to the same extent as if he were a holder of a license or permit under such chapter 40.

SEC. 1106. (a) The Federal Explosives Act of October 6, 1917 (40 Stat. 385, as amended; 50 U.S.C. 121–143), and as extended by Act of July 1, 1948 (40 Stat. 671; 50 U.S.C. 144), and all regulations adopted thereunder are hereby repealed.

(b) (1) Section 837 of title 18 of the United States Code is repealed.

(2) The item relating to such section 837 in the chapter analysis of chapter 39 of such title 18 is repealed.

SEC. 1107. There are hereby authorized to be appropriated such sums as are necessary to carry out the purposes of this title.

APPENDIX C—REGULATIONS

Following are extracts of regulations regarding Federal control of explosives that relate directly to black powder that have been promulgated by various Federal agencies pursuant to Acts of Congress:

1. Regulations promulgated by the Director, Bureau of Alcohol, Tobacco and Firearms, U.S. Department of the Treasury, pursuant to Title XI of the Organized Crime Control Act of 1970, Pub. L. 91–452, 84 Stat. 952, Oct. 15, 1970, 18 U.S.C. Chapter 40:

COMMERCE IN EXPLOSIVES

PART 181 OF TITLE 26, CODE OF FEDERAL REGULATIONS

In order to implement the provisions of Title XI, Regulation of Explosives (title 18, United States Code, chapter 40 (84 Stat. 952)) of the Organized Crime Control Act of 1970 (84 Stat. 922), the following regulations are hereby prescribed as Part 181 of Title 26 of the Code of Federal Regulations:

Preamble. 1. These regulations shall not affect any act done or any liability or right accruing, or accrued, or any suit or proceeding had or commenced before the effective date of these regulations.

2. These regulations shall be effective on and after February 12, 1971.

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Authority: The provisions of this Part 181 issued under 84 Stat. 952–960, 18 U.S.C. 841–848, unless otherwise noted.

Subpart A—Introduction

§ 181.1 Scope of regulations.

(a) *In general.* The regulations contained in this part relate to commerce in explosives and are promulgated to implement title XI, Regulation of Explosives (18 U.S.C. chapter 40; 84 Stat. 952), of the Organized Crime Control Act of 1970 (84 Stat. 922).

(b) *Procedural and substantive requirements.* This part contains the procedural and substantive requirements relative to:

(1) The interstate or foreign commerce in explosive materials;

(2) The licensing of manufacturers and importers of, and dealers in, explosive materials;

(3) The issuance of user permits;

(4) The conduct of business by licensees and operations by permittees;

(5) The storage of explosive materials;

(6) The records and reports required of licensees and permittees;

(7) Relief from disabilities under this part; and

(8) Exemptions, unlawful acts, penalties, seizures, and forfeitures.

(c) *Persons engaged in business or operations on October 15, 1970.* This part fully applies to persons engaged on October 15, 1970, in business or operations requiring a license or permit under this part who have filed an application for such license or permit prior to February 12, 1971, and who are continuing such business or operations pending final action on such application pursuant to section 1105(c) of the Organized Crime Control Act of 1970 (84 Stat. 960).

§ 18.2 Relations to other provisions of law.

The provisions in this part are in addition to, and are not in lieu of, any other provision of law, or regulations, respecting commerce in explosive materials. For regulations applicable to commerce in firearms and ammunition, see Part 178 of this chapter. For regulations applicable to traffic in machine guns, destructive devices, and certain other firearms, see Part 179 of this chapter. For statutes applicable to the registration and licensing of persons engaged in the business of manufacturing, importing or exporting arms, ammunition, or implements of war, see section 414 of the Mutual Security Act of 1954 (22 U.S.C. 1934), and regulations in Part 180 of this chapter and in Parts 121–128 of Title 22, Code of Federal Regulations. For statutes applicable to nonmailable materials, see 18 U.S.C. 1716 and regulations thereunder. For statutes applicable to water quality standards, see 33 U.S.C. 1171(b).

Subpart B—Definitions

§ 181.11 Meaning of terms.

When used in this part and in forms prescribed under this part, where not otherwise distinctly expressed or manifestly incompatible with the intent thereof,

terms shall have the meanings ascribed in this section. Words in the plural form shall include the singular, and vice versa, and words importing the masculine gender shall include the feminine. The term "includes" and "including" do not exclude other things not enumerated which are in the same general class or are otherwise within the scope thereof.

Act. Chapter 40 of title 18 of the United States Code.

Ammunition. Small arms ammunition or cartridge cases, primers, bullets, or smokeless propellants designed for use in small arms, and shall include percussion caps and $\frac{3}{32}$-inch pyrotechnic safety fuses. The term shall not include black powder.

Approved storage facility. A facility for the storage of explosive materials conforming to the requirements of this part and covered by a license or permit issued under this part.

Army-type structure. A structure approved by the Department of Defense for the storage of explosive materials.

Assistant Regional Commissioner. An Assistant Regional Commissioner, Alcohol, Tobacco, and Firearms, who is responsible to, and functions under the direction and supervision of, a Regional Commissioner of Internal Revenue.

Blasting agent. Any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive: *Provided*, That the finished product, as mixed for use or shipment, cannot be detonated by means of a numbered 8 test blasting cap when unconfined. A numbered 8 test blasting cap is one containing 2 grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate, or a blasting cap of equivalent strength.

Business premises. When used with respect to a manufacturer, importer or dealer the property on which explosive materials are or will be manufactured, imported, stored or distributed. Such premises shall include the property where the records of a manufacturer, importer or dealer are or will be maintained if different than the premises where explosive materials are or will be manufactured, imported, stored or distributed. When used with respect to a user of explosive materials, the property on which the explosive materials are or will be received or stored. Such premises shall include the property where the records of such user are or will be maintained if different than the premises where explosive materials are or will be received or stored.

Commissioner. The Commissioner of Internal Revenue.

Crime punishable by imprisonment for a term exceeding 1 year. Any offense for which the maximum penalty, whether or not imposed, is capital punishment or imprisonment in excess of 1 year. The term shall not include (a) any Federal or State offenses pertaining to antitrust violations, unfair trade practices or restraints of trade, or (b) any State offense (other than one involving a firearm or explosive) classified by the laws of the State as a misdemeanor and punishable by a term imprisonment of 2 years or less.

Customs officer. Any officer of the Bureau of Customs or any agent or other person authorized by law or by the Secretary of the Treasury, or appointed in writing by a Regional Commissioner of Customs, or by another principal customs officer under delegated authority, to perform the duties of an officer of the Bureau of Customs.

Dealer. Any person engaged in the business of distributing explosive materials at wholesale or retail.

Detonator. Any device containing a detonating charge that is used for initiating detonation in an explosive; the term includes electric blasting caps of instantaneous and delay types, blasting caps for use with safety fuses and detonating-cord delay connectors.

Director. The Director, Alcohol, Tobacco, and Firearms Division, Internal Revenue Service, Treasury Department, Washington, D.C. 20224.

Distribute. To sell, issue, give, transfer, or otherwise dispose of. The term does not include a mere change of possession from a person to his agent or employee in connection with the agency or employment.

District Director. A District Director of Internal Revenue.

Executed under penalties of perjury. Signed with the prescribed declaration under the penalties of perjury as provided on or with respect to the return, form, or other document or, where no form of declaration is prescribed, with the declaration: "I declare under the penalties of perjury that this—(insert type of document, such as, statement, application, request, certificate), including the documents submitted in support thereof, has been examined by me and, to the best of my knowledge and belief, is true, correct, and complete."

Explosive materials. Explosives, blasting agents, and detonators. Such materials shall include all items in the Explosives List provided for in § 181.23.

Explosives. Any chemical compound mixture, or device, the primary or common purpose of which is to function by explosion; the term includes dynamite and other high explosives, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, and igniters.

Fugitive from justice. Any person who has fled from the jurisdiction of any court of record to avoid prosecution for any crime or to avoid giving testimony in any criminal proceeding. The term shall also include any person who has been convicted of any crime and has fled to avoid imprisonment.

Importer. Any person engaged in the business of importing or bringing explosive materials into the United States for purposes of sale or distribution.

Indictment. Includes an indictment or information in any court under which a crime punishable by imprisonment for a term exceeding 1 year may be prosecuted.

Inhabited building. Any building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building occupied in connection with the manufacture, transportation, storage, or use of explosive materials.

Internal revenue district. An internal revenue district under the jurisdiction of a District Director of Internal Revenue.

Internal revenue region. An internal revenue region under the jurisdiction of a Regional Commissioner of Internal Revenue.

Interstate or foreign commerce. Commerce between any place in a State and any place outside of that State, or within any possession of the United States (not including the Canal Zone) or the District of Columbia, and commerce between places within the same State but through any place outside of that State.

Licensed dealer. A dealer licensed under the provisions of this part.

Licensed importer. An importer licensed under the provisions of this part.

Licensed manufacturer. A manufacturer licensed under the provisions of this part to engage in the business of manufacturing explosive materials for purposes of sale or distribution or for his own use.

Licensed manufacturer-limited. A manufacturer licensed under the provisions of this part to engage in the business of manufacturing explosive materials for his own use and not for sale or distribution.

Licensee. Any importer, manufacturer, or dealer licensed under the provisions of this part.

Manufacturer. Any person engaged in the business of manufacturing explosive materials for purposes of sale or distribution or for his own use.

Manufacturer-limited. Any person engaged in the business of manufacturing explosive materials for his own use and not for sale or distribution.

Permittee. Any user of explosives for lawful purpose, who has obtained a user permit under the provisions of this part.

Person. Any individual, corporation, company, association, firm, partnership, society, or joint stock company.

Regional Commissioner. A Regional Commissioner of Internal Revenue.

Service Center Director. A director of an internal revenue service center.

State. A State of the United States. The term shall include the District of Columbia, the Commonwealth of Puerto Rico, and the possessions of the United States (not including the Canal Zone).

State of residence. The State in which an individual regularly resides or maintains his home. Temporary sojourn in a State does not make the State of temporary sojourn the State of residence.

U.S.C. The United States Code.

User-limited permit. A user permit valid only for a single purchase transaction, a new permit being required for a subsequent purchase transaction.

User permit. A permit issued to a person authorizing him (1) to acquire for his own use explosive materials from a licensee in a State other than the State in which he resides or from a foreign country, and (2) to transport explosive materials so acquired in interstate or foreign commerce.

Subpart C—Administrative and Miscellaneous Provisions

§ 181.21 Forms prescribed.

The Director is authorized to prescribe all forms required by this part. All of the information called for in each form shall be furnished, as indicated by the headings on the form and the instructions thereon or issued in respect thereto, and as required by this part.

§ 181.22 Emergency variations from requirements.

(a) The Director may approve variations from the requirements of this part when he finds that an emergency exists and that the proposed variations from the specific requirements (1) are necessary, (2) will not hinder the effective administration of this part, and (3) will not be contrary to any provisions of law.

(b) Variations from requirements granted under this section are conditioned on compliance with the procedures, conditions, and limitations with respect thereto set forth in the approval of the application. Failure to comply in good faith with such procedures, conditions, and limitations shall automatically terminate the authority for such variations, and the licensee or permittee thereupon shall fully comply with the prescribed requirements of regulations from which the variations were authorized. Authority for any variation may be withdrawn whenever in the judgment of the Director the emergency no longer exists or the effective administration of this part is hindered by the continuation of such variation. A licensee or permittee who desires to employ such variation shall submit a written application so to do, in triplicate, to the Assistant Regional Commissioner for transmittal to the Director. The application shall describe the proposed variation and set forth the reasons therefor. A variation shall not be employed until the application has been approved. The licensee or permittee shall retain, as part of his records, available for examination by internal revenue officers, any application approved by the Director under the provisions of this section.

§ 181.23 Explosives list.

The Director shall compile and publish in the FEDERAL REGISTER an Explosives List. This list shall be published and revised at least annually.

§ 181.24 Right of entry and examination.

Any internal revenue officer may enter during business hours the premises, including places of storage, of any licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee for the purpose of inspecting or examining any records or documents required to be kept by such importer, manufacturer, dealer, or permittee under this part, and any explosive materials kept or stored by such importer, manufacturer, dealer, or permittee at such premises.

§ 181.25 Disclosure of information.

Upon receipt of written request of any State or any political subdivision thereof, the Assistant Regional Commissioner may make available to such State or any political subdivision thereof, any information which the Assistant Regional Commissioner may obtain by reason of the provisions of the Act with respect to the identification of persons within such State or political subdivision thereof, who have purchased or received explosive materials, together with a description of such explosive materials.

§ 181.26 Prohibited shipments, transportation, or receipt of explosive materials.

(a) No person, other than a licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee, shall transport, ship, cause to be transported, or receive in interstate or foreign commerce any explosive materials: *Provided*, That the provisions of this paragraph shall not apply to the transportation, shipment, or receipt of explosive materials by a nonlicensed person or nonpermittee who lawfully purchases explosive materials from a licensee in a State contiguous to the purchaser's State of residence if, (1) the purchaser's State of residence has enacted legislation, currently in force, specifically authorizing a resident of that State to purchase explosive materials in a contiguous State, (2) the provisions of § 181.105(c) are fully complied with, and (3) the purchaser is not otherwise prohibited under pargaraph (b) from shipping or transporting explosive materials in interstate or foreign commerce or receiving explosive materials which have been shipped or transported in interstate or foreign commerce.

(b) No person may ship or transport any explosive material in interstate or foreign commerce or receive any explosive materials which have been shipped or transported in interstate or foreign commerce who (1) is under indictment for, or who has been convicted in any court of, a crime punishable by imprisonment for a term exceeding 1 year, (2) is a fugitive from justice, (3) is an unlawful user of or addicted to marihuana (as defined in section 4761 of the

Internal Revenue Code of 1954; 26 U.S.C. 4761) or any depressant or stimulant drug (as defined in section 201(v) of the Federal Food, Drug, and Cosmetic Act; 21 U.S.C. 321(v), or narcotic drug (as defined in section 4731(a) of the Internal Revenue Code of 1954; 26 U.S.C. 4731(a)), or (4) has been adjudicated as a mental defective or has been committed to a mental institution.

§ 181.27 Out-of-State disposition of explosive materials.

No nonlicensee or nonpermittee shall distribute any explosive materials to any other nonlicensee or nonpermittee who the distributor knows or has reasonable cause to believe does not reside in the State in which the distributor resides.

§ 181.28 Stolen explosive materials.

No person shall receive, conceal, transport, ship, store, barter, sell, or dispose of any stolen explosive materials knowing or having reasonable cause to believe that the explosive materials were stolen.

§ 181.29 Unlawful storage.

No person shall store any explosive materials in a manner not in conformity with the provisions of Subpart J.

§ 181.30 Reporting theft or loss of explosive materials.

Any licensee or permittee who has knowledge of the theft or loss of any explosive materials from his stock shall within 24 hours of discovery thereof report such theft or loss on Form 4712 to the Assistant Regional Commissioner in accordance with the instructions on such form, and to appropriate local authorities. Any other person who has knowledge of the theft or loss of any explosive materials from his stock shall within 24 hours of discovery thereof report such theft or loss in writing to the Assistant Regional Commissioner, and to appropriate local authorities.

§ 181.31 Inspection of site of accidents or fires; right of entry.

Any internal revenue officer may inspect the site of any accident or fire in which there is reason to believe that explosive materials were involved. Any internal revenue officer may enter into or upon any property where explosive materials have been used, are suspected of having been used, or have been found in an otherwise unauthorized location.

Subpart D—Licenses and Permits

§ 181.41 General.

(a) Each person intending to engage in business as an importer or manufacturer of, or a dealer in, explosive materials shall, before commencing such business, obtain the license required by this subpart for the business to be operated. Each person who intends to acquire for use explosive materials from a licensee in a State other than the State in which he resides, or from a foreign country, or who intends to transport explosive materials in interstate or foreign commerce, shall obtain a permit under the provisions of this subpart: *Provided*, That it is not necessary to obtain such permit if the user intends to lawfully purchase explosive materials from a licensee in a State contiguous to the user's State of residence and the user's State of residence has enacted legislation, currently in force, specifically authorizing a resident of that State to purchase explosive materials in a contiguous State.

(b) Each person intending to engage in business as an explosive materials importer, manufacturer, or dealer shall file an application, with the required fee (see § 181.42), with the Service Center Director for the internal revenue district in which his business premises are to be located. A separate license must be obtained for each business premises at which the applicant is to manufacture, import, or distribute explosive materials: *Provided*, That a separate license shall not be required for storage facilities operated by the licensee as an integral part of one business premises or to cover a location used by the licensee solely for maintaining the records required by this part: *Provided further*, That a separate license shall not be required of a licensed manufacturer with respect to his on site manufacturing. A license shall, subject to the provisions of law, entitle the licensee to transport, ship, and receive explosive materials in interstate or foreign commerce, and to engage in the business specified by the license, at the location described on the license (and in the case of a licensed manufacturer, on site within the same internal revenue region), for the period stated on the license: *Provided*, That it shall not be necessary for a licensed importer or a

licensed manufacturer (for purposes of sale or distribution) to also obtain a dealer's license in order to engage in business on his licensed premises as a dealer in explosive materials.

(c) Except as provided in paragraph (a) of this section, each person intending to acquire explosive materials from a licensee in a State other than a State in which he resides, or from a foreign country, or who intends to transport explosive materials in interstate or foreign commerce, shall file an application, with the required fee (see § 181.43), with the Service Center Director for the internal revenue district in which is located his legal residence or principal place of business. A permit shall, subject to the provisions of the Act and other applicable provisions of law, entitle the permittee to acquire, transport, ship, and receive in interstate or foreign commerce explosive materials of the class authorized by his permit. Only one permit is required under the provisions of this part.

§ 181.42 License fees.

(a) Each applicant shall pay a fee for obtaining a license, a separate fee being required for each business premises, as follows:

(1) Manufacturer—$50.
(2) Manufacturer-limited (nonrenewable)—$5.
(3) Importer—$50.
(4) Dealer—$20.

(b) Each applicant for a renewal of a license shall pay a fee equal to one-half of the fee prescribed under paragraph (a).

§ 181.43 Permit fees.

(a) Each applicant shall pay a fee for obtaining a permit as follows:

(1) User—$20.
(2) User-limited (nonrenewable)—$2.

(b) Each applicant for a renewal of a user permit shall pay a fee of $10.

§ 181.44 License or permit fee not refundable.

No refund of any part of the amount paid as a license or permit fee shall be made where the operations of the licensee or permittee are, for any reason, discontinued during the period of an issued license or permit. However, the license or permit fee submitted with an application for a license or permit shall be refunded if that application is denied.

§ 181.45 Original license or permit.

(a) Any person who intends to engage in business as an explosive materials importer, manufacturer, or dealer on or after February 12, 1971, or who has not timely submitted application for renewal of a previous license issued under this part, shall file with the Service Center Director for the internal revenue district in which the applicant is to do business an application, Form 4705, in duplicate. The application must be executed under the penalties of perjury and the penalties imposed by 18 U.S.C. 844(a). The application shall be accompanied by the appropriate fee in the form of (1) cash, or (2) money order or check made payable to the Internal Revenue Service. Forms 4705 may be obtained from any Assistant Regional Commissioner or from any District Director.

(b) Any person, except as provided in § 181.41(a), who intends to acquire on or after February 12, 1971, explosive materials from a licensee in a State other than the State in which he resides, or from a foreign country or who intends to transport explosive materials in interstate or foreign commerce, or who has not timely submitted application for renewal of a previous permit issued under this part, shall file with the Service Center Director for the internal revenue district in which is located his legal residence or principal place of business an application, Form 4707, in duplicate. The application must be executed under the penalties of perjury and the penalties imposed by 18 U.S.C. 844(a). The application shall be accompanied by the appropriate fee in the form of (1) cash, or (2) money order or check made payable to the Internal Revenue Service. Forms 4707 may be obtained from any Assistant Regional Commissioner or from any District Director.

(c) Any person engaging in a business or operation requiring a license or permit under the provisions of this part who was engaged in such business or

operation on October 15, 1970, and who has filed an application for a license or permit prior to February 12, 1971, may continue such business or operation pending final action on the application (see § 181.1(c)).

§ 181.46 Renewal of license or permit.

If a licensee or permittee intends to continue the business or operation described on a license or permit issued under this part after the expiration date of the license or permit, he shall, unless otherwise notified in writing by the Assistant Regional Commissioner, execute and file prior to the expiration of his license or permit an application for license renewal, Form 4706 (Part III), or an application for permit renewal, Form 4708 (Part III), accompanied by the required fee, with the Service Center Director for the internal revenue district in which the business premises are located, or in the case of a permittee, in which is located his legal residence or principal place of business: *Provided*, That a license issued to a manufacturer-limited is not renewable and is only valid for 30 days from date of issuance, and a user-limited permit is not renewable and is only valid for a single purchase transaction. All applications for manufacturer-limited licenses or user-limited permits must be filed on Form 4705 or Form 4707 in the manner required by § 181.45. In the event the licensee or permittee does not timely file a renewal application, he must file an original application as required by § 181.45, and obtain the required license or permit in order to continue business or operations. If a licensee or permittee does not timely receive renewal application forms through the mails, he should so notify his Assistant Regional Commissioner.

§ 181.47 Procedure by Service Center Director.

Upon receipt of an application for an original license or an original permit or an application for renewal of a license or renewal of a permit, the Service Center Director shall deposit the fee accompanying the license or permit application and forward the application to the Assistant Regional Commissioner. Where an application is filed with an insufficient fee, the application and any fee submitted shall be returned.

§ 181.48 Abandoned application.

Upon receipt of an incomplete or improperly executed application, the applicant shall be notified of the deficiency in the application. If the application is not corrected and returned within 30 days following the date of notification, the application shall be considered as having been abandoned and the license or permit fee returned.

§ 181.49 Issuance of license or permit.

(a) Upon receipt of a properly executed application for a license or permit, the Assistant Regional Commissioner shall, upon finding through further inquiry or investigation, or otherwise, that the applicant is entitled thereto, issue the appropriate license or permit and a copy thereof: *Provided*, That in the case of a user-limited permit, the original only shall be issued. Each license or permit shall bear a serial number and such number may be assigned to the licensee or permittee to whom issued for as long as he maintains continuity of renewal in the same internal revenue region.

(b) The Assistant Regional Commissioner shall approve a properly executed application for license or permit, if:

(1) The applicant is 21 years of age or over;

(2) The applicant (including, in the case of a corporation, partnership, or association, any individual possessing, directly or indirectly, the power to direct or cause the direction of the management and policies of the corporation, partnership, or association) is not a person to whom distribution of explosive materials is prohibited under the provisions of the Act;

(3) The applicant has not willfully violated any of the provisions of the Act or this part;

(4) The applicant has not knowingly withheld information or has not made any false or fictitious statement intended or likely to deceive, in connection with his application;

(5) The applicant has in a State business premises from which he conducts business or operations subject to license or permit under the Act or from which he intends to conduct such business or operations;

(6) The applicant has storage facilities for the class of explosive materials described on the application which facilities meet the standards prescribed by Subpart J of this part, unless he establishes to the satisfaction of the Assistant

Regional Commissioner that the business or operations to be conducted will not require the storage of explosive materials;

(7) The applicant has certified in writing that he is familiar with and understands all published State laws and local ordinances relating to explosive materials for the location in which he intends to do business; and

(8) The applicant for a license has submitted the certificate required by section 21 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1171 (b)).

(c) The Assistant Regional Commissioner shall approve or deny an application for license or permit within the 45-day period beginning on the date a properly executed application was received by the Service Center Director: *Provided*, That when an applicant for license or permit renewal is a person who is, pursuant to the provisions of § 181.83 or § 181.142, conducting business or operations under a previously issued license or permit, action regarding the application will be held in abeyance pending the completion of the proceedings against the applicant's existing license or permit, or renewal application, or final action by the Commissioner on an application for relief submitted pursuant to § 181.142, as the case may be.

§ 181.50 Correction of error on license or permit.

(a) Upon receipt of a license or permit issued under the provisions of this part, each licensee or permittee shall examine same to insure that the information contained thereon is accurate. If the license or permit is incorrect, the licensee or permittee shall return the license or permit to the Assistant Regional Commissioner with a statement showing the nature of the error. The Assistant Regional Commissioner shall correct the error, if the error was made in his office, and return the license or permit. However, if the error resulted from information contained in the licensee's or permittee's application for the license or permit, the Assistant Regional Commissioner shall require the licensee or permittee to file an amended application setting forth the correct information and a statement explaining the error contained in the application. Upon receipt of the amended application and a satisfactory explanation of the error, the Assistant Regional Commissioner shall make the correction on the license or permit and return the same to the licensee or permittee.

(b) When the Assistant Regional Commissioner finds through any means other than notice from the licensee or permittee that an incorrect license or permit has been issued, (1) the Assistant Regional Commissioner may require the holder of the incorrect license or permit to return the license or permit for correction, and (2) if the error resulted from information contained in the licensee's or permittee's application for the license or permit, the Assistant Regional Commissioner shall require the licensee or permittee to file an amended application setting forth the correct information, and a statement satisfactorily explaining the error contained in the application. The Assistant Regional Commissioner then shall make the correction on the license or permit and return same to the licensee or permittee.

§ 181.51 Duration of license or permit.

Licenses and permits shall be issued for a period of 1 year: *Provided*, That a manufacturer-limited license shall be issued for a period of 30 days and a user-limited permit shall be valid only for a single purchase transaction.

§ 181.52 Limitations on license or permit.

(a) The license covers the business and class of explosive materials specified in the license at the licensee's business premises (see § 181.41(b)).

(b) The permit is valid with respect to the type of operations and class of explosive materials specified in the permit.

§ 181.53 License and permit not transferable.

Licenses and permits issued under this part are not transferable to another person. In the event of the lease, sale, or other transfer of the business or operations covered by the license or permit, the successor must obtain the license or permit required by this part prior to commencing such business or operations. However, for rules on right of succession, see § 181.59.

§ 181.54 Change of location; change in construction.

(a) *Other than storage facilities.* Except as provided in paragraph (b), a licensee or permittee may during the term of his license or permit remove his

business or operations to a new location at which he intends regularly to carry on such business or operations, without procuring a new license or permit. However, in every case, whether or not the removal is from one internal revenue region to another, notification of the new location of the business or operations must be given not less than 10 days prior to such removal to the Assistant Regional Commissioner for the internal revenue region from which or within which the removal is to be made, and the Assistant Regional Commissioner for the internal revenue region to which the removal is to be made. In each instance, the license or permit and any copies thereof furnished with the license or permit must be submitted for endorsement to the Assistant Regional Commissioner having jurisdiction over the internal revenue region to which or within which removal is to be made. After endorsement of the license or permit and the copies thereof to show the new location, and the new license or permit number, if any, the Assistant Regional Commissioner will return same to the licensee or permittee.

(b) *Storage facilities.* A licensee or permittee who intends to change the location of his approved storage facility described in his application (other than a change of location of a portable approved storage facility) during the term of his license or permit shall make written application, in duplicate, to the Assistant Regional Commissioner who issued the license or permit, describing the location, the type of construction, and the class of explosive materials as prescribed in Subpart J. Such application may include a request for approval of specific successive changes in location of an approved storage facility. Storage of explosive materials may not be commenced at the new location prior to receipt of the copy of such application stamped "Approved".

(c) *Additions to or changes in storage facilities.* A licensee or permittee who intends to make additions to or changes in construction of approved storage facilities described in his application, shall file an application on Form 4705 or on Form 4707 with the Assistant Regional Commissioner for an amended license or permit, describing the proposed additions or changes. Additions to or changes in construction of approved storage facilities may not be made prior to issuance of the amended license or permit. Upon receipt of the amended license or amended permit, the licensee or permittee shall submit his superseded license or superseded permit and any copies thereof to the Assistant Regional Commissioner.

§ 181.55 Change in class of explosive materials.

A licensee or permittee who intends to change the class of explosive materials described in his license or permit from a lower to a higher classification (see Subpart J) shall file an application on Form 4705 or on Form 4707 with the Assistant Regional Commissioner for an amended license or permit. If the change in class of explosive materials would require a change in storage facilities, the amended application shall include a description of the type of construction as prescribed in Subpart J. Business or operations with respect to the new class of explosive materials may not be commenced prior to issuance of the amended license or amended permit. Upon receipt of the amended license or amended permit, the licensee or permittee shall submit his superseded license or superseded permit and any copies thereof to the Assistant Regional Commissioner.

§ 181.56 Change in trade name.

A licensee or permittee continuing to conduct business or operations at the location shown on his license or permit is not required to obtain a new license or permit by reason of a mere change in trade name under which he conducts his business or operations: *Provided*, That such licensee or permittee furnishes his license or permit and any copies thereof for endorsement of such change to the Assistant Regional Commissioner for the internal revenue region in which the licensee or permittee conducts his business or operations, within 30 days from the date the licensee or permittee begins his business or operations under the new trade name.

§ 181.57 Change of control.

In the case of a corporation or association holding a license or permit under this part, if actual or legal control of the corporation or association changes, directly or indirectly, whether by reason of change in stock ownership or control (in the corporation holding a license or permit or in any other corporation), by operation of law, or in any other manner, the licensee or permittee shall, within 30 days of such change, gives written notification thereof executed under the penal-

ties of perjury, to the Assistant Regional Commissioner. Upon expiration of the license or permit, the corporation or association must file a Form 4705 or a Form 4707 as required by § 181.45 and pay the fee prescribed in § 181.42(b) or § 181.43 (b).

§ 181.58 Continuing partnerships.

Where, under the laws of the particular State, the partnership is not terminated on death or insolvency of a partner, but continues until the winding up of the partnership affairs is completed, and the surviving partner has the exclusive right to the control and possession of the partnership assets for the purpose of liquidation and settlement, such surviving partner may continue to conduct the business or operations under the license or permit of the partnership. If such surviving partner acquires the business or operations on completion of settlement of the partnership, he shall obtain a license or permit in his own name from the date of acquisition, as provided in § 181.45. The rule set forth in this section shall also apply where there is more than one surviving partner.

§ 181.59 Right of succession by certain persons.

(a) Certain persons other than the licensee or permittee may secure the right to carry on the same explosive materials business or operations at the same business premises for the remainder of the term of license or permit. Such persons are:

(1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee or permittee; and

(2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors.

(b) In order to secure the right provided by this section, the person or persons continuing the business or operations shall furnish the license or permit and copies thereof for that business or operations for endorsement of such succession to the Assistant Regional Commissioner for the internal revenue region in which the business or operations is conducted within 30 days from the date on which the successsor begins to carry on the business or operations.

§ 181.60 Certain continuances of business or operations.

A licensee or permittee who furnishes his license or permit to the Assistant Regional Commissioner for correction, amendment or endorsement in compliance with the provisions contained in this subpart may continue his business or operations while awaiting its return.

§ 181.61 Discontinuance of business or operations.

Where an explosive materials business or operations is either discontinued or succeeded by a new owner, the owner of the business or operations discontinued or succeeded shall within 30 days thereof furnish to the Assistant Regional Commissioner for the internal revenue region in which his business or operations was located notification of the discontinuance or succession and his license or permit and any copies thereof. (See also § 181.128.)

§ 181.62 State or other law.

A license or permit issued under this part confers no right or privilege to conduct business or operations, including storage, contrary to State or other law. The holder of such a license or permit is not by reason of the rights and privileges granted by that license or permit immune from punishment for conducting an explosive materials business or operations in violation of the provisions of any State or other law. Similarly, compliance with the provisions of any State or other law affords no immunity under Federal law or regulations.

Subpart E—License and Permit Proceedings

§ 181.71 Opportunity for compliance.

Except in cases of willfulness or those in which the public interest requires otherwise, and the Assistant Regional Commissioner so alleges in the notice of denial of an application or revocation of a license or permit, no license or permit shall be revoked or renewal application denied without first calling to the attention of the licensee or permittee the reasons for the contemplated action and affording him an opportunity to demonstrate or achieve compliance with all lawful requirements and to submit facts, arguments, or proposals of adjustment. The notice of contemplated action, Form 4715, shall afford the

licensee or permittee 15 days from the date of receipt of the notice to respond. If no response is received within the 15 days, or after consideration of relevant matters presented by the licensee or permittee, the Assistant Regional Commissioner finds that the licensee or permittee is not likely to abide by the law and regulations, he will proceed as provided in § 181.74.

§ 181.72 Denial of initial application.

Whenever the Assistant Regional Commissioner has reason to believe that an applicant for an original license or permit is not eligible to receive a license or permit under the provisions of § 181.49, he shall issue a notice of denial on Form 4716. The notice shall set forth the matters of fact and law relied upon in determining that the application should be denied, and shall afford the applicant 15 days from the date of receipt of the notice in which to request a hearing to review the denial. If no request for a hearing is filed within that time, a copy of the application, marked "Disapproved", will be returned to the applicant.

§ 181.73 Hearing after initial application is denied.

If the applicant for an original license or permit desires a hearing, he shall file a request therefor, in duplicate, with the Assistant Regional Commissioner, within 15 days after receipt of the notice of denial. The request should include a statement of the reasons therefor. On receipt of the request, the Assistant Regional Commissioner shall refer the matter to a hearing examiner and the examiner shall set a time and place (see § 181.77) for a hearing and shall serve notice thereof upon the applicant and the Assistanct Regional Commissioner at least 10 days in advance of the hearing date. The hearing shall be conducted in accordance with the hearing procedures prescribed in Part 200 of this chapter (see § 181.82). Within a reasonable time after the conclusion of the hearing, and as expeditiously as possible, the examiner shall render his recommended decision. He shall certify to the complete record of the proceedings before him and shall immediately forward the complete certified record, together with four copies of his recommended decision, to the Assistant Regional Commissioner for decision.

§ 181.74 Denial of renewal application or revocation of license or permit.

If, following or without opportunity for compliance under § 181.71, as circumstances warrant, the Assistant Regional Commissioner finds that the licensee or permittee is not likely to comply with the law or regulations or is otherwise not eligible to continue operations authorized under his license or permit, the Assistant Regional Commissioner will issue a notice of denial of the renewal application or revocation of the license or permit, Form 4716 or 4717, as appropriate. In either case, the notice shall set forth the matters of fact constituting the violations specified, dates, places, and the sections of law and regulations violated. The notice shall, in the case of revocation of a license or permit, specify the date on which such action is effective, which date shall be on or after the date the notice is served on the licensee or permittee. The notice shall also advise the licensee or permittee that he may, within 15 days after receipt of the notice, request a hearing and, if applicable, a stay of the effective date of the revocation of his license or permit.

§ 181.75 Hearing after denial of renewal application or revocation of license or permit.

If a licensee or permittee whose renewal application has been denied or whose license or permit has been revoked desires a hearing, he shall file a request therefor, in duplicate, with the Assistance Regional Commissioner. In the case of the revocation of a license or permit, he may include a request for a stay of the effective date of the revocation. On receipt of the request the Assistant Regional Commissioner shall advise the licensee or permittee whether the stay of the effective date of the revocation is granted. If the stay of the effective date of the revocation is granted, the Assistant Regional Commissioner shall refer the matter to a hearing examiner. The hearing examiner shall set a time and place (see § 181.77) for a hearing and shall serve notice thereof upon the licensee or permittee and the Assistant Regional Commissioner at least 10 days in advance of the hearing date. If the stay of the effective date of the revocation is denied, the licensee or permittee may request an immediate hearing. In such event, the Assistant Regional Commissioner shall immediately refer the matter to a hearing examiner who shall set a date and place for a hearing, which date shall be

no later than 10 days from the date the licensee or permittee requested an immediate hearing. The hearing shall be held in accordance with the applicable provisions of Part 200 of this chapter. Within a reasonable time after the conclusion of the hearing, and as expeditiously as possible, the hearing examiner shall render his decision. He shall certify to the complete record of the proceeding before him and shall immediately forward the complete certified record, together with two copies of his decision, to the Assistant Regional Commissioner, serve one copy of his decision on the licensee or permittee or his counsel, and transmit a copy to the attorney for the Government.

§ 181.76 Action by Assistant Regional Commissioner.

(a) *Initial application proceedings.* If, upon receipt of the record and the recommended decision of the examiner, the Assistant Regional Commissioner decides that the license or permit should be issued, he shall approve the application, briefly stating, for the record, his reasons therefor. If he contemplates that the denial should stand, he shall serve a copy of the examiner's recommended decision on the applicant, informing the applicant of his contemplated action and affording the applicant not more than 10 days in which to submit proposed findings and conclusions or exceptions to the recommended decision with reasons in support thereof. If the Assistant Regional Commissioner, after consideration of the record of the hearing and of any proposed findings, conclusions, or exceptions filed with him by the applicant, approves the findings, conclusions and recommended decision of the examiner, he shall issue the license or permit or disapprove the application in accordance therewith. If he disapproves of the findings, conclusions, and recommendation of the examiner, in whole or in part, he shall by order make such findings and conclusions as in his opinion are warranted by the law and the facts in the record. Any decision of the Assistant Regional Commissioner ordering the disapproval of an initial application for a license or permit shall state the findings and conclusions upon which it is based, including his ruling upon each proposed finding, conclusion, and exception to the examiner's recommended decision, together with a statement of his findings and conclusions, and reasons or basis therefor, upon all material issues of fact, law or discretion presented on the record. A signed duplicate original of the decision shall be served upon the applicant and the original copy containing certificate of service shall be placed in the official record of the proceedings. If the decision of the Assistant Regional Commissioner is in favor of the applicant, he will issue the license or permit, to be effective on issuance.

(b) *Renewal application and revocation proceedings.* Upon receipt of the complete certified records of the hearing, the Assistant Regional Commissioner shall enter an order confirming the revocation of the license or permit, or disapproving the application, in accordance with the examiner's findings and decision, unless he disagrees with the findings and decision. A signed duplicate original of the order, Form 4718, shall be served upon the licensee or permittee and the original copy containing certificate of service shall be placed in the official record of the proceedings. If the Assistant Regional Commissioner disagrees with the findings and decision of the examiner, he shall file a petition with the Director for review thereof as provided in § 181.79. In either case, if the renewal application denial is sustained a copy of the application marked "Disapproved" will be returned to the applicant. If the renewal application denial is reversed a license or permit will be issued to become effective on expiration of the license or permit being renewed, or on the date of issuance, whichever is later. If the proceedings involve the revocation of a license or permit which expired before a decision is in favor of the licensee or permittee, the Assistant Regional Commissioner shall:

(1) If renewal application was timely filed and a stay of the effective date of the revocation was granted, issue a license or permit effective on the date of issuance;

(2) If renewal application was not timely filed but a stay of the effective date of the revocation had been granted, request that a renewal application be filed and, pursuant thereto, issue a license or permit to be effective on issuance; or

(3) If a stay of the effective date of the revocation had not been granted, request that an application be filed as provided in § 181.45, and process it in the same manner as for an application for an original license or permit.

(c) *Curtailment of stay of revocation effective date.* If, after approval of a request for a stay of the effective date of an order revoking a license or permit

but before actions are completed under this subpart, the Assistant Regional Commissioner finds that it is contrary to the public interest for the licensee or permittee to continue the operations or activities covered by his license or permit, the Assistant Regional Commissioner may issue a notice of withdrawal of such approval, effective on the date of issuance. Such notice shall be served upon the licensee or permittee in the manner provided in § 181.81.

§ 181.77 Designated place of hearing.

The designated place of hearing set as provided in § 181.73 or § 181.75 shall be at the location convenient to the aggrieved party.

§ 181.78 Representation at a hearing.

An applicant, licensee, or permittee may be represented by an attorney or other person recognized to practice before the Internal Revenue Service as provided in 31 CFR Part 10 (Treasury Department Circular No. 230) if he has otherwise complied with the applicable requirements of §§ 601.521–601.527 of this chapter. The Assistant Regional Commissioner may be represented in proceedings under §§ 181.73 and 181.75 by an attorney in the office of the regional counsel who is authorized to execute and file motions, briefs, and other papers in the proceedings, on behalf of the Assistant Regional Commissioner, in his own name as "Attorney for the Government."

§ 181.79 Appeal on petition to the Director.

An appeal to the Director is not required prior to filing an appeal with the U.S. Court of Appeals for judicial review. An appeal may be taken by the applicant, licensee, or permittee to the Director from a decision resulting from a hearing under § 181.73 or § 181.75. An appeal may also be taken by an Assistant Regional Commissioner from a decision resulting from a hearing under § 181.75 as provided in § 181.76(b). Such appeal shall be taken by filing a petition for review on appeal with the Director within 15 days of the service of an examiner's decision or an order. The petition shall set forth facts tending to show (a) action of an arbitrary nature, (b) action without reasonable warrants in fact, or (c) action contrary to law and regulations. A copy of the petition shall be filed with the Assistant Regional Commissioner or served on the applicant, licensee, or permittee, as the case may be. In the event of such appeal, the Assistant Regional Commissioner shall immediately forward the complete original record, by certified mail, to the Director for his consideration, review, and disposition in the manner provided in Subpart I of Part 200 of this chapter. When, on appeal, the Director affirms the initial decision of the Assistant Regional Commissioner or the examiner, as the case may be, such initial decision shall be final.

§ 181.80 Court review.

An applicant, licensee, or permittee may, within 60 days after receipt of the decision of the examiner or the final order of the Assistant Regional Commissioner or the Director, file a petition for a judicial review thereof, with the U.S. Court of Appeals for the district in which he resides or has his principal place of business. The Director, upon notification that such petition has been filed, shall have prepared, in triplicate, a complete transcript of the record of the proceedings. The Assistant Regional Commissioner or the Director, as the case may be, will certify to the correctness of such transcript of the record, forward one copy to the attorney for the Government in the review of the case, and file the original record of the proceedings with the original certificate in the U.S. Court of Appeals.

§ 181.81 Service on applicant, licensee, or permittee.

All notices and other formal documents required to be served on an applicant, licensee, or permittee under this subpart shall be served by certified mail or by personal delivery. Where service is by personal delivery, the signed duplicate original copy of the formal document shall be delivered to the applicant, licensee, or permittee, or, in the case of a corporation, partnership, or association, by delivering it to an officer, manager, or general agent thereof, or to its attorney of record.

§ 181.82 Provisions of Part 200 made applicable.

The provisions of Subpart G of Part 200 of this chapter, as well as those provisions of Part 200 relative to failure to appear, withdrawal of an application or surrender of a permit, the conduct of hearings before a hearing examiner, and

record of testimony are hereby made applicable to application, license, and permit proceedings under this subpart to the extent that they are not contrary to or incompatible with the provisions of this subpart.

§ 181.83 Operations by licensees or permittees after notice of denial or revocation.

In any case where a notice of revocation has been issued and a request for a stay of the effective date of the revocation has not been granted, the licensee or permittee may not engage in the activities covered by the license or permit pending the outcome of proceedings under this subpart. In any case where notice of revocation has been issued but a stay of the effective date of the revocation has been granted, the licensee or permittee may continue to engage in the activities covered by his license or permit unless or until formally notified to the contrary: *Provided*, That in the event the license or permit would have expired before proceedings under this subpart are completed, timely renewal application must have been filed to continue the license or permit beyond its expiration date. In any case where a notice of denial of a renewal application has been issued, the licensee or permittee may continue to engage in the activities covered by the existing license or permit after the date of expiration thereof until proceedings under this subpart are completed.

Subpart F—Conduct of Business or Operations

§ 181.101 Posting of license or permit.

Licenses or permits issued under this part or copies thereof shall be kept posted and kept available for inspection on the business premises at each place where explosive materials are manufactured, imported, or distributed and in each magazine of an approved storage facility.

§ 181.102 Authorized operations by permittees and certain licensees.

(a) *In general.* The license issued to a manufacturer-limited does not authorize such licensee to engage in another class of business required to be licensed under the Act or this part. Therefore if such licensee intends to manufacture explosive materials for purposes of sale or distribution or to deal in explosive materials, he shall so qualify. Similarly, a permit issued under this part does not authorize the permittee to engage in the business of manufacturing, importing, or dealing in explosive materials. Accordingly if a permittee's operations bring him within the definition of a manufacturer, importer, or dealer under this part he shall qualify as such.

(b) *Distributions of surplus stocks.* Licensed manufacturers-limited and permittees are not authorized to engage in the business of sale or distribution of explosive materials. However, such licensees or permittees may dispose of surplus stocks of explosive materials to other licensees or permittees in accordance with the provisions of § 181.103, and to nonlicensees or to nonpermittees in accordance with the provisions of § 181.105(d).

§ 181.103 Sales or distributions between licensees or between licensees and permittees.

(a) A licensed importer, licensed manufacturer, or licensed dealer selling or otherwise distributing explosive materials to another licensee or permittee, or a permittee or a licensed manufacturer-limited disposing a surplus stock to another permittee or licensee, shall verify the identity and the status as a licensee or permittee of the distributee prior to making the transaction. Such verification shall be established by the distributee furnishing to the distributor a certified copy (in the case of a user-limited, the original) of the distributee's license or permit and by such other means as the distributor deems necessary: *Provided*, That it shall not be required (1) for a distributee who has furnished a certified copy of his license or permit to a distributor to again furnish such certified copy to that distributor during the term of the distributee's current license or permit and (2) for the licensees of multilicensed business organizations to furnish certified copies of their licenses to other licensed locations operated by such organization: *Provided further*, That a multilicensed business organization may furnish to a distributor in lieu of a certified copy of each license, a list certified to be true, correct and complete, containing the name, address, license number, and the date of license expiration of each licensed location operated by such orga-

nization, and the distributor may sell or otherwise dispose of explosive materials as provided by this section to any licensee appearing on such list without requiring a certified copy of a license therefrom. A distributor licensee who has the certified information required by this section may sell or distribute explosive materials to a licensee or permittee for not more than 45 days following the expiration date of the distributee's license or permit, unless the distributor knows or has reason to believe that the distributee's authority to continue business or operations under this part has been terminated.

(b) A licensed importer, licensed manufacturer, or licensed dealer selling or otherwise distributing explosive materials to another licensee or permittee, or a permittee or a licensed manufacturer-limited disposing of surplus stocks to another permittee or licensee, which is a business entity shall verify the identity of the representative or agent of the business entity who is authorized to acquire explosive materials on behalf of such business entity. Each business entity acquiring explosive materials shall furnish the licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee with a current certified list of representatives or agents authorized to acquire explosive materials on behalf of such business entity showing the name, address, and date and place of birth of each such representative or agent. A licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee shall not distribute explosive materials to a business entity on the order of a person who does not appear on such list.

(c) A licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee acquiring explosive materials from another licensee or permittee shall furnish such licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee with a certified current statement of the intended use of the explosive materials by such licensee or permittee (such as resale, mining, quarrying, agriculture, construction, road building, oil well drilling, seismographic research, or other specified lawful activity) and specifying the name, address, date and place of birth, social security number of the distributee where the distributee is a natural person. In the case of a business entity such statement shall specify the intended use, taxpayer identification number, the identity and principal and local places of business of such business entity and the information required by paragraph (b) of this section. A licensee or permittee who has furnished such statement to a licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee shall not be required to again furnish such statement to that distributor if the information on the statement remains unchanged.

(d) Where possession of explosive materials is transferred at the distributor's premises, the distributor shall in all instances verify the identity of the person accepting possession on behalf of the distributee before relinquishing such possession. Prior to the delivery at the distributor's premises of explosive materials to an employee of a licensee or permittee, or to an employee of a carrier transporting explosive materials to a licensee or permittee, the distributor so delivering explosive materials shall obtain an executed Form 4721 from such employee before releasing the explosive materials. The Form 4721 shall contain all of the information as indicated by the headings on the form and the instructions thereon or issued in respect thereto, and as required by this part.

(e) The user-limited permit issued under the provisions of this part is valid only for a single purchase transaction and is not renewable (see § 181.51). Accordingly, each permittee holding a user-limited permit shall at the time he acquires explosive materials from a licensed importer, licensed manufacturer, or licensed dealer present his permit to such licensee. The licensed importer, licensed manufacturer, or licensed dealer shall write across the face of such permit "Transaction completed", the date, sign his name and indicate his license number, and return the permit to the permittee.

§ 181.104 Certified copy of license or permit.

Except as provided in § 181.49(a), each person issued a license or permit under the provisions of this part shall be furnished together with his license or permit a copy thereof for his certification. If such a person desires an additional copy of his license or permit for certification and for use pursuant to § 181.103, he shall:

(a) Make a reproduction of the copy of his license or permit and execute the certification thereon, or

(b) Make a reproduction of his license or permit, enter upon such reproduction the statement: "I certify that this is a true copy of a (*insert the word*

license or *permit*) issued to me to engage in the business or operations specified in Item 5" and sign his name adjacent thereto, or

(c) Submit a request, in writing, for certified copies of his license or permit to the Assistant Regional Commissioner for the Internal Revenue region in which the license or permit was issued. The request shall set forth the name, trade name (if any), and address of the licensee or permittee and the number of copies of the license or permit desired. There shall be imposed a fee of $1 for each copy of a license or permit issued by the Assistant Regional Commissioner under the provisions of this paragraph. Fee payment shall accompany each such request for additional copies of a license or permit. Such fee shall be paid by (1) cash, or (2) money order or check made payable to the Internal Revenue Service.

§ 181.105 Distributions to nonlicensees and nonpermittees.

(a) The provision of this section shall apply in any case where distribution of explosive materials to the distributee is not otherwise prohibited by the Act or this part.

(b) Except as provided in paragraph (c) of this section, a licensed importer, licensed manufacturer, or licensed dealer may distribute explosive materials to a nonlicensee or nonpermittee if the nonlicensee or nonpermittee is a resident of the same State in which the licensee's business premises are located, and the nonlicensee or nonpermittee furnishes to the licensee the explosives transaction record, Form 4710, required by § 181.126. Disposition of Form 4710 shall be made in accordance with the provisions of § 181.126(c).

(c) A licensed importer, licensed manufacturer, or licensed dealer may sell or distribute explosive materials to a resident of a State contiguous to the State in which the licensee's place of business is located if the purchaser's State of residence has enacted legislation, currently in force, specifically authorizing a resident of that State to purchase explosive materials in a contiguous State and the purchaser and the licensee have, prior to the distribution of the explosive materials, complied with all the requirements of paragraphs (b), (e), and (f) of this section applicable to intrastate transactions occurring on the licensee's business premises.

(d) A licensed manufacturer-limited or a permittee may dispose of surplus stocks of explosive materials to a nonlicensee or nonpermittee if the nonlicensee or nonpermittee is a resident of the same State in which such licensee's or permittee's business premises or operations are located, or is a resident of a State contiguous to the State in which the licensee's or permittee's place of business or operations are located, and if the requirements of paragraphs (b), (c), (e), and (f) of this section are fully met.

(e) A licensed importer, licensed manufacturer, or licensed dealer selling or otherwise distributing explosive materials to a business entity shall verify the identity of the representative or agent of the business entity who is authorized to acquire explosive materials on behalf of such business entity. Each business entity acquiring explosive materials shall furnish the licensed importer, licensed manufacturer, or licensed dealer with a current certified list of the names of representatives or agents authorized to acquire explosive materials on behalf of such business entity. A licensed importer, licensed manufacturer, or licensed dealer shall not distribute explosive materials to a business entity on the order of a person whose name does not appear on such list.

(f) Where the possession of explosive materials is transferred at the distributor's premises, the distributor shall in all instances verify the identity of the person accepting possession on behalf of the distributee before relinquishing such possession. Prior to the delivery at the distributor's premises of explosive materials to an employee of a nonlicensee or nonpermittee, or to an employee of a carrier transporting explosive materials to a nonlicensee or nonpermittee, the distributor so delivering explosive materials shall obtain an executed Form 4721 from such employee before releasing the explosive materials. The Form 4721 shall contain all of the information as indicated by the headings on the form and the instructions thereon or issued in respect thereto, and as required by this part.

§ 181.106 Certain prohibited distributions.

(a) A licensed importer, licensed manufacturer, licensed manufacturer-limited, or licensed dealer shall not distribute explosive materials to any person not licensed or holding a permit under this part, who the licensee knows or has

reason to believe does not reside in the State in which the licensee's place of business is located: *Provided*, That the foregoing provisions of this paragraph shall not apply to the distribution of explosive materials to a resident of a State contiguous to the State in which the licensee's place of business is located if the requirements of § 181.105(c) are fully met.

(b) A licensed importer, licensed manufacturer, licensed manufacturer-limited, or licensed dealer shall not distribute any explosive materials to any person (1) who the importer, manufacturer, or dealer knows is less than 21 years of age, or (2) in any State where the purchase, possession, or use by such person of such explosive materials would be in violation of any State law or any published ordinance applicable at the place of distribution, or (3) who the importer, manufacturer, or dealer has reason to believe intends to transport such explosive materials into a State where the purchase, possession, or use of explosive materials is prohibited or which does not permit its residents to transport or ship explosive materials into such State or to receive explosive materials in such State, or (4) who the importer, manufacturer, or dealer has reasonable cause to believe intends to use such explosive materials for other than a lawful purpose.

(c) A licensed importer, licensed manufacturer, licensed manufacturer-limited, or licensed dealer shall not distribute any explosive materials to any person knowing or having reason to believe that such person (1) is, except as provided under § 181.142 (d) and (e), under indictment for, or has been convicted in any court, of a crime punishable by imprisonment for a term exceeding 1 year, (2) is a fugitive from justice, (3) is an unlawful user of marihuana (as defined in section 4761 of the Internal Revenue Code of 1954; 26 U.S.C. 4761) or any depressant or stimulant drug (as defined in section 201 (v) of the Federal Food, Drug, and Cosmestic Act; 21 U.S.C. 321(v), or narcotic drug (as defined in section 4731(a) of the Internal Revenue Code of 1954; 26 U.S.C. 4731(a)), or (4) has been adjudicated as a mental defective or has been committed to a mental institution.

§ 181.107 Record of transactions.

Every licensee and permittee shall maintain records of explosive materials in such form and manner as is prescribed by Subpart G of this part.

§ 181.108 Importation.

Explosive materials imported or brought into the United States by a licensed importer or permittee may be released from Customs custody to the licensed importer or permittee upon proof of his status as a licensed importer or permittee. Such status shall be established by the licensed importer or permittee furnishing to the Customs officer a certified copy of his license or permit (see § 181.104). The provisions of this section are in addition to, and are not in lieu of, any applicable requirement under Part 180 of this chapter.

§ 181.109 Identification of explosive materials.

Each licensed manufacturer of explosive materials on or after February 12, 1971, shall legibly identify by marking all explosive materials he manufactures for sale or distribution. The marks required by this section shall identify the manufacturer and the location, date, and shift of manufacture. The licensed manufacturer shall place on each cartridge, bag, or other immediate container of explosive materials manufactured for sale or distribution the required mark which shall also be placed on the outside container, if any, used for their packaging: *Provided*, That with respect to explosive materials of small size not suitable for marking on the individual item (for example, blasting caps), it shall only be necessary to place such identification marks on the containers used for their packaging.

Subpart G—Records and Reports

§ 181.121 General.

(a) The records pertaining to explosive materials prescribed by this part shall be in permanent form, and shall be retained on the licensed or permit premises in the manner prescribed by this subpart for a period of not less than 5 years from the date the transaction occurs or until discontinuance of business or operations by the licensee or permittee. (See also § 181.128.)

(b) Internal revenue officers may enter the premises of any licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or per-

mittee for the purpose of examining or inspecting any record or document required by or obtained under this part (see § 181.24). Section 843(f) of the Act requires licensed importers, licensed manufacturers, licensed manufacturers-limited, licensed dealers, and permittees to make such records available for such examination or inspection at all reasonable times. Section 843(f) of the Act also requires licensed importers, licensed manufacturers, licensed manufacturers-limited, licensed dealers, and permittees to submit such reports and information with respect to such records and the contents thereof as the regulations contained in this part prescribe.

(c) Each licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, and permittee shall maintain such records of importation, production, shipment, receipt, sale, or other disposition, whether temporary or permanent, of explosive materials as the regulations contained in this part prescribe. Section 842(g) of the Act makes it unlawful for any licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee knowingly to make any false entry in any record required to be maintained pursuant to the Act and the regulations contained in this part.

§ 181.122 Records maintained by importers.

(a) Each licensed importer of explosive materials shall take true and accurate inventories which shall include all explosive materials on hand required to be accounted for in the records kept under this part. The licensed importer shall take such an inventory as of February 12, 1971, or at the time of commencing business subsequent thereto, which shall be the effective date of the license issued upon original qualification under this part; at the time of changing the location of his premises to another region; at the time of discontinuing business, and at such other times as the Assistant Regional Commissioner may in writing require. Each inventory shall be prepared in duplicate, the original of which shall be submitted to the Assistant Regional Commissioner, and the duplicate shall be retained by the licensed importer. (See also § 181.127.)

(b) Each licensed importer shall not later than the close of the next business day following the date of importation or other acquisition, record the quantity and class of explosive materials, as prescribed in the Explosives List, manufacturer manufacturers' marks of identification (if any), and country of manufacture of explosive materials he imports or otherwise acquires, and the date such importation or other acquisition was made.

(c) A record of explosive materials distributed by a licensed importer to another licensee or permittee shall be maintained by the licensed importer on his licensed premises and shall show the quantity, class (as prescribed in the Explosives List), manufacturer, manufacturers' marks of identification (if any), country of manufacture, and license or permit number of the licensee or permittee to whom the explosive materials were distributed, and the date of the transaction. The information required by § 181.103 (b), (c) and (d) shall also be maintained as part of the records of the licensed importer. The information required by this paragraph shall be entered in the proper record book not later than the close of the next business day following the date of the transaction.

(d) Notwithstanding the provisions of paragraph (c) of this section, the Assistant Regional Commissioner may authorize alternate records to be maintained by a licensed importer to record his distribution of explosive materials when it is shown by the licensed importer that such alternate records will accurately and readily disclose the information required by paragraph (c) of this section. A licensed importer who proposes to use alternate records shall submit a letter application, in duplicate, to the Assistant Regional Commissioner and shall describe the proposed alternate records and the need therefor. Such alternate records shall not be employed by the licensed importer until approval in such regard is received from the Assistant Regional Commissioner.

(e) Each licensed importer shall maintain separate records of the sales or other distribution made of explosive materials to nonlicensees or nonpermittees. Such records shall be maintained in the form and manner as prescribed by § 181.126.

§ 181.123 Records maintained by licensed manufacturers.

(a) Each licensed manufacturer shall take true and accurate inventories which shall include all explosive materials on hand required to be accounted for in the records kept under this part. The licensed manufacturer shall take such

an inventory as of February 12, 1971, or at the time of commencing business subsequent thereto, which shall be the effective date of the license issued upon original qualification under this part; at the time of changing location of his premises to another region; at the time of discontinuing business, and at such other times as the Assistant Regional Commissioner may in writing require. Each inventory shall be prepared in duplicate, the original of which shall be submitted to the Assistant Regional Commissioner, and the duplicate shall be retained by the licensed manufacturer. (See also §-181.127.)

(b) Each licensed manufacturer shall record the marks of identification (if any) the quantity and class of explosive materials, as prescribed in the Explosives List, he manufactures or otherwise acquires, and the date of such manufacture or acqusition. The information required by this paragraph shall be recorded not later than the close of the next business day following the date of such manufacture or acquisition.

(c) (1) A record of explosive materials distributed by a licensed manufacturer to another licensee or permittee shall be maintained by the licensed manufacturer on his licensed premises and shall show the marks of identification (if any), the quantity, class (as prescribed in the Explosives List), and manufacturer or importer, as applicable, if acquired other than by his manufacture, and license or permit number of the licensee or permittee to whom the explosive materials were distributed, and the date of the transaction. The information required by § 181.103 (b), (c) and (d) shall also be maintained as part of the records of the licensed manufacturer. The information required by this paragraph shall be entered in the proper record book not later than the close of the next business day following the date of the transaction.

(2) Each licensed manufacturer who manufactures explosive materials for his own use shall record in a separate permanent record the quantity and class of explosive materials, as prescribed in the Explosives List, he daily uses and the date of such use. The information required by this subparagraph shall be recorded not later than the close of the next business day following the date of such use.

(d) Notwithstanding the provisions of paragraph (c) of this section, the Assistant Regional Commissioner may authorize alternate records to be maintained by a licensed manufacturer to record his distribution or use of explosive materials when it is shown by the licensed manufacturer that such alternate records will accurately and readily disclose the information required by paragraph (c) of this section. A licensed manufacturer who proposes to use alternate records shall submit a letter application, in duplicate, to the Assistant Regional Commissioner and shall describe the proposed alternate records and the need therefor. Such alternate records shall not be employed by the licensed manufacturer until approval in such regard is received from the Assistant Regional Commissioner.

(e) Each licensed manufacturer shall maintain separate records of the sales or other distributions made of explosive materials to nonlicensees or nonpermittees. Such records shall be maintained in the form and manner as prescribed by § 181.126.

§ 181.124 Records maintained by dealers.

(a) Each licensed dealer shall take true and accurate inventories which shall include all explosive materials on hand required to be accounted for in the records kept under this part. The licensed dealer shall take such an inventory as of February 12, 1971, or at the time of commencing business subsequent thereto, which shall be the effective date of the license issued upon original qualification under this part; at the time of changing location of his premises to another region; at the time of discontinuing business, and at such other times as the Assistant Regional Commissioner may in writing require. Each inventory shall be prepared in duplicate, the original of which shall be submitted to the Assistant Regional Commissioner, and the duplicate shall be retained by the licensed dealer. (See also § 181.127.)

(b) Each licensed dealer shall enter into a permanent record each purchase or other acquisition of explosive materials. The purchase or other acquisition of explosive materials by a licensed dealer shall, except as provided in paragraph (c) of this section, be recorded not later than the close of the next business day following the date of such purchase or acquisition. The record shall show the date of receipt, the name, address and license or permit number of

the person from whom received, the name of the manufacturer and importer (if any), the manufacturers' marks of identification (if any), and the quantity and class of explosive materials are prescribed in the Explosives List.

(c) When a commercial record is maintained by a licensed dealer showing his purchase or acquisition of explosive materials, and such record contains all acquisition information required by the permanent record prescribed by paragraph (b) of this section, the licensed dealer acquiring such explosive materials may, for a period not exceeding 7 days following the date of such acquisition, delay making the required entry into such permanent record: *Provided*, That the commercial record is, until such time as the required entry into the permanent record is made, (1) maintained by the licensed dealer separate from other commercial documents maintained by such licensee, and (2) readily available for inspection on the licensed premises.

(d) A permanent record of explosive materials sold or otherwise distributed by a licensed dealer to another licenseee or permittee shall be maintained by the licensed dealer on his licensed premises and shall show the quantity, class of explosive materials, as prescribed in the Explosives List, the name of the manufacturer and importer (if any), the manufacturers' marks of identification (if any), the license or permit number of the licensee or permittee to whom the explosive materials were distributed, and the date of the transaction. The information required by § 181.103 (b), (c) and (d) shall also be maintained as part of the records of the licensed dealer. The information required by this paragraph shall be entered in the permanent record in the manner required in paragraphs (b) and (c) of this section with respect to acquisition of explosive materials.

(e) Notwithstanding the provisions of paragraphs (b) and (d) of this section, the Assistant Regional Commissioner may authorize alternate records to be maintained by a licensed dealer to record his acquisition or disposition of explosive materials, when it is shown by the licensed dealer that such alternate records will accurately and readily disclose the required information. A licensed dealer who proposes to use alternate records shall submit a letter application, in duplicate, to the Assistant Regional Commissioner and shall describe the proposed alternate records and the need therefor. Such alternate records shall not be employed by the licensed dealer until approval in such regard is received from the Assistant Regional Commissioner.

(f) Each licensed dealer shall maintain separate records of the sales or other distributions made of explosive materials to nonlicensees or nonpermittees. Such records shall be maintained in the form and manner as prescribed by § 181.126.

§ 181.125 Records maintained by licensed manufacturers-limited and permittees.

(a) Each licensed manufacturer-limited and each permittee shall take true and accurate inventories which shall include all exposive materials on hand required to be accounted for in the records kept under this part. Such inventory shall be made as of February 12, 1971, or at the time of commencing business or operations subsequent thereto, which shall be the effective date of the license or permit issued upon original qualification under this part; at the time of changing the location of his premises to another region; at the time of discontinuing business or operations, and at such other times as the Assistant Regional Commissioner may in writing require. Each inventory shall be prepared in duplicate, the original of which shall be submitted to the Assistant Regional Commissioner, and the duplicate shall be retained by the licensee or permittee. (See also § 181.127.)

(b) A licensed manufacturer-limited disposing of surplus stocks of explosive materials to other licensees or to permittees shall record in the permanent record not later than the close of the next business day following the date of the disposition, the information prescribed in § 181.123(c)(1). Each licensed manufacturer-limited shall maintain separate records of dispositions of surplus stocks of explosive materials to nonlicensees or nonpermittees. Such records shall be maintained in the form and manner as prescribed by § 181.126.

(c) Each permittee shall record in a permanent record the manufacturers' marks of identification (if any), the quantity and class of explosive materials, as prescribed in the Explosives List, he daily acquires, the date of such acquisition, and the name, address and license number of the person from whom

explosive materials were obtained. The information required by this paragraph shall be recorded not later than the close of the next business day following the date of such acquisition.

A permittee disposing of surplus stocks of explosive materials to other permittees or to licensees shall record in the permanent record not later than the close of the next business day following the date of the disposition, the information prescribed in § 181.124(d). Each permittee shall maintain separate records of dispositions of surplus stocks of explosive materials to nonlicensees or nonpermittees. Such records shall be maintained in the form and manner as perscribed by § 181.126.

(d) Notwithstanding the provisions of paragraph (c) of this section, the Assistant Regional Commissioner may authorize alternate records to be maintained by a permittee to record his acquisition of explosive materials, when it is shown by the permittee that such alternate records will accurately and readily disclose the required information. A permittee who proposes to use alternate records shall submit a letter application, in duplicate, to the Assistant Regional Commissioner and shall describe the proposed alternate records and the need therefor. Such alternate records shall not be employed by the permittee until approval in such regard is received from the Assistant Regional Commissioner.

§ 181.126 Explosives transactions record.

(a) A licensee or permittee shall not sell or otherwise distribute, temporarily or permanently, explosive materials to any person, other than another licensee or permittee, unless he records the transaction on an explosives transaction record, Form 4710.

(b) Prior to the sale or other distribution of explosive materials to a nonlicensee or nonpermittee who is a resident of the State in which the licensee or permittee maintains his business premises or who is not a resident of the State in which the licensee or permittee maintains his business premises and such nonlicensee or nonpermittee is acquiring explosive materials under the provisions contained in § 181.105(c), the licensee or permittee so distributing the explosive materials shall obtain an executed Form 4170 from the distributee. The Form 4710 shall contain all of the information as indicated by the headings on the form and the instructions thereon or issued in respect thereto, and as required by this part.

(c) Form 4710 shall be completed in duplicate, the original of which shall be retained by the licensee or permittee as part of his permanent records in accordance with the requirements in paragraph (d) of his section, and the copy shall be forwarded to the Assistant Regional Commissioner on or before the close of business on the business day next succeeding that on which the transaction occurs.

(d) Each original For 4710 shall be retained in numerical (by transaction serial number) order commencing with "1" and continuing in regular sequence. When the numbering of any series reaches "1,000,000", the licensee or permittee may recommence the series. The recommenced series shall be given an alphabetical prefix or suffix. Where there is a change in proprietorship, or in the individual, firm, corporate name, or trade name, the series in use at the time of such change may be continued.

(e) The requirements of this section shall be in addition to any other recordkeeping requirement contained in this part.

(f) A licensee or permittee may obtain, upon request, a supply of Form 4710 from any Assistant Regional Commissioner or any District Director.

§ 181.127 Daily summary of magazine transactions.

In taking the inventory required by § § 181.122, 181.123, 181.124, and 181.125, the inventory shall be entered in a record of daily transactions to be maintained at each magazine of an approved storage facility. At the close of business of each day each licensee and permittee shall record by class of explosive materials, as prescribed in the Explosive List, the total quantity received in and removed from each magazine during the day and the total remaining on hand at the end of the day. Any discrepancy which might indicate a theft or loss of explosive materials shall be reported in accordance with the provisions of § 181.30.

§ 181.128 Discontinuance of business.

Where an explosive materials business or operations is discontinued and succeeded by a new licensee or permittee the records prescribed by this subpart

shall appropriately reflect such facts and shall be delivered to the successor. Where discontinuance of the business or operations is absolute, the records prescribed by this subpart shall be delivered within 30 days following the business or operations discontinuance to the Assistant Regional Commissioner for the internal revenue region in which the business was operated: *Provided, however,* Where State law or local ordinance requires the delivery of records to other responsible authority, the Assistant Regional Commissioner may arrange for the delivery of the records required by this subpart to such authority. (See also § 181.61.)

§ 181.129 Exportation.

Explosive materials shall be exported in accordance with the applicable provisions of section 414 of the Mutual Security Act of 1954 (22 U.S.C. 1934) and regulations thereunder. However, licensed manufacturers, licensed importers, and licensed dealers exporting explosive materials shall maintain records showing the manufacture or acquisition of explosive materials as required by this part and records showing the quantity and class of explosive materials, as prescribed in the Explosives List, the name and address of the foreign consignee of the explosive materials and the date the explosive materials were exported.

Subpart H—Exemptions

§ 181.141 General.

The provisions of this part shall not apply with respect to:

(a) Any aspect of the transportation of explosive materials via railroad, water, highway, or air which are regulated by the U.S. Department of Transportation, and agencies thereof.

(b) The use of explosive materials in medicines and medicinal agents in the forms prescribed by the official United States Pharmacopoeia, or the National Formulary.

(c) The transportation, shipment, receipt, or importation of explosive materials for delivery to any agency of the United States or to any State or political subdivision thereof.

(d) Small ammunition and components thereof.

(e) Black powder in quantities not to exceed five pounds.

(f) The manufacture under the regulation of the military department of the United States of explosive materials for, or their distribution to or storage or possession by the military or naval services or other agencies of the United States.

(g) Arsenals, navy yards, depots, or other establishments owned by, or operated by or on behalf of, the United States.

(h) The importation and distribution of fireworks in a finished state, commonly sold at retail for personal use in compliance with State laws or local ordinances.

(i) Gasoline, fertilizers, propellant actuated devices, or propellant actuated industrial tools manufactured, imported, or distributed for their intended purposes.

§ 181.142 Relief from disabilities incurred by indictment or conviction.

(a) Any person may make application for relief from the disabilities under the Act incurred by reason of an indictment for or conviction of a crime punishable by imprisonment for a term exceeding 1 year.

(b) An application for such relief shall be addressed to the Commissioner and shall include such supporting data as the applicant deems appropriate. In the case of a corporation, the supporting data should include information as to the absence of culpability in the offense of which the corporation was indicted or convicted, or of any person having the power to direct or control the management of the corporation, if such be the fact. The application shall be filed, in triplicate, with the Assistant Regional Commissioner for the internal revenue region wherein the business premises are located or the applicant resides.

(c) The Commissioner may grant relief to an applicant if it is established to the satisfaction of the Commissioner that the circumstances regarding the indictment or conviction, and the applicant's record and reputation are such that the applicant will not be likely to act in a manner dangerous to public safety, and that the granting of the relief would not be contrary to the public interest.

(d) A person who has been granted relief under this section shall be relieved of any disabilities imposed by the Act with respect to engaging in the business of importing, manufacturing, or dealing in explosive materials, or the purchase of explosive materials incurred by reason of such indictment or conviction.

(e) (1) A licensee or permittee who is indicted for or convicted of a crime punishable by imprisonment for a term exceeding 1 year during the term of a current license or permit or while he has pending a license or permit renewal application shall not be barred from licensed or permit operations for 30 days after the date of indictment or 30 days after the date upon which his conviction becomes final, and if he files his application for relief as provided by this section within such 30-day period, he may further continue licensed or permit operations during the pendency of his application. A licensee or permittee who does not file an application within 30 days from the date of his indictment or within 30 days from the date his conviction becomes final, shall not continue licensed or permit operations beyond 30 days from the date of his indictment or beyond 30 days from the date his conviction becomes final.

(2) In the event the term of a license or permit of a person expires during the 30-day period following the date or indictment or during the 30-day period after the date upon which his conviction becomes final or during the pendency of his application for relief, he must file a timely application for renewal of his license or permit in order to continue licensed or permit operations. Such license or permit application shall show that the applicant has been indicted for or convicted of a crime punishable by imprisonment for a term exceeding 1 year.

(3) A licensee or permittee shall not continue licensed or permit operations beyond 30 days following the date the Commissioner issues notification that the licensee's or permittee's application for removal of the disabilities resulting from an indictment or conviction has been denied.

(4) When as provided in this section a licensee or permittee may no longer continue licensed or permit operations, any application for renewal of license or permit filed by the licensee or permittee during the pendency of his application for removal of disabilities resulting from an indictment or conviction, shall be denied by the Assistant Regional Commissioner.

Subpart I—Unlawful Acts, Penalties, Seizures, and Forfeitures

§ 181.161 Engaging in business without a license.

Any person engaging in the business of importing, manufacturing, or dealing in explosive materials without a license issued under the Act, shall be fined not more than $10,000 or imprisoned not more than 10 years, or both.

§ 181.162 False statement or representation.

Any person who knowingly withholds information or makes any false or fictitious oral or written statement or furnishes or exhibits any false, fictitious, or misrepresented identification, intended or likely to deceive for the purpose of obtaining explosive materials, or a license, permit exemption, or relief from disability under the Act, shall be fined not more than $10,000 or imprisoned not more than 10 years, or both.

§ 181.163 False entry in record.

Any licensed importer, licensed manufacturer, licensed manufacturer-limited, licensed dealer, or permittee who knowingly makes any false entry in any record required to be kept pursuant to Subpart G of this part, shall be fined not more than $10,000 or imprisoned not more than 10 years, or both.

§ 181.164 Unlawful storage.

Any person who stores any explosive material in a manner not in conformity with the provisions of Subpart J of this part, shall be fined not more than $1,000 or imprisoned not more than 1 year, or both.

§ 181.165 Failure to report theft or loss.

Any person who has knowledge of the theft or loss of any explosive materials from his stock and fails to report such theft or loss within 24 hours of discovery thereof in accordance with § 181.30, shall be fined not more than $1,000 or imprisoned not more than 1 year, or both.

§ 181.166 Seizure or forfeiture.

Any explosive material involved or used or intended to be used in any violation of the provisions of the Act or of this part, or in any violation of any criminal law of the United States shall be subject to seizure and forfeiture, and all provisions of the Internal Revenue Code of 1954 (title 26 U.S.C.) relating to the seizure, forfeiture, and disposition of firearms, as defined in section 5845(a) of that Code (26 U.S.C. 5845(a)), shall, so far as applicable, extend to seizures and forfeitures under the provisions of the Act.

Subpart J—Storage

§ 181.181 General.

(a) No person shall store any explosive materials in a manner not in conformity with the provisions of this subpart (see § 181.29). Section 842(j) of the Act requires that the storage of explosive materials by any person must be in a manner conforming with the regulations contained in this subpart. The storage standards prescribed by this subpart confer no rights or privileges to store explosive materials in a manner contrary to State or other law.

(b) Notwithstanding the provisions of paragraph (a) of this section, the Assistant Regional Commissioner may authorize alternate storage facilities for the storage of explosive materials when it is shown that such alternate facilities are or will be constructed in a manner substantially equivalent to the standards of construction contained in this subpart. Such alternate storage facilities shall not be used for the storage of explosive materials until approval is received from the Assistant Regional Commissioner.

(c) A licensee or permittee who intends to make additions to, modification of, or changes in his approved storage facilities shall follow the procedures and be subject to the requirements of § 181.54(c).

§ 181.182 Classes of explosive materials.

For purposes of this part, there shall be three classes of explosive materials. These classes, together with the description of explosive materials comprising each class, are as follows.

(a) *High explosives.* Explosive materials which can be caused to detonate by means of a blasting cap when unconfined. (For example, dynamite.)

(b) *Low explosives.* Explosive materials which can be caused to deflagrate when confined. (For example, black powder.)

(c) *Blasting agents.* (For example, ammonium nitrate-fuel oil.)

§ 181.183 Types of storage facilities.

For purposes of this part, there shall be five types of storage facilities. These types, together with the classes of explosive materials which shall be stored therein, are as follows:

(a) *Type 1 storage facilities.* Permanent storage facilities for the storage of high explosives, subject to the limitations prescribed by §§ 181.186 and 181.193. Other classes may also be stored therein.

(b) *Type 2 storage facilities.* Portable indoor and outdoor storage facilities for the storage of high explosives, subject to the limitations prescribed by §§ 181.186, 181.188(b), and 181.193. Other classes may also be stored therein.

(c) *Type 3 storage facilities.* Portable outdoor facilities for the temporary storage of high explosives while attended (for example, a "day-box"), subject to the limitations prescribed by §§ 181.186 and 181.193. Other classes may also be stored therein.

(d) *Type 4 storage facilities.* Facilities for the storage of low explosives, subject to the limitations prescribed by §§ 181.186(b), 181.190(b), and 181.193. Blasting agents may also be stored therein.

(e) *Type 5 storage facilities.* Facilities for the storage of blasting agents, subject to the limitations prescribed by §§ 181.186 (a) and (c), 181.191(b), and 181.193.

§ 181.184 Inspection of storage facilities.

Any person storing explosive materials shall open and inspect his storage facilities at intervals not greater than 3 days to determine whether the explosives therein are intact and to determine whether there has been unauthorized entry

or attempted entry into the storage facilities or the unauthorized removal of facilities or their contents.

§ 181.185 Movement of explosive materials.

All explosive materials must be kept in storage facilities meeting the standards prescribed by this subpart unless they are:

(a) In the process of manufacture, or

(b) Being physically handled in the operating process of a licensee or user, or

(c) Being used, or

(d) Being transported to a place of storage or use by a permittee or by a person who has lawfully acquired explosive materials pursuant to the requirements of § 181.126.

§ 181.186 Location of storage facilities.

(a)(1) Except as otherwise provided in this subpart, storage facilities in which any explosive materials are stored shall be located at minimum distances from inhabited buildings, passenger railways, public highways, and from other storage facilities in which explosive materials are stored as specified in the American Table of Distances (see § 181.198): *Provided*, That this table shall not apply to any indoor storage facility. When a storage facility is not barricaded, the distances shown in the American Table of Distances shall be doubled. For purposes of this paragraph, a storage facility shall be deemed barricaded when it is effectually screened from inhabited buildings, passenger railways, public highways, and other storage facilities in which explosive materials are stored either by a natural or artificial barricade of such height that a straight line from the top of any sidewall of the storage facility to the eave line of such other inhabited building or storage facility, or to a point 12 feet above the center of a passenger railway or public highway, will pass through such intervening barricade.

(2) If any two or more storage facilities are separated from each other by less than the distances specified in § 181.198, then such two or more storage facilities, as a group, shall be considered as one storage facility, and the total quantity of explosive materials stored in such group shall be treated as if stored in a single facility and shall comply with the minimum of distances specified in § 181.198 from other storage facilities, inhabited buildings, passenger railways, and public highways.

(b) Storage facilities in which low explosives are stored shall be located at minimum distances from inhabited buildings, passenger railways, public highways, and from other storage facilities in which explosive materials are stored as specified in the table of distances for storage of low explosives (see § 181.199): *Provided*, That this table shall not apply to any indoor storage facility. The distances shown therein shall not be reduced by the presence of barricades.

(c) Ammonium nitrate and storage facilities in which blasting agents are stored shall be located at minimum distances from storage facilities containing high explosives or blasting agents as specified in the Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents (see § 181.200).

§ 181.187 Construction of type 1 storage facilities.

A type 1 storage facility shall be a permanent structure: a building, an igloo or Army-type structure, a tunnel, or a dugout. It shall be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and well ventilated.

(a) *Buildings.* All building type storage facilities shall be constructed of masonry, wood, metal, or a combination of these materials and shall have no openings except for entrances and ventilation. Ground around such storage facilities shall slope away for drainage.

(1) *Masonry wall construction.* Masonry wall construction shall consist of brick, concrete, tile, cement block, or cinder block and shall be not less than 6 inches in thickness. Hollow masonry units used in construction shall have all hollow spaces filled with well-tamped coarse dry sand or weak concrete (a mixture of one part cement and eight parts of sand with enough water to dampen the mixture while tamping in place). Interior walls shall be covered with a nonsparking material.

(2) *Fabricated metal wall construction.* Metal wall construction shall consist of sectional sheets of steel or aluminum not less than number 14 gauge, securely

fastened to a metal framework. Such metal wall construction shall be either lined inside with brick, solid cement blocks, hardwood not less than 4 inches in thickness, or shall have at least a 6-inch sand fill between interior and exterior walls. Interior walls shall be constructed of or covered with a nonsparking material.

(3) *Wood frame wall construction.* The exterior of outer wood walls shall be covered with iron or aluminum not less than number 26 gauge. An inner wall of nonsparking material shall be constructed so as to provide a space of not less than 6 inches between the outer and inner walls, which space shall be filled with coarse dry sand or weak concrete.

(4) *Floors.* Floors shall be constructed of a nonsparking material and shall be strong enough to bear the weight of the maximum quantity to be stored.

(5) *Foundations.* Foundations shall be constructed of brick, concrete, cement block, stone, or wood posts. If piers or posts are used, in lieu of a continuous foundation, the space under the buildings shall be enclosed with metal.

(6) *Roof.* Except for buildings with fabricated metal roofs, the outer roof shall be covered with no less than number 26-gauge iron or aluminum fastened to ⅞-inch sheathing.

(7) *Bullet-resistant ceilings or roofs.* Where it is possible for a bullet to be fired directly through the roof and into the storage facility at such an angle that the bullet would strike a point below the top of inner walls, storage facilities shall be protected by one of the following methods:

(i) A sand tray shall be located at the tops of inner walls covering the entire ceiling area, except that necessary for ventilation, lined with a layer of building paper, and filled with not less than 4 inches of coarse dry sand.

(ii) A fabricated metal roof shall be constructed of 3/16-inch plate steel lined with 4 inches of hardwood. (For each additional 1/16-inch of plate steel, the hardwood lining may be decreased 1 inch.)

(8) *Doors.* All doors shall be constructed of ¼-inch plate steel and lined with 2 inches of hardwood. Hinges and hasps shall be attached to the doors by welding, riveting or bolting (nuts on inside of door). They shall be installed in such a manner that the hinges and hasps cannot be removed when the doors are closed and locked.

(9) *Locks.* Each door shall be equipped with two mortise locks; or with two padlocks fastened in separate hasps and staples; or with a combination of mortise lock and a padlock; or with a mortise lock that requires two keys to open; or a three-point lock. Locks shall be five-tumbler proof. All padlocks shall be protected with ¼-inch steel caps constructed so as to prevent sawing or lever action on the locks or hasps.

(10) *Ventilation.* Except at doorways, a 2-inch air space shall be left around ceilings and the perimeter of floors. Foundation ventilators shall be not less than 4 by 6 inches. Vents in the foundation, roof, or gables shall be screened and offset.

(11) *Exposed metal.* No sparking metal construction shall be exposed below the top of walls in the interior of storage facilities, and all nails therein shall be blind-nailed or countersunk.

(b) *Igloos, Army-type structures, tunnels, and dugouts.* Igloo, Army-type tunnel, and dugout storage facilities shall be constructed of reinforced concrete, masonry, metal or a combination of these materials. They shall have an earth-mound covering of not less than 24 inches on the top, sides and rear. Interior walls and floors shall be covered with a nonsparking material. Storage facilities of this type shall also be constructed in conformity with the requirements of paragraph (a)(4) and paragraphs (a) (8) through (11) of this section.

§ 181.188 Construction of type 2 storage facilities.

A type 2 storage facility shall be a box, a trailer, a semitrailer or other mobile facility. It shall be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and well ventilated. Except as provided in paragraph (c) of this section, hinges and hasps shall be attached to the covers or doors in the manner prescribed in § 181.187(a)(8) and the locking system shall be that prescribed in § 181.187(a)(9).

(a) *Outdoor storage facilities.* Outdoor storage facilities shall be at least 1 cubic yard in size and supported in such a manner so as to prevent direct contact with the ground. The sides, bottoms, tops, and covers or doors shall be con-

structed of ¼-inch steel and shall be lined with 2 inches of hardwood. Edges of metal covers shall overlap sides at least 1 inch. The ground around such storage facilities shall slope away for drainage. When unattended, vehicular storage facilities shall have wheels removed or shall be otherwise effectively immobilized by kingpin locking devices or other methods approved by the Director.

(b) *Indoor storage facilities.* No indoor facility for the storage of high explosives shall be located in a residence or dwelling. When located in a warehouse, wholesale, or retail establishment, such storage facilities shall be provided with substantial wheels or casters to facilitate removal therefrom. No more than two indoor storage facilities shall be kept in any one building. Two storage facilities may be kept in the same building only when one is used for the storage of blasting caps, squibs, or similar items and the other facility is used for the storage of other high explosives. Each storage facility shall be located on the floor nearest the ground level and within 10 feet of an outside exit. Indoor storage facilities within one building shall be separated by a distance of not less than 10 feet. No indoor storage facility shall contain a quantity of high explosives in excess of 50 pounds or more than 5,000 blasting caps. Indoor facilities shall be of wood or metal construction as prescribed in subparagraphs (1) or (2) of this paragraph.

(1) *Wood construction.* Wood indoor storage facilities shall have sides, bottoms, and covers or doors constructed of 2-inch hardwood and shall be well braced at corners. They shall be covered with sheet metal of not less than number 20 gauge. Nails exposed to the interior of such facilities shall be countersunk.

(2) *Metal construction.* Metal indoor storage facilities shall have sides, bottoms, and covers or doors constructed of number 12-gauge metal and shall be lined inside with a nonsparking material. Edges of metal covers shall overlap sides at least 1 inch.

(c) *Cap boxes.* Storage facilities for blasting caps in quantities of 100 or less shall have sides, bottoms, and covers constructed of number 12-gauge metal and lined with a nonsparking material. Hinges and hasps shall be attached thereto by welding. A single five-tumbler proof lock shall be sufficient for locking purposes.

§ 181.189 Construction of type 3 storage facilities.

A type 3 storage facility shall be a "day-box" or other portable facility. It shall be constructed in the same manner prescribed for type 2 outdoor storage facilities in § 181.188(a), except that it may be less than 1 cubic yard in size, and shall be bullet-resistant, fire-resistant, weather-resistant, theft-resistant, and well ventilated. Hinges, hasps, locks, and lock protection shall be in conformity with the requirements of § 181.187(a) (8) and (9). The ground around such storage facilities shall slope away for drainage. No explosive materials shall be left in such facilities if unattended. The explosive materials contained therein must be removed to types 1 or 2 storage facilities for unattended storage.

§ 181.190 Construction of type 4 storage facilities.

A type 4 storage facility may be a building, an igloo or Army-type structure, a tunnel, a dugout, a box, a trailer, or a semitrailer or other mobile facility and shall be fire-resistant, weather-resistant, and theft-resistant. They shall be constructed of masonry, metal-covered wood, fabricated metal, or a combination of these materials. The walls and floors of such storage facilities shall be lined with a nonsparking material. The doors or covers shall be metal or solid wood covered with metal. The foundations, locks, lock protection, hinges, hasps, and interior shall be in conformity with the requirements of § 181.187(a) (5), (8), (9), and (11).

(a) *Outdoor storage facilities.* The ground around such storage facilities shall slope away for drainage. When unattended, vehicular storage facilities shall have wheels removed or shall be otherwise effectively immobilized by kingpin locking devices or other methods approved by the Director.

(b) *Indoor storage facilities.* No indoor facility for the storage of low explosives shall be located in a residence or dwelling. When located in a warehouse, wholesale, or retail establishment, such storage facilities shall be provided with substantial wheels or casters to facilitate removal therefrom. No more than one indoor storage facility shall be kept in any one building. It shall be located on the floor nearest the ground level and within 10 feet of an outside

exit. No indoor storage facility shall contain a quantity of low explosives in excess of 50 pounds.

§ 181.191 Construction of type 5 storage facilities.

A type 5 storage facility may be a building, an igloo or Army-type structure, a tunnel, a dugout, a bin, a box, a trailer, or a semitrailer or other mobile facility and shall be theft-resistant. The doors or covers thereof shall be solid wood or metal. The hinges, hasps, locks, and lock protection shall be in conformity with the requirements of § 181.187(a) (8) and (9).

(a) *Outdoor storage facilities.* The ground around such storage facilities shall slope away for drainage. When unattended, vehicular storage facilities shall have wheels removed or shall be otherwise effectively immobilized by kingpin locking devices or other methods approved by the Director.

(b) *Indoor storage facilities.* No indoor storage facility for the storage of blasting agents shall be located in a residence or dwelling.

§ 181.192 Smoking and open flames.

Smoking, matches, open flames, and spark-producing devices shall not be permitted in, or within 50 feet of, any outdoor storage facility.

§ 181.193 Quantity and storage restrictions.

Explosive materials in excess of 300,000 pounds and blasting caps in excess of 20 million shall not be stored in one storage facility. Blasting caps shall not be stored with other explosive materials in the same storage facility.

§ 181.194 Storage within types 1, 2, 3, and 4 facilities.

(a) Explosive materials within a storage facility shall not be placed directly against interior walls. Any devices constructed or placed within a storage facility shall not interfere with ventilation.

(b) Containers of explosive materials shall be stored by being laid flat with top sides up. Corresponding classes, grades and brands shall be stored together within a storage facility in such a manner that class, grade, and brand marks are easily visible upon inspection. Stocks of explosive materials shall be stored so as to be easily counted and checked.

(c) Except with respect to fiberboard containers, containers of explosive materials shall not be unpacked or repacked inside a storage facility or within 50 feet thereof, and shall not be unpacked or repacked in close proximity to other explosive materials. Containers of explosive materials shall be securely closed while being stored.

(d) Tools used for opening or closing containers of explosive materials shall be of nonsparking materials, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber, or wooden mallet shall be used for opening or closing wood containers of explosive materials. Metal tools other than nonsparking transfer conveyors shall not be stored in any storage facility containing high explosives.

§ 181.195 Housekeeping.

Storage facilities shall be kept clean, dry, and free of grit, paper, empty packages and containers, and rubbish. Floors shall be regularly swept. Brooms and other utensils used in the cleaning and maintenance of storage facilities shall have no spark-producing metal parts. Floors stained by leakage from explosive materials shall be cleaned according to instructions of the manufacturer. When any explosive material has deteriorated to the extent that it is in a dangerous condition, or if a liquid leaks therefrom, it shall be destroyed in accordance with the instructions of its manufacturer. The area surrounding storage facilities shall be kept clear of rubbish, brush, dry grass, or trees for not less than 25 feet in all directions. Any other combustible materials shall be kept a distance of not less than 50 feet from outdoor storage facilities.

§ 181.196 Repair of storage facilities.

Prior to the interior repair of storage facilities, all explosive materials shall be removed and the interior shall be cleaned. Prior to the exterior repair of storage facilities, all explosive materials shall be removed if there exists a possibility that such repairs may produce sparks or flame. The explosive materials removed from storage facilities under repair shall either be placed in other storage facilities appropriate for the storage of such materials under this subpart or placed

a safe distance from the facilities under repair where they shall be properly guarded and protected until the repairs have been completed.

§ 181.197 Lighting.

No lighting shall be placed or used in a storage facility of type 1, 2, 3, or 4 except battery-activated safety lights or battery-activated safety lanterns.

§ 181.198 American table of distances for storage of explosive materials.

Explosives		Distances in feet when storage is barricaded			
Pounds over	Pounds not over	Inhabited buildings	Passenger railways	Public highways	Separation of magazines
2	5	70	30	30	6
5	10	90	35	35	8
10	20	110	45	45	11
20	30	125	50	50	11
30	40	140	55	55	12
40	50	150	60	60	14
50	75	170	70	70	15
75	100	190	75	75	16
100	125	200	80	80	18
125	150	215	85	85	19
150	200	235	95	95	21
200	250	255	105	105	23
250	300	270	110	110	24
300	400	295	120	120	27
400	500	320	130	130	29
500	600	340	135	135	31
600	700	355	145	145	32
700	800	375	350	150	33
800	900	390	155	155	35
900	1,000	400	160	160	36
1,000	1,200	425	170	165	39
1,200	1,400	450	180	170	41
1,400	1,600	470	190	175	43
1,600	1,800	490	195	180	44
1,800	2,000	505	205	185	45
2,000	2,500	545	220	190	49
2,500	3,000	580	235	195	52
3,000	4,000	635	255	210	58
4,000	5,000	685	275	225	61
5,000	6,000	730	295	235	65
6,000	7,000	700	310	245	68
7,000	8,000	800	320	250	72
8,000	9,000	835	335	255	75
9,000	10,000	865	245	260	78
10,000	12,000	875	370	270	82
12,000	14,000	885	380	275	87
14,000	16,000	900	405	280	90
16,000	18,000	940	420	285	94
18,000	20,000	975	235	290	98
20,000	25,000	1,055	470	315	105
25,000	30,000	1,130	500	340	112
30,000	35,000	1,205	525	360	119
35,000	40,000	1,275	550	380	124
40,000	45,000	1,340	570	400	129
45,000	50,000	1,400	590	420	135
50,000	55,000	1,460	610	440	140
55,000	60,000	1,515	630	455	145
60,000	65,000	1,565	645	470	150
65,000	70,000	1,610	660	485	155
70,000	75,000	1,655	675	500	160
75,000	80,000	1,695	690	510	165
80,000	85,000	1,730	705	520	170
85,000	90,000	1,760	720	530	175
90,000	95,000	1,790	730	540	180
95,000	100,000	1,815	745	545	185
100,000	110,000	1,835	770	550	195
110,000	120,000	1,855	790	555	205
120,000	130,000	1,875	810	560	215
130,000	140,000	1,890	835	565	225
140,000	150,000	1,900	850	570	235
150,000	160,000	1,935	870	580	245
160,000	170,000	1,965	890	590	255
170,000	180,000	1,990	905	600	265
180,000	190,000	2,010	920	605	275
190,000	200,000	2,030	935	610	285
200,000	210,000	2,055	955	620	295
210,000	230,000	2,100	980	635	315
230,000	250,000	2,155	1,010	650	335
250,000	275,000	2,215	1,040	670	360
275,000	300,000	2,275	1,075	690	385

Note: American Table of Distances for Storage of Explosives, as Revised and Approved by The Institute of Makers of Explosives, June 5, 1964.

SEC. 181.199—TABLE OF DISTANCES FOR STORAGE OF LOW EXPLOSIVES

Pounds (over)	Pounds (not over)	Inhabited building distance (feet)	Public railroad and highway distance (feet)	Above-ground magazine (feet)
(1)	(2)	(3)	(4)	(5)
0	1,000	75	75	50
1,000	5,000	115	115	75
5,000	10,000	150	150	100
10,000	20,000	190	190	125
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	280	280	190
80,000	90,000	295	295	195
90,000	100,000	300	300	200
100,000	200,000	375	375	250
200,000	300,000	450	450	300

Note: A portion of table 5-4.1, as published in Department of Defense 4145.27 M, "DOD Ammunition and Explosives Safety Standards", March 1969.

SEC. 181.200—TABLE OF RECOMMENDED SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS

Donor weight		Minimum separation distance of receptor when barricaded [1] feet		Minimum thickness of artificial barricades [4] inches
Pounds over	Pounds not over	Ammonium nitrate [2]	Blasting agent [3]	
	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	43	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

[1] When the ammonium nitrate and/or blasting agent is not barricaded, the distances shown in the table shall be multiplied by 6. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like which may enclose the "donor." Where storage is in bullet-resistant magazines recommended for explosives or where the storage is protected by a bullet-resistant wall, distances and barricade thicknesses in excess of those prescribed in the American Table of Distances are not required.

[2] The distances in the table apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer promulgated by the National Plant Food Institute; and ammonium nitrate failing to pass said test shall be stored at separation distances determined by competent persons and approved by the authority having jurisdiction.

[3] These distances apply to nitro-carbo-nitrates and blasting agents which pass the insensitivity test prescribed in the U.S. Department of Transportation (DOT) regulations.

[4] Earth or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves are also acceptable.

Note: Recommended separation distances to prevent explosion of ammonium nitrate and ammonium nitrate-based blasting agents by propagation from nearby stores of high explosives or blasting agents referred to in the table as the "donor." Ammonium nitrate, by itself, is not considered to be a donor when applying this table. Ammonium nitrate, ammonium nitrate-fuel oil or combinations thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distance of explosives or blasting agents, one-half the mass of the ammonium nitrate should be included in the mass of the donor.

These distances apply to the separation of stores only. The American Table of Distances shall be used in determining separation distances from inhabited buildings, passenger railways and public highways.

Source: Reprinted from Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents, NFPA No. 492–1969 Edition, as approved by the Institute of Makers of Explosives.

Explosives List for 1973

COMMERCE IN EXPLOSIVES

Pursuant to the provisions of section 841(d), title 18, United States Code, and § 181.23, Title 26, Code of Federal Regulations (26 CFR Part 181), the Director, Bureau of Alcohol, Tobacco, and Firearms, must publish and revise at least annually in the Federal Register a list of explosives determined to be within the coverage of 18 U.S.C., Chapter 40, Importation, Manufacture, Distribution and Storage of Explosives Materials.

The following is the 1973 Explosives List required to be so published, and supersedes the Explosives List dated March 16, 1972 (37 FR 5968).

Rex D. Davis,
Director, Bureau of Alcohol, Tobacco and Firearms.

Explosives List

A

Aluminum containing polymeric propellant.
Aluminum ophorite explosive.

Amatol.
Amitol.
Ammonal.
Ammonium nitrate-amino compound explosives.
Ammonium nitrate explosive mixtures (cap sensitive).
Ammonium nitrate-nitroglycerin mixture.
Ammonium nitrate-nitrolactose mixture.
Aromatic nitro-explosive mixture.
Ammonium perchlorate composite propellant.
Ammonium perchlorate explosive mixtures.
Ammonium picrate.
Ammonium salt lattice with isomorphously substituted inorganic salts.

B

BEAF (1.2-bis (2.2-difluoro-2-nitroacetoxyethane)).
Black powder.
Blasting agents, nitro-carbo-nitrates.
Blasting caps.
Blasting gelatin.
Blasting powder.
BTNEC (bis (trinitroethyl) carbonate).
BTNEN (bis (trinitroethyl) nitramine).

C

Calcium nitrate explosive mixture.
Carboxy-terminated propellant.
Cellulose hexanitrate explosive mixture.
Chlorate explosive mixtures.
Chlorate of potash explosive mixtures.
Chlorates with red phosphorus explosive mixture.
Chlorates with sulphur explosive mixture.
Copper acetylide explosive mixture.
Crystalline explosive (cap sensitive).
Crystalline picrate with lead azide explosive mixture.
Cyanuric triazide.
Cyclonite.
Cyclotetramethylenetetranitramine.
Cyclotetramethylenetrinitramine.
Cyclotrimethylenetrinitramine.

D

DATB (diaminotrinitrotetramethylene tetranitramine).
DDNP (diazodinitrophenol).
Delay powders.
Detonating cord.
Detonators.
Dimethylol dimethyl methane dinitrate composition.
Dinitroethyleneurea.
Dinitroglycerine.
Dinitrophenol.
Dinitrophenolates.
Dinitrophenyl hydrazine.
Dinitroresorcinol.
Dinitrotoluene-sodium nitrate explosive mixtures.
Dipicryl sulfone.
Dipicrylamine.
DNDP (dinitropentano nitrile).
DNPA (2,2-dinitropropyl acrylate).
Dynamite.

E

EDNP (ethyl 4,4-dinitropentanoate).
Erythritol tetranitrate explosives.
Ethylenedinitramine.
Ethyl-tetryl.
Explosive conitrates.
Explosive gelatin.

Explosive mixtures containing oxygen releasing inorganic salts and hydrocarbons.
Explosive mixtures containing oxygen releasing inorganic salts and nitro bodies.
Explosive mixtures containing oxygen releasing inorganic salts and water insoluble fuels.
Explosive mixtures containing oxygen releasing inorganic salts and water soluble fuels.
Explosive mixtures containing sensitized nitromethane.
Explosive nitro compounds of aromatic hydrocarbons.
Explosive organic nitrate mixtures.
Explosive powders.

F

FEFO (bis(2,2-dinitro-2-fluoroethyl)).
Fulminate of mercury.
Fulminating gold.

G

Gelatinized nitrocellulose.
Gem-dinitro aliphatic explosive mixtures.
Glyceryl trinitrate.
Guanyl nitrosamino guanyl tetrazene.
Guanyl nitrosamino guanylidene hydrazine.
Guncotton.

H

Heavy metal azides.
Hexanite.
Hexanitrodiphenylamine.
Hexogen.
Hexogene or octagene and a nitrated N-methylaniline.
Hexolites.
HMX (cyclo-1,3,5,7-tetramethyl-2,4,6,8- tetranitramine).
Hydrazine perchlorate explosive mixtures.
Hydrazinium nitrate/hydrazine/aluminum explosive system.
Hydrazoic acid.

I

Igniter cord.
Igniters.
Inorganic perchlorate explosive mixtures.
KDNBF (potassium dinitrobenzo-furoxane mannitol hexanitrate).

L

Lead azide.
Lead mannite.
Lead mononitroresorcinate.
Lead picrate.
Lead salts of explosives and explosive mixtures.
Lead styphnate.
Lead trinitro resorcinate.
Liquid nitrated polyol and trimethylolethane.
Liquid oxygen with carbon black.
Liquid oxygen explosives.
Liquid oxygen with wood pulp.
Lithium perchlorate explosive mixtures.

M

Magnesium ophorite explosives.
MDNP (methyl 4.4-dinitropentanoate).
Mercuric fulminate.
Mercury oxalate.
Mercury tartrate.
Mononitrotoluene nitroglycerin mixture.
Monopropellants.

N

Nitrate sensitized with gelled nitroparaffin.
Nitrated carbohydrate explosive.
Nitrated glucoside explosive.

Nitrated mixture explosives (ammonium and sodium).
Nitrated polyhydric alcohol emulsion explosive.
Nitrated propylene glycol explosive.
Nitrates of polyatomic alcohol and carbohydrate explosive mixtures.
Nitrates of soda explosive mixtures.
Nitric acid and a nitro aromatic compound explosive.
Nitric acid and carboxylic fuel explosive.
Nitric acid explosive mixtures.
Nitro aromatic explosive mixtures.
Nitro compounds of furane explosive mixtures.
Nitrocellulose explosive.
Nitroderivative of urea explosive mixture.
Nitrogelatine explosive.
Nitrogen resorcinate.
Nitrogen trichloride.
Nitrogen tri-iodide.
Nitroglycerin.
Nitroglycide.
Nitroglycol.
Nitroguanidine explosives.
Nitronium perchlorate propellant mixtures.
Nitropentaerythrite.
Nitropentaerythrite-nitroglycerin composition.
Nitrostarch.
Nitrourea.
N-nitrophenyl diazonium perchlorate.

O

Octogen.
Octol (75 percent HMX, 25 percent TNT).

P

Particulate explosives.
Pellet powder.
Pentaerythritol tetranitrate.
Pentaerythrite tetranitrate.
Penthrinite composition.
Pentolite.
Perchlorate mixture explosives.
Perchloric acid based explosive mixtures.
Peroxide based explosive mixtures.
PETN.
Picramic acid and its salts.
Picramide.
Picrate of ammonia.
Picrate of potassium explosive mixtures.
Picratol.
Picric acid.
Picryl chloride.
Picryl fluoride.
Polyolpolynitrate-nitrocellulose explosive gels.
Potassium chlorate and lead sulfocyanate explosive.
Potassium chlorate base explosive mixtures.
Potassium nitroaminotetrazole.
Pressure venting blasting devices.

R

RDX (cyclo-1,3,5-trimethylene-2,4,6-trinitramine).

S

Safety fuses.
Salts of organic amino sulphonic acid explosive mixture.
Silver acetylide.
Silver azide.
Silver oxalate explosive mixtures.
Silver styphnate.
Silver tartrate explosive mixtures.
Silver tetrazene.
Slurried explosive mixtures of water, inorganic oxidizing salt, gelling agent, fuel and sensitizer.

Smokeless gun powder.
Sodatol.
Sodium amatol.
Sodium chlorate explosive mixture.
Sodium chlorate-sodium nitrate explosive mixtures.
Sodium dinitro-ortho-cresolate.
Sodium nitrate-potassium nitrate explosive mixture.
Sodium picramate.
Squibs.
Styphnate of lead.
Styphnic acid.

T

Tacot (tetranitro-2,3,5,6-dibenzo-1,3a,4,6a-tetrazapentalene).
Tetrazene (tetracene, tetrazine, 1(5-tetrazoyl)-4-guanyl tetrazene hydrate).
Tetranitroaniline.
Tetranitrocarbazole.
2,4,6 tetranitroaniline.
Tetra-nitro-aniline explosive mixture.
Tetranitromethane explosive mixtures.
Tetryl.
Tetrytol.
Thickened inorganic oxidizer salt slurried explosive mixture.
TNEF (trinitroethyl formal).
TNEOC (trinitroethylorthocarbonate).
TNEOF (trinitroethyl orthoformate).
TNT (Trinitrotoluene).
Torpex.
Tridite.
Trimethylenetrinitramine.
Trimethylol ethyl methane trinitrate composition.
Trimethylolthane trinitrate-nitrocellulose.
Trimonite.
Trinitroanisole.
Trinitrobenzene.
Trinitrobenzoic Acid.
Trinitrocresol.
Trinitroglycerin.
Trinitroglycerin mixture.
Trinitro-meta-cresol.
Trinitronaphthalene.
Trinitrophenetol.
Trinitrophenylethylnitramine explosive mixtures.
Trinitrophenylmethylnitramine explosive mixtures.
Trinitrophloroglucinol.
Trinitroresorcinol.
Trinitrotoluene explosive mixture.
Trinitrotoluol explosive mixtures.
Tritonal.

U

Urea nitrate.

W

Water bearing explosives having salts or oxidizing acids and nitrogen bases, sulfates, or sulfamates.

X

Xanthamonas hydrophilic colloid explosive mixture.

2. Regulations promulgated by the Secretary, Occupational Safety and Health Administration, U.S. Department of Labor, pursuant to section 6, Pub. L. 91–596, Dec. 29, 1970, 84 Stat. 1593, 29 U.S.C. Chapter 15.

a. 29 C.F.R. § 1910.109:

b. 29 C.F.R. § 1926.904:

§ 1910.109 Explosives and blasting agents.

(a) *Definitions applicable to this section*—(1) *Blasting agent.*—Blasting agent—any material or mixture, consisting of a fuel and oxidizer, intended

for blasting, not otherwise classified as an explosive and in which none of the ingredients are classified as an explosive, provided that the finished product, as mixed and packaged for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.

(2) *Explosive-actuated power devices.*—Explosive-actuated power device—any tool or special mechanized device which is actuated by explosives, but not including propellant-actuated power devices. Examples of explosive-actuated power devices are jet tappers and jet perforators.

(3) *Explosive.*—Explosive—any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified by the U.S. Department of Transportation; see 49 CFR Chapter I. The term "explosives" shall include all material which is classified as Class A, Class B, and Class C explosives by the U.S. Department of Transportation, and includes, but is not limited to dynamite, black powder, pellet powders, initiating explosives, blasting caps, electric blasting caps, safety fuse, fuse lighters, fuse igniters, squibs, cordeau detonant fuse, instantaneous fuse, igniter cord, igniters, small arms ammunition, small arms ammunition primers, smokeless propellant, cartridges for propellant-actuated power devices, and cartridges for industrial guns. Commercial explosives are those explosives which are intended to be used in commercial or industrial operations.

NOTE 1: Classification of explosives is described by the U.S. Department of Transportation as follows (see 49 CFR Chapter I):

(i) *Class A explosives.*—Possessing, detonating, or otherwise maximum hazard; such as dynamite, nitroglycerin, picric acid, lead azide, fulminate of mercury, black powder, blasting caps, and detonating primers.

(ii) *Class B explosives.*—Possessing flammable hazard, such as propellant explosives (including some smokeless propellants), photographic flash powders, and some special fireworks.

(iii) *Class C explosives.*—Includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities.

(iv) *Forbidden or not acceptable explosives.*—Explosives which are forbidden or not acceptable for transportation by common carriers by rail freight, rail express, highway, or water in accordance with the regulations of the U.S. Department of Transportation, 49 CFR Chapter I.

(4) *Highway.*—Highway—any public street, public alley, or public road.

(5) *Inhabited building.*—Inhabited building—a building or structure regularly used in whole or part as a place of human habitation. The term "inhabited building" shall also mean any church, school, store, railway passenger station, airport terminal for passengers, and any other building or structure where people are accustomed to congregate or assemble but excluding any building or structure occupied in connection with the manufacture, transportation, storage, and use of explosives.

(6) *Magazine.*—Magazine—any building or structure, other than an explosives manufacturing building, used for the storage of explosives.

(7) *Motor vehicle.*—Motor vehicle—any self-propelled vehicle, truck, tractor, semitrailer, or truck-full trailers used for the transportation of freight over public highways.

(8) *Propellant-actuated power devices.*—Propellant-actuated power devices—any tool or special mechanized device or gas generator system which is actuated by a smokeless propellant or which releases and directs work through a smokeless propellant charge.

(9) *Public conveyance.*—Public conveyance—any railroad car, streetcar, ferry, cab, bus, airplane, or other vehicle which is carrying passengers for hire.

(10) *Pyrotechnics.*—Pyrotechnics—any combustible or explosive compositions or manufactured articles designed and prepared for the purpose of producing audible or visible effects which are commonly referred to as fireworks.

(11) *Railway.*—Railway—any steam, electric, diesel electric, or other railroad or railway which carries passengers for hire on the particular line or branch in the vicinity where explosives are stored or where explosives manufacturing buildings are situated.

(12) *Semiconductive hose.*—Semiconductive hose—a hose with an electrical resistance high enough to limit flow of stray electric currents to safe levels, yet not so high as to prevent drainage of static electric charges to ground; hose of not more than 2 megohms resistance over its entire length and of not less than 5,000 ohms per foot meets the requirement.

(13) *Small arms ammunition.*—Small arms ammunition—any shotgun, rifle, pistol, or revolver cartridge, and cartridges for propellant-actuated power devices and industrial guns. Military-type ammunition containing explosive-bursting charges, incendiary, tracer, spotting, or pyrotechnic projectiles is excluded from this definition.

(14) *Small arms ammunition primers.*—Small arms ammunition primers—Small percussion-sensitive explosive charges, encased in a cup, used to ignite propellant powder.

(15) *Smokeless propellant.*—Smokeless propellants—solid propellants, commonly called smokeless powders in the trade, used in small arms ammunition, cannon, rockets, propellant-actuated power devices, etc.

(16) *Special industrial explosives devices.*—Special industrial explosives devices—explosive-actuated power devices and propellant-actuated power devices.

(17) *Special industrial explosives materials.*—Special industrial explosives materials—shaped materials and sheet forms and various other extrusions, pellets, and packages of high explosives, which include dynamite, trinitrotoluene (TNT), pentaerythritol tetranitrate (PETN), hexahydro-1,3,5-trinitro-s-triazine (RDX), and other similar compounds used for high-energy-rate forming, expanding, and shaping in metal fabrication, and for dismemberment and quick reduction of scrap metal.

(18) *Water gels or slurry explosives.*—These comprise a wide variety of materials used for blasting. They all contain substantial proportions of water and high proportions of ammonium nitrate, some of which is in solution in the water. Two broad classes of water gels are (i) those which are sensitized by a material classed as an explosive, such as TNT or smokeless powder, (ii) those which contain no ingredient classified as an explosive; these are sensitized with metals such as aluminum or with other fuels. Water gels may be premixed at an explosives plant or mixed at the site immediately before delivery into the borehole.

(19) *DOT specifications.*—Regulations of the Department of Transportation published in 49 CFR Chapter I.

(20) *DOT regulations.*—See § 1910.109(a)(19).

(21) *DOT requirements.*—See § 1910.109(a)(19).

(b) *Miscellaneous provisions.*—(1) *General hazard.*—No person shall store, handle, or transport explosives or blasting agents when such storage, handling, and transportation of explosives or blasting agents constitutes an undue hazard to life and property.

(2) *Unauthorized recipients.*—No person shall sell or give away any explosive or blasting agent to any unauthorized person.

(3) *Display.*—No person shall sell, display, or expose for sale any explosive or blasting agent on any highway, street, sidewalk, public way, or public place.

(c) *Storage of explosives.*—(1) *General provisions.*—(i) All Class A, Class B, Class C explosives, and special industrial explosives, and any newly developed and unclassified explosives, shall be kept in magazines which meet the requirements of this paragraph.

(ii) Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives.

(iii) Ground around magazines shall slope away for drainage. The land surrounding magazines shall be kept clear of brush, dried grass, leaves, and other materials for a distance of at least 25 feet.

(iv) Magazines as required by this paragraph shall be of two classes; namely, Class I magazines, and Class II magazines.

(v) Class I magazines shall be required where the quantity of explosives stored is more than 50 pounds. Class II magazines may be used where the quantity of explosives stored is 50 pounds or less.

(vi) Class I magazines shall be located away from inhabited buildings, passenger railways, and public highways and from other magazines in conformity with Table H-21.

TABLE H-21—AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES

[As revised and approved by the Institute of Makers of Explosives, June 5, 1964]

Explosives		Distances in feet when storage is barricaded				Explosives		Distances in feet when storage is barricaded			
Pounds over	Pounds not over	Inhabited buildings	Passenger railways	Public highways	Separation of magazines	Pounds over	Pounds not over	Inhabited buildings	Passenger railways	Public highways	Separation of magazines
2	5	70	30	30	6	12,000	14,000	885	390	275	87
5	10	90	35	35	8	14,000	16,000	900	405	280	90
10	20	110	45	45	10	16,000	18,000	940	420	285	94
20	30	125	50	50	11	18,000	20,000	975	435	290	98
30	40	140	55	55	12	20,000	25,000	1,055	470	315	105
40	50	150	60	60	14	25,000	30,000	1,130	500	340	112
50	75	170	70	70	15	30,000	35,000	1,205	525	360	119
75	100	190	75	75	16	35,000	40,000	1,275	550	380	124
100	125	200	80	80	18	40,000	45,000	1,340	570	400	129
125	150	215	85	85	19	45,000	50,000	1,400	590	420	135
150	200	235	95	95	21	50,000	55,000	1,460	610	440	140
200	250	255	105	105	23	55,000	60,000	1,515	630	455	145
250	300	270	110	110	24	60,000	65,000	1,565	645	470	150
300	400	295	120	120	27	65,000	70,000	1,610	660	485	155
400	500	320	130	130	29	70,000	75,000	1,655	675	500	160
500	600	340	135	135	31	75,000	80,000	1,695	690	510	165
600	700	355	145	145	32	80,000	85,000	1,730	705	520	170
700	800	375	150	150	33	85,000	90,000	1,760	720	530	175
800	900	390	155	155	35	90,000	95,000	1,790	730	540	180
900	1,000	400	160	160	36	95,000	100,000	1,815	745	545	185
1,000	1,200	425	170	165	39	100,000	110,000	1,835	770	550	195
1,200	1,400	450	180	170	41	110,000	120,000	1,855	790	555	205
1,400	1,600	470	190	175	43	120,000	130,000	1,875	810	560	215
1,600	1,800	490	195	180	44	130,000	140,000	1,890	835	565	225
1,800	2,000	505	205	185	45	140,000	150,000	1,900	850	570	235
2,000	2,500	545	220	190	49	150,000	160,000	1,935	870	580	245
2,500	3,000	580	235	195	52	160,000	170,000	1,965	890	590	255
3,000	4,000	635	255	210	58	170,000	180,000	1,990	905	600	265
4,000	5,000	685	275	225	61	180,000	190,000	2,010	920	605	275
5,000	6,000	730	295	235	65	190,000	200,000	2,030	935	610	285
6,000	7,000	770	310	245	68	200,000	210,000	2,055	955	620	295
7,000	8,000	800	320	250	72	210,000	230,000	2,100	980	635	315
8,000	9,000	835	335	255	75	230,000	250,000	2,155	1,010	650	335
9,000	10,000	865	345	260	78	250,000	275,000	2,215	1,040	670	360
10,000	12,000	875	370	270	82	275,000	300,000	2,275	1,075	690	385

Note 1. "Natural barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine when the trees are bare of leaves.

Note 2. "Artificial barricade" means an artificial mound of revetted wall of earth of a minimum thickness of three feet.

Note 3. "Barricaded" means that a building containing explosives is effectually screened from a magazine, building, railway, or highway, either by a natural barricade, or by an artificial barricade of such height that a straight line from the top of any sidewall of the building containing explosives to the eave line of any magazine, or building, or to a point 12 feet above the center of a railway or highway, will pass through such intervening natural, or artificial barricade.

Note 4. When 2 or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such 2 or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways, and highways.

Note 5. This table applies only to the manufacture and permanent storage of commercial explosives. It is not applicable to transportation of explosives, or any handling or temporary storage necessary or incident thereto. It is not intended to apply to bombs, projectiles, or other heavily encased explosives.

(vii) Except as provided in subdivision (viii) of this subparagraph, class II magazines shall be located in conformity with Table H–21, but may be permitted in warehouses and in wholesale and retail establishments when located on a floor which has an entrance at outside grade level and the magazine is located not more than 10 feet from such an entrance. Two class II magazines may be located in the same building when one is used only for blasting caps in quantities not in excess of 5,000 caps and a distance of 10 feet is maintained between magazines.

(viii) When used for temporary storage at a site for blasting operations, class II magazines shall be located away from neighboring inhabited buildings, railways, highways, and other magazines. A distance of at least one hundred and fifty (150) feet shall be maintained between class II magazines and the work in

progress when the quantity of explosives kept therein is in excess of 25 pounds, and at least 50 feet when the quantity of explosives is 25 pounds, or less.

(ix) This paragraph (c) does not apply to:

(*a*) Stocks of small arms ammunition, propellant-actuated powder cartridges, small arms ammunition primers in quantities of less than 750,000, or of smokeless propellants in quantities less than 750 pounds;

(*b*) Explosive-actuated power devices when in quantities less than 50 pounds net weight of explosives;

(*c*) Fuse lighters and fuse igniters;

(*d*) Safety fuses other than cordeau detonant fuses.

(2) *Construction of magazines—general.*—(i) Magazines shall be constructed in conformity with the provisions of this paragraph.

(ii) Magazines for the storage of explosives, other than black powder, Class B and Class C explosives shall be bullet resistant, weather resistant, fire resistant, and ventilated sufficiently to protect the explosive in the specific locality. Magazines used only for storage of black powder, Class B and Class C explosives shall be weather resistant, fire-resistant, and have ventilation. Magazines for storage of blasting and electric blasting caps shall be weather resistant, fire-resistant, and ventilated.

(iii) Property upon which Class I magazines are located and property where Class II magazines are located outside of buildings shall be posted with signs reading "Explosives—Keep Off." Such signs shall be located so as to minimize the possibility of a bullet traveling in the direction of the magazine if anyone shoots at the sign.

(iv) Magazines requiring heat shall be heated by either hot-water radiant heating with the magazine building; or air directed into the magazine building over either hot water or low pressure steam (15 p.s.i.g.) coils located outside the magazine building.

(v) The magazine heating systems shall meet the following requirements:

(*a*) The radiant heating coils within the building shall be installed in such a manner that the explosives or explosives containers cannot contact the coils and air is free to circulate between the coils and the explosives or explosives containers.

(*b*) The heating ducts shall be installed in such a manner that the hot-air discharge from the duct is not directed against the explosives or explosives containers.

(*c*) The heating device used in connection with a magazine shall have controls which prevent the ambient building temperature from exceeding 130° F.

(*d*) The electric fan or pump used in the heating system for a magazine shall be mounted outside and separate from the wall of the magazine and shall be grounded.

(*e*) The electric fan motor and the controls for electrical heating devices used in heating water or steam shall have overloads and disconnects, which comply with subpart S of this part. All electrical switch gear shall be located a minimum distance of 25 feet from the magazine.

(*f*) The heating source for water or steam shall be separated from the magazine by a distance of not less than 25 feet when electrical and 50 feet when fuel fired. The area between the heating unit and the magazine shall be cleared of all combustible materials.

(*g*) The storage of explosives and explosives containers in the magazine shall allow uniform air circulation so product temperature uniformity can be maintained.

(vi) When lights are necessary inside the magazine, electric safety flashlight, or electric safety lanterns shall be used.

(3) *Construction of Class I magazines.*—(i) Class I magazines shall be of masonry construction or of wood or of metal construction, or a combination of these types. Thickness of masonry units shall not be less than 8 inches. Hollow masonry units used in construction required to be bullet resistant shall have all hollow spaces filled with weak cement or well-tamped sand. Wood construction walls, required to be bullet resistant, shall have at least a 6-inch space between interior and exterior sheathing and the space between sheathing shall be filled with well-tamped sand. Metal wall construction, when required to be bullet resistant, shall be lined with brick at least 4 inches in thickness or shall have at least a 6-inch sandfill between interior and exterior walls.

(ii) Floors and roofs of masonry magazines may be of wood construction. Wood floors shall be tongue and grooved lumber having a nominal thickness of 1 inch.

(iii) Roofs required to be bullet resistant shall be protected by a sand tray located at the line of eaves and covering the entire area except that necessary for ventilation. Sand in the sand tray shall be maintained at a depth of not less than 4 inches.

(iv) All wood at the exterior of magazines, including eaves, shall be protected by being covered with black or galvanized steel or aluminum metal of thickness of not less than No. 26 gage. All nails exposed to the interior of magazines shall be well countersunk.

(v) Foundations for magazines shall be of substantial construction and arranged to provide good cross ventilation.

(vi) Magazines shall be ventilated sufficiently to prevent dampness and heating of stored explosives. Ventilating openings shall be screened to prevent the entrance of sparks.

(vii) Openings to magazines shall be restricted to that necessary for the placement and removal of stocks of explosives. Doors for openings in magazines for Class A explosives shall be bullet resistant. Doors for magazines not required to be bullet resistant shall be designed to prevent unauthorized entrance to the magazine.

(viii) Magazines shall be provided with substantial means for locking; locks shall be provided and magazine doors shall be kept locked, except during the time of placement and removal of stocks of explosives.

(ix) Provisions shall be made to prevent the piling of stocks of explosives directly against masonry walls, brick-lined or sand-filled metal walls and single-thickness metal walls; such protection, however, shall not interfere with proper ventilation at the interior of side and end walls.

(4) *Construction of Class II magazines.*—(i) Class II magazines shall be of wood or metal construction, or a combination thereof.

(ii) Wood magazines of this class shall have sides, bottom, and cover constructed of 2-inch hardwood boards well braced at corners and protected by being entirely covered with sheet metal of not less than No. 20 gage. All nails exposed to the interior of the magazine shall be well countersunk. All metal magazines of this class shall have sides, bottom, and cover constructed of sheet metal, and shall be lined with three-eighths-inch plywood or equivalent. Edges of metal covers shall overlap sides at least 1 inch.

(iii) Covers for both wood- and metal-constructed magazines of this class shall be provided with substantial strap hinges and shall be provided with substantial means for locking. Covers shall be kept locked except during the placement or removal of explosives.

(iv) Magazines of this class shall be painted red and shall bear lettering in white, on all sides and top, at least 3 inches high, "Explosives—Keep Fire Away." Class II magazines when located in warehouses, and in wholesale and retail establishments shall be provided with substantial wheels or casters to facilitate easy removal in the case of fire. Where necessary due to climatic conditions, Class II magazines shall be ventilated.

(5) *Storage within magazines.*—(i) Packages of explosives shall be laid flat with top side up. Black powder when stored in magazines with other explosives shall be stored separately. Black powder stored in kegs shall be stored on ends, bungs down, or on side, seams down. Corresponding grades and brands shall be stored together in such a manner that brands and grade marks show. All stocks shall be stored so as to be easily counted and checked. Packages of explosives shall be piled in a stable manner. When any kind of explosive is removed from a magazine for use, the oldest explosive of that particular kind shall always be taken first.

(ii) Packages of explosives shall not be unpacked or repacked in a magazine nor within 50 feet of a magazine or in close proximity to other explosives. Tools used for opening packages of explosives shall be constructed of nonsparking materials, except that metal slitters may be used for opening fiberboard boxes. A wood wedge and a fiber, rubber, or wood mallet shall be used for opening or closing wood packages of explosives. Opened packages of explosives shall be securely closed before being returned to a magazine.

(iii) Magazines shall not be used for the storage of any metal tools nor any commodity except explosives, but this restriction shall not apply to the storage of blasting agents and blasting supplies.

(iv) Magazine floors shall be regularly swept, kept clean, dry, free of grit, paper, empty used packages, and rubbish. Brooms and other cleaning utensils shall not have any spark-producing metal parts. Sweepings from floors of magazines shall be properly disposed of. Magazine floors stained with nitroglycerin shall be cleaned according to instructions by the manufacturer.

(v) When any explosive has deteriorated to an extent that it is an unstable or dangerous condition, or if nitroglycerin leaks from any explosives, then the person in possession of such explosive shall immediately proceed to destroy such explosive in accordance with the instructions of the manufacturer. Only experienced persons shall be allowed to do the work of destroying explosives.

(vi) When magazines need inside repairs, all explosives shall be removed therefrom and the floors cleaned. In making outside repairs, if there is a possibility of causing sparks or fire the explosives shall be removed from the magazine. Explosives removed from a magazine under repair shall either be placed in another magazine or placed a safe distance from the magazine where they shall be properly guarded and protected until repairs have been completed, when they shall be returned to the magazine.

(vii) Smoking, matches, open flames, spark-producing devices, and firearms (except firearms carried by guards) shall not be permitted inside of or within 50 feet of magazines. The land surrounding a magazine shall be kept clear of all combustible materials for a distance of at least 25 feet. Combustible materials shall not be stored within 50 feet of magazines.

(viii) Magazines shall be in the charge of a competent person at all times who shall be at least 21 years of age, and who shall be held responsible for the enforcement of all safety precautions.

(ix) Explosives recovered from blasting misfires shall be placed in a separate magazine until competent personnel has determined from the manufacturer the method of disposal. Caps recovered from blasting misfires shall not be reused. Such explosives and caps shall then be disposed of in the manner recommended by the manufacturer.

(d) *Transportation of explosives*—(1) *General provisions.*—(i) No employee shall be allowed to smoke, carry matches or any other flame-producing device, or carry any firearms or loaded cartridges while in or near a motor vehicle transporting explosives; or drive, load, or unload such vehicle in a careless or reckless manner.

(ii) Explosives shall not be carried or transported in or upon a public conveyance or vehicle carrying passengers for hire.

(iii) Explosives shall not be transferred from one vehicle to another within the confines of any jurisdiction (city, county, State, or other area) without informing the fire and police departments thereof. In the event of breakdown or collision the local fire and police departments shall be promptly notified to help safeguard such emergencies. Explosives shall be transferred from the disabled vehicle to another only, when proper and qualified supervision is provided.

(iv) Blasting caps or electric blasting caps shall not be transported over the highways on the same vehicles with other explosives.

(2) *Transportation vehicles.* (i) Vehicles used for transporting explosives shall be strong enough to carry the load without difficulty and be in good mechanical condition. If vehicles do not have a closed body, the body shall be covered with a flameproof and moisture-proof tarpaulin or other effective protection against moisture and sparks. All vehicles used for the transportation of explosives shall have tight floors and any exposed spark-producing metal on the inside of the body shall be covered with wood or other nonsparking materials to prevent contact with packages of explosives. Packages of explosives shall not be loaded above the sides of an open-body vehicle.

(ii) Every vehicle used for transporting explosives and oxidizing materials listed in (*a*) of this subdivision shall be marked as follows:

(*a*) Exterior markings or placards required on applicable vehicles shall be as follows for the various classes of commodities:

Commodity	*Type of marking or placard*
Explosives, Class A, any quantity or a combination of Class A and Class B explosives.	Explosive A (Red letters on white background).
Explosives, Class B, any quantity.	Explosives B (Red letters on white background).
Oxidizing material (blasting agents, ammonium nitrate, etc.), 1,000 pounds or more gross weight.	Oxidizers (Yellow letters on black background).

(*b*) Each marking or placard shall consist of letters not less than 4 inches high, in the color specified, using approximately a ⅝-inch stroke. The placard must be larger than the lettering required thereon by at least 1 inch at the top and bottom sides. Such marking or placard described in subdivision (*a*) shall be contained in an area on the vehicle which has no other marking, lettering, or graphic display, for at least 3 inches in each direction.

(*c*) Such markings or placards shall be displayed at the front, rear, and on each side of the motor vehicle or trailer, or other cargo carrying body while it contains explosives or other dangerous articles of such type and in such quantity as specified in (*a*) of this subdivision. The front marking or placard may be displayed on the front of either the truck, truck body, truck tractor or the trailer.

(*d*) Any motor vehicle, trailer, or other cargo-carrying body containing more than one kind of explosive as well as an oxidizing material requiring a placard under the provisions of subdivision (*a*), the aggregate gross weight of which totals 1,000 pounds or more, shall be marked or placarded "Dangerous" as well as "Explosive A" or "Explosive B" as appropriate. If explosives Class A and explosives Class B are loaded on the same vehicle, the "Explosives B" marking need not be displayed.

(*e*) In any combination of two or more vehicles containing explosives or other dangerous articles each vehicle shall be marked or placarded as to its contents and in accordance with (*a*) and (*c*) of this subdivision.

(iii) Each motor vehicle used for transporting explosives shall be equipped with a minimum of two extinguishers, each having a rating of at least 10-BC.

(*a*) Only extinguishers listed or approved by Underwriters Laboratories, Inc., or the Factory Mutual Engineering Corp. shall be deemed suitable for use on explosives-carrying vehicles.

(*b*) Extinguishers shall be filled and ready for immediate use and located near the driver's seat. Extinguishers shall be examined periodically by a competent person.

(iv) A motor vehicle used for transporting explosives shall be given the following inspection to determine that it is in proper condition for safe transportation of explosives:

(*a*) Fire extinguishers shall be filled and in working order.

(*b*) All electrical wiring shall be completely protected and securely fastened to prevent short-circuiting.

(*c*) Chassis, motor, pan and underside of body shall be reasonably clean and free of excess oil and grease.

(*d*) Fuel tank and feedline shall be secure and have no leaks.

(*e*) Breaks, lights, horn, windshield wipers, and steering apparatus shall function property.

(*f*) Tires shall be checked for proper inflation and defects.

(*g*) The vehicle shall be in proper condition in every other respect and acceptable for handling explosives.

(3) *Operation of transportation vehicles.* (i) Vehicles transporting explosives shall only be driven by and be in the charge of a driver who is physically fit, careful, capable, reliable, able to read and write the English language, and not addicted to the use, or under the influence of intoxicants, narcotics, or other dangerous drugs, and not less than 21 years of age. He shall be familiar with the traffic regulations, State laws, and the provisions of this section.

(ii) Except under emergency conditions, no vehicle transporting explosives shall be parked before reaching its destination, even though attended, on any public street adjacent to or in proximity to any bridge, tunnel, dwelling, building, or place where people work, congregate, or assemble.

(iii) Every motor vehicle transporting any quantity of Class A or Class B explosives shall, at all times, be attended by a driver or other attendant of the motor carrier. This attendant shall have been made aware of the class of the explosive materials in the vehicle and of its inherent dangers, and shall have been instructed in the measures and procedures to be followed in order to protect the public from those dangers. He shall have been made familiar with the vehicle he is assigned, and shall be trained, supplied with the necessary means, and authorized to move the vehicle when required.

(*a*) For the purpose of this subdivision, a motor vehicle shall be deemed "attended" only when the driver or other attendant is physically on or in the vehicle, or has the vehicle within his field of vision and can reach it quickly and without any kind of interference "attended" also means that the driver or attendant is awake, alert, and not engaged in other duties or activities which may divert his attention from the vehicle, except for necessary communication with public officers, or representatives of the carrier shipper, or consignee, or except for necessary absence from the vehicle to obtain food or to provide for his physical comfort.

(*b*) However, an explosive-laden vehicle may be left unattended if parked within a securely fenced or walled area with all gates or entrances locked where parking of such vehicle is otherwise permissible, or at a magazine site established solely for the purpose of storing explosives.

(iv) No spark-producing metal, spark-producing metal tools, oils, matches, firearms, electric storage batteries, flammable substances, acids, oxidizing materials, or corrosive compounds shall be carried in the body of any motor truck and/or vehicle transporting explosives, unless the loading of such dangerous articles and the explosives comply with U.S. Department of Transportation regulations.

(v) Vehicles transporting explosives shall avoid congested areas and heavy traffic. Where routes through congested areas have been designated by local authorities such routes shall be followed.

(vi) Delivery shall only be made to authorized persons and into authorized magazines or authorized temporary storage or handling areas.

(e) *Use of explosives and blasting agents*—(1) *General provisions.*—(i) While explosives are being handled or used, smoking shall not be permitted and no one near the explosives shall possess matches, open light or other fire or flame. No person shall be allowed to handle explosives while under the influence of intoxicating liquors, narcotics, or other dangerous drugs.

(ii) Original containers or Class II magazines shall be used for taking detonators and other explosives from storage magazines to the blasting area.

(iii) When blasting is done in congested areas or in close proximity to a structure, railway, or highway or any other installation that may be damaged, the blast shall be covered before firing with a mat constructed so that it is capable of preventing fragments from being thrown.

(iv) Persons authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution, including but not limited to warning signals, flags, barricades, or woven wire mats to insure the safety of the general public and workmen.

(v) Blasting operations shall be conducted during daylight hours.

(vi) Whenever blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph, and steam utilities, the blaster shall notify the appropriate representatives of such utilities at least 24 hours in advance of blasting, specifying the location and intended time of such blasting. Verbal notice shall be confirmed with written notice.

(vii) Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent powerlines, dust storms, or other sources of extraneous electricity. These precautions shall include:

(*a*) The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm.

(*b*) The posting of signs warning against the use of mobile radio transmitters on all roads within 350 feet of the blasting operations.

(2) *Storage at use sites.*—(i) Empty boxes and paper and fiber packing materials which have previously contained high explosives shall not be used again for any purpose, but shall be destroyed by burning at an approved isolated location out of doors, and no person shall be nearer than 100 feet after the burning has started.

(ii) Containers of explosives shall not be opened in any magazine or within 50 feet of any magazine. In opening kegs or wooden cases, no sparking metal tools shall be used; wooden wedges and either wood, fiber or rubber mallets

shall be used. Nonsparking metallic slitters may be used for opening fiberboard cases.

(iii) Explosives or blasting equipment that are obviously deteriorated or damaged shall not be used.

(iv) No explosives shall be abandoned.

(3) *Loading of explosives in blast holes.*—(i) All drill holes shall be sufficiently large to admit freely the insertion of the cartridges of explosives.

(ii) Tamping shall be done only with wood rods without exposed metal parts, but nonsparking metal connectors may be used for jointed poles. Violent tamping shall be avoided. Primed cartridges shall not be tamped.

(iii) When loading blasting agents pneumatically over electric blasting caps, semiconductive delivery hose shall be used and the equipment shall be bonded and grounded.

(iv) No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives shall be immediately returned to an authorized magazine.

(v) Drilling shall not be started until all remaining butts of old holes are examined with a wooden stick for unexploded charges, and if any are found, they shall be refired before work proceeds.

(vi) No person shall be allowed to deepen drill holes which have contained explosives.

(vii) After loading for a blast is completed, all excess blasting caps or electric blasting caps and other explosives shall immediately be returned to their separate storage magazines.

(4) *Initiation of explosive charges.*—(i) Only electric blasting caps shall be used for blasting operations in congested districts, or on highways, or adjacent to highways open to traffic, except where sources of extraneous electricity make such use dangerous.

(ii) When fuse is used, the blasting cap shall be securely attached to the safety fuse with a standard-ring type cap crimper. All primers shall be assembled at least 50 feet from any magazine.

(iii) Primers shall be made up only as required for each round of blasting.

(iv) No blasting cap shall be inserted in the explosives without first making a hole in the cartridge for the cap with a wooden punch of proper size or standard cap crimper.

(v) Explosives shall not be extracted from a hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

(vi) If there are any misfires while using cap and fuse, all persons shall be required to remain away from the charge for at least 1 hour. If electric blasting caps are used and a misfire occurs, this waiting period may be reduced to 30 minutes. Misfires shall be handled under the direction of the person in charge of the blasting and all wires shall be carefully traced and search made for unexploded charges.

(vii) Blasters, when testing circuits to charged holes, shall use only blasting galvanometers designed for this purpose.

(viii) Only the employee making leading wire connections in electric firing shall be allowed to fire the shot. Leading wires shall remain shorted and not be connected to the blasting machine or other source of current until the charge is to be fired.

(5) *Warning required.*—Before a blast is fired, the employer shall require that a loud warning signal be given by the person in charge, who has made certain that all surplus explosives are in a safe place, all persons and vehicles are at a safe distance or under sufficient cover, and that an adequate warning has been given.

(f) *Explosives at piers, railway stations, and cars or vessels not otherwise specified in this standard*—(1) *Railway cars.*—Except in an emergency and with permission of the local authority, no person shall have or keep explosives in a railway car unless said car and contents and methods of loading are in accordance with the U.S. Department of Transportation Regulations for the Transportation of Explosives, 49 CFR Chapter I.

(2) *Packing and marking.*—No person shall deliver any explosive to any carrier unless such explosive conforms in all respects, including marking and packing, to the U.S. Department of Transportation Regulations for the Transportation of Explosives.

(3) *Marking cars.*—Every railway car containing explosives which has reached its designation, or is stopped in transit so as no longer to be in interstate commerce, shall have attached to both sides and ends of the car, cards with the words "Explosives—Handle Carefully—Keep Fire Away" in red letters at least 1½ inches high on a white background.

(4) *Storage.*—Any explosives at a railway facility, truck terminal, pier, wharf, harbor facility, or airport terminal, whether for delivery to a consignee, or forwarded to some other destination, shall be kept in a safe place, isolated as far as practicable and in such manner that they can be easily and quickly removed.

(5) *Hours of transfer.*—Explosives shall not be delivered to or received from any railway station, truck terminal, pier, wharf, harbor facility, or airport terminal between the hours of sunset and sunrise.

(g) *Blasting agents.*—(1) *General.*—Unless otherwise set forth in this paragraph, blasting agents, excluding water gels, shall be transported, stored, and used in the same manner as explosives. Water gels are covered in paragraph (h) of this section.

(2) *Fixed location mixing.*—(i) Buildings or other facilities used for mixing blasting agents shall be located, with respect to inhabited buildings, passenger railroads, and public highways, in accordance with Table H–21. In determining the distance separating highways, railroads, and inhabited buildings from potential explosions (as prescribed in Table H–21), the sum of all masses which may propagate (i.e., lie at distances less than prescribed in Table H–22) from either individual or combined donor masses are included. However, when the ammonium nitrate must be included, only 50 percent of its weight shall be used because of its reduced blast effects.

(ii) Buildings used for the mixing of blasting agents shall conform to the requirements of this section.

(*a*) Buildings shall be of non-combustible construction or sheet metal on wood studs.

(*b*) Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.

(*c*) All fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.

(*d*) The building shall be well ventilated.

(*e*) Heating units which do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside the mixing building.

(*f*) All internal-combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

(iii) Equipment used for mixing blasting agents shall conform to the requirements of this subdivision.

(*a*) The design of the mixer shall minimize the possibility of frictional heating, compaction, and especially confinement. All bearings and drive assemblies shall be mounted outside the mixer and protected against the accumulation of dust. All surfaces shall be accessible for cleaning.

(*b*) Mixing and packaging equipment shall be constructed of materials compatible with the fuel-ammonium nitrate composition.

(*c*) Suitable means shall be provided to prevent the flow of fuel oil to the mixer in case of fire. In gravity flow systems an automatic spring-loaded shutoff valve with fusible link shall be installed.

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(iv) The provisions of this subdivision shall be considered when determining blasting agent compositions.

(*a*) The sensitivity of the blasting agent shall be determined by means of a No. 8 test blasting cap at regular intervals and after every change in formulation.

(*b*) Oxidizers of small particle size, such as crushed ammonium nitrate prills or fines, may be more sensitive than coarser products and shall, therefore, be handled with greater care.

(*c*) No hydrocarbon liquid fuel with flashpoint lower than that of No. 2 diesel fuel oil 125° F. minimum shall be used.

(*d*) Crude oil and crankcase oil shall not be used.

(*e*) Metal powders such as aluminum shall be kept dry and shall be stored in containers or bins which are moisture-resistant or weathertight. Solid fuels shall be used in such manner as to minimize dust explosion hazards.

(*f*) Peroxides and chlorates shall not be used.

(v) All electrical switches, controls, motors, and lights located in the mixing room shall conform to the requirements in subpart S of this part for Class II, Division 2 locations; otherwise they shall be located outside the mixing room. The frame of the mixer and all other equipment that may be used shall be electrically bonded and be provided with a continuous path to the ground.

(vi) Safety precautions at mixing plants shall include the requirements of this subdivision.

(*a*) Floors shall be constructed so as to eliminate floor drains and piping into which molten materials could flow and be confined in case of fire.

(*b*) The floors and equipment of the mixing and packaging room shall be cleaned regularly and thoroughly to prevent accumulation of oxidizers or fuels and other sensitizers.

(*c*) The entire mixing and packaging plant shall be cleaned regularly and thoroughly to prevent excessive accumulation of dust.

(*d*) Smoking, matches, open flames, spark-producing devices, and firearms (except firearms carried by guards) shall not be permitted inside of or within 50 feet of any building or facility used for the mixing of blasting agents.

(*e*) The land surrounding the mixing plant shall be kept clear of brush, dried grass, leaves, and other materials for a distance of at least 25 feet.

(*f*) Empty ammonium nitrate bags shall be disposed of daily in a safe manner.

(*g*) No welding shall be permitted or open flames used in or around the mixing or storage area of the plant unless the equipment or area has been completely washed down and all oxidizer material removed.

(*h*) Before welding or repairs to hollow shafts, all oxidizer material shall be removed from the outside and inside of the shaft and the shaft vented with a minimum one-half inch diameter opening.

(*i*) Explosives shall not be permitted inside of or within 50 feet of any building or facility used for the mixing of blasting agents.

(3) *Bulk delivery and mixing vehicles.*—(i) The provisions of this subparagraph shall apply to off-highway private operations as well as to all public highway movements.

(ii) A bulk vehicle body for delivering and mixing blasting agents shall conform with the requirements of this subdivision (ii).

(*a*) The body shall be constructed of noncombustible materials.

(*b*) Vehicles used to transport bulk premixed blasting agents on public highways shall have closed bodies.

(*c*) All moving parts of the mixing system shall be designed as to prevent a heat buildup. Shafts or axles which contact the product shall have outboard bearings with 1-inch minimum clearance between the bearings and the outside of the product container. Particular attention shall be given to the clearances on all moving parts.

(*d*) A bulk delivery vehicle shall be strong enough to carry the load without difficulty and be in good mechanical condition.

(iii) Operation of bulk delivery vehicles shall conform to the requirements of this subdivision. These include the placarding requirements as specified by Department of Transportation.

(*a*) The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. The employer shall assure that the operator is familiar with the commodities being delivered and the general procedure for handling emergency situations.

(*b*) The hauling of either blasting caps or other explosives but not both, shall be permitted on bulk trucks provided that a special wood or nonferrous-lined container is installed for the explosives. Such blasting caps or other explosives shall be in DOT-specified shipping containers: see 49 CFR Chapter I.

(*c*) No person shall smoke, carry matches or any flame-producing device, or carry any firearms while in or about bulk vehicles effecting the mixing transfer or down-the-hole loading of blasting agents at or near the blasting site.

(*d*) Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, cap wires, or explosive materials. The employer shall assure that the driver, in moving the vehicle, has assistance of a second person to guide his movements.

(*e*) No intransit mixing of materials shall be performed.

(iv) Pneumatic loading from bulk delivery vehicles into blastholes primed with electric blasting caps or other static-sensitive systems shall conform to the requirements of this subdivision.

(*a*) A positive grounding device shall be used to prevent the accumulation of static electricity.

(*b*) A discharge hose shall be used that has a resistance range that will prevent conducting stray currents, but that is conductive enough to bleed off static buildup.

(*c*) A qualified person shall evaluate all systems to determine if they will adequately dissipate static under potential field conditions.

(v) Repairs to bulk delivery vehicles shall conform to the requirements of this section.

(*a*) No welding or open flames shall be used on or around any part of the delivery equipment unless it has been completely washed down and all oxidizer material removed.

(*b*) Before welding or making repairs to hollow shafts, the shaft shall be thoroughly cleaned inside and out and vented with a minimum one-half inch diameter opening.

(4) *Bulk storage bins.*—(i) The bin, including supports, shall be constructed of compatible materials, waterproof, and adequately supported and braced to withstand the combination of all loads including impact forces arising from product movement within the bin and accidental vehicle contact with the support legs.

(ii) The bin discharge gate shall be designed to provide a closure tight enough to prevent leakage of the stored product. Provision shall also be made so that the gate can be locked.

(iii) Bin loading manways or access hatches shall be hinged or otherwise attached to the bin and be designed to permit locking.

(iv) Any electrically driven conveyors for loading or unloading bins shall conform to the requirements of Subpart S of this Part. They shall be designed to minimize damage from corrosion.

(v) Bins containing blasting agent shall be located, with respect to inhabited buildings, passenger railroads, and public highways, in accordance with Table H–21 and separation from other blasting agent storage and explosives storage shall be in conformity with Table H–22.

(vi) Bins containing ammonium nitrate shall be separated from blasting agent storage and explosives storage in conformity with Table H–22.

TABLE H–22.—TABLE OF RECOMMENDED SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS [1] [2]

Donor weight		Minimum separation distance of receptor when barricaded [3] foot		Minimum thickness of artificial barricades [2] inches
Pounds over	Pounds not over	Ammonium nitrate [4]	Blasting agent [5]	
	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	43	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

[1] These distances apply to the separation of stores only. Table H–21 shall be used in determining separation distances from inhabited buildings, passenger railways, and public highways.

[2] Earth, or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves, are also acceptable.

[3] When the ammonium nitrate and/or blasting agent is not barricaded, the distances shown in the table shall be multiplied by 6. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers, and the like which may enclose the "donor." Where storage is in bullet-resistant magazines recommended for explosives or where the storage is protected by a bullet-resistant wall, distances, and barricade thicknesses in excess of those prescribed in table H–21 are not required.

[4] The distances in the table apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer promulgated by the National Plant Food Institute*; and ammonium nitrate failing to pass said test shall be stored at separation distances determined by competent persons. (*Definition and Test Procedures for Ammonium Nitrate Fertilizer, National Plant Food Institute, November 1964.)

[5] These distances apply to nitro-carbo-nitrates and blasting agents which pass the insensitivity test prescribed in the U.S. Department of Transportation (DOT) regulations.

Notes to Table of Recommended Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents:

When the ammonium nitrate must be counted in determining the distances to be maintained from inhabited buildings, passenger railways and public highways, it may be counted at $\frac{1}{3}$ its actual weight because its blast effect is lower.

Guide to use of table of recommended separation distances of ammonium nitrate and blasting agents from explosives or blasting agents.

(a) Sketch location of all potential donor and acceptor materials together with the maximum mass of material to be allowed in that vicinity. (Potential donors are high explosives, blasting agents, and combination of masses of detonating materials. Potential acceptors are high explosives, blasting agents and ammonium nitrate.)

(b) Consider separately each donor mass in combination with each acceptor mass. If the masses are closer than table allowance (distances measured between nearest edges), the combination of masses becomes a new potential donor of weight equal to the total mass. When individual masses are considered as donors, distances to potential acceptors shall be measured between edges. When combined masses within propagating distance of each other are considered as a donor, the appropriate distance to the edge of potential acceptors shall be computed as a weighted distance from the combined masses.

Calculation of weighted distance from combined masses:

Let $M_2, M_3 \ldots M_n$ be donor masses to be combined.

M_1 is a potential acceptor mass.

D_{12} is distance from M_1 to M_2 (edge to edge).

D_{13} is distance from M_1 to M_3 (edge to edge), etc.

To find weighted distance $[D_{1(2,3 \ldots n)}]$ from combined masses to M_1, add the products of the individual masses and distances and divide the total by the sum of the masses thus:

$$D_{1\,(2,\,3,\,\cdots n)} = \frac{M_2 \times D_{12} + M_3 \times D_{13} \cdots + M_n \times D_{1n}}{M_2 + M_3 \cdots + M_n}$$

Propagation is possible if either an individual donor mass is less than the tabulated distance from an acceptor or a combined mass is less than the weighted distance from an acceptor.

(c) In determining the distance separating highways, railroads, and inhabited buildings from potential explosions (as prescribed in table H–21), the sum of all masses which may propagate (i.e., lie at distances less than prescribed in the table) from either individual or combined donor masses are included. However, when the ammonium nitrate must be included, only 50 percent of its weight shall be used because of its reduced blast effects. In applying table H–21 to distances from highways, railroads, and inhabited buildings, distances are measured from the nearest edge of potentially explodable material as prescribed in table H–21, note 5.

(d) When all or part of a potential acceptor comprises explosives class A as defined in DOT regulations, storage in bullet-resistant magazines is required. Safe distances to stores in bullet-resistant magazines may be obtained from the intermagazine distances prescribed in table H–21.

(e) Barricades must not have line-of-sight openings between potential donors and acceptors which permit blast or missiles to move directly between masses.

(f) Good housekeeping practices shall be maintained around any bin containing ammonium nitrate or blasting agent. This includes keeping weeds and other combustible materials cleared within 25 feet of such bin. Accumulation of spilled product on the ground shall be prevented.

(5) *Storage of blasting agents and supplies.*—(i) Blasting agents and oxidizers used for mixing of blasting agents shall be stored in the manner set forth in this subdivision.

(*a*) Blasting agents or ammonium nitrate, when stored in conjunction with explosives, shall be stored in the manner set forth in paragraph (c) of this section for explosives. The mass of blasting agents and one-half the mass of ammonium nitrate shall be included when computing the total quantity of explosives for determining distance requirements.

(*b*) Blasting agents, when stored entirely separate from explosives, may be stored in the manner set forth in paragraph (c) of this section or in one-story warehouses (without basements) which shall be:

(*1*) Noncombustible or fire resistive;

(*2*) Constructed so as to eliminate open floor drains and piping into which molten materials could flow and be confined in case of fire;

(*3*) Weather resistant;

(*4*) Well ventilated; and

(*5*) Equipped with a strong door kept securely locked except when open for business.

(*c*) Semitrailer or full-trailer vans used for highway or onsite transportation of the blasting agents are satisfactory for temporarily storing these materials, provided they are located in accordance with Table H–21 with respect to inhabited buildings, passenger railways, and public highways and according to Table H–22 with respect to one another. Trailers shall be provided with substantial means for locking, and the trailer doors shall be kept locked, except during the time of placement and removal of stocks of blasting agents.

(ii) Warehouses used for the storage of blasting agents separate from explosives shall be located as set forth in this subdivision.

(*a*) Warehouses used for the storage of blasting agents shall be located in accordance with the provisions of Table H–21 with respect to inhabited buildings, passenger railways, and public highways, and according to Table H–22 with respect to one another.

(*b*) If both blasting agents and ammonium nitrate are handled or stored within the distance limitations prescribed through subparagraph (2) of this paragraph, one-half the mass of the ammonium nitrate shall be added to the mass of the blasting agent when computing the total quantity of explosives for determining the proper distance for compliance with Table H–21.

(iii) Smoking, matches, open flames, spark producing devices, and firearms are prohibited inside of or within 50 feet of any warehouse used for the storage of blasting agents. Combustible materials shall not be stored within 50 feet of warehouses used for the storage of blasting agents.

(iv) The interior of warehouses used for the storage of blasting agents shall be kept clean and free from debris and empty containers. Spilled materials shall be cleaned up promptly and safely removed. Combustible materials, flammable liquids, corrosive acids, chlorates, or nitrates shall not be stored in any warehouse used for blasting agents unless separated therefrom by a fire resistive separation of not less than 1 hour resistance. The provisions of this subdivision shall not prohibit the storage of blasting agents together with non-explosive blasting supplies.

(v) Piles of ammonium nitrate and warehouses containing ammonium nitrate shall be adequately separated from readily combustible fuels.

(vi) Caked oxidizers, either in bags or in bulk, shall not be loosened by blasting.

(vii) Every warehouse used for the storage of blasting agents shall be under the supervision of a competent person who shall be not less than 21 years of age.

(6) *Transportation of packaged blasting agents.*—(i) When blasting agents are transported in the same vehicle with explosives, all of the requirements of paragraph (d) of this section shall be complied with.

(ii) Vehicles transporting blasting agents shall only be driven by and be in charge of a driver at least twenty-one (21) years of age who is capable, careful, reliable, and in possession of a valid motor vehicle operator's license. Such a person shall also be familiar with the States vehicle and traffic laws.

(iii) No matches, firearms, acids, or other corrosive liquids shall be carried in the bed or body of any vehicle containing blasting agents.

(iv) No person shall be permitted to ride upon, drive, load, or unload a vehicle containing blasting agents while smoking or under the influence of intoxicants, narcotics, or other dangerous drugs.

(v) It is prohibited for any person to transport or carry any blasting agents upon any public vehicle carrying passengers for hire.

(vi) Vehicles transporting blasting agents shall be in safe operating condition at all times.

(vii) When offering blasting agents for transportation on public highways the packaging marking, and labeling of containers of blasting agents shall comply with the requirement of DOT.

(viii) Vehicles used for transporting blasting agents on public highways shall be placarded in accordance with DOT regulations.

(7) *Use of blasting agents.*—Persons using blasting agents shall comply with all of the applicable provisions of paragraph (e) of this section.

(h) *Water gel (Slurry) explosives and blasting agents*—(1) *General provisions.*—Unless otherwise set forth in this paragraph, water gels shall be transported, stored and used in the same manner as explosives or blasting agents in accordance with the classification of the product.

(2) *Types and classifications.*—(i) Water gels containing a substance in itself classified as an explosive shall be classified as an explosive and manufactured, transported, stored, and used as specified for "explosives" in this section, except as noted in subdivision (iv) of this subparagraph.

(ii) Water gels containing no substance in itself classified as an explosive and which are cap-sensitive as defined in paragraph (a) of this section under Blasting Agent shall be classified as an explosive and manufactured, transported, stored and used as specified for "explosives" in this section.

(iii) Water gels containing no substance in itself classified as an explosive and which are not cap-sensitive as defined in paragraph (a) of this section under Blasting Agent shall be classified as blasting agents and manufactured, transported, stored, and used as specified for "blasting agents" in this section.

(iv) When tests on specific formulations of water gels result in Department of Transportation classification as a Class B explosive, bullet-resistant magazines are not required, see paragraph (c) (2) (ii) of this section.

(3) *Fixed location mixing.*—(i) (a) Buildings or other facilities used for mixing water gels shall be located with respect to inhabited buildings, passenger railroads and public highways, in accordance with Table H–21.

(*b*) In determining the distances separating highways, railroads, and inhabited buildings from potential explosions (as prescribed in Table H–21), the sum of all masses that may propagate (i.e., lie at distances less than prescribed in Table H–22) from either individual or combined donor masses are included. However, when the ammonium nitrate must be included, only 50 percent of its weight shall be used because of its reduced blast effects.

(ii) Buildings used for the mixing of water gels shall conform to the requirements of this subdivision.

(*a*) Buildings shall be of noncombustible construction or sheet metal on wood studs.

(*b*) Floors in a mixing plant shall be of concrete or of other nonabsorbent materials.

(*c*) Where fuel oil is used all fuel oil storage facilities shall be separated from the mixing plant and located in such a manner that in case of tank rupture, the oil will drain away from the mixing plant building.

(*d*) The building shall be well ventilated.

(*e*) Heating units that do not depend on combustion processes, when properly designed and located, may be used in the building. All direct sources of heat shall be provided exclusively from units located outside of the mixing building.

(*f*) All internal-combustion engines used for electric power generation shall be located outside the mixing plant building, or shall be properly ventilated and isolated by a firewall. The exhaust systems on all such engines shall be located so any spark emission cannot be a hazard to any materials in or adjacent to the plant.

(iii) Ingredients of water gels shall conform to the requirements of this subdivision.

(*a*) Ingredients in themselves classified as Class A or Class B explosives shall be stored in conformity with paragraph (c) of this section.

(*b*) Nitrate-water solutions may be stored in tank cars, tank trucks, or fixed tanks without quantity or distance limitations. Spills or leaks which may contaminate combustible materials shall be cleaned up immediately.

(c) Metal powders such as aluminum shall be kept dry and shall be stored in containers or bins which are moisture-resistant or weathertight. Solid fuels shall be used in such manner as to minimize dust explosion hazards.

(d) Ingredients shall not be stored with imcompatible materials.

(e) Peroxides and chlorates shall not be used.

(iv) Mixing equipment shall comply with the requirements of this subdivision.

(a) The design of the processing equipment, including mixing and conveying equipment, shall be compatible with the relative sensitivity of the materials being handled. Equipment shall be designed to minimize the possibility of frictional heating, compaction, overloading, and confinement.

(b) Both equipment and handling procedures shall be designed to prevent the introduction of foreign objects or materials.

(c) Mixers, pumps, valves, and related equipment shall be designed to permit regular and periodic flushing, cleaning, dismantling, and inspection.

(d) All electrical equipment including wiring, switches, controls, motors, and lights, shall conform to the requirements of Subpart S of this part.

(e) All electric motors and generators shall be provided with suitable overload protection devices. Electrical generators, motors, proportioning devices, and all other electrical enclosures shall be electrically bonded. The grounding conductor to all such electrical equipment shall be effectively bonded to the service entrance ground connection and to all equipment ground connections in a manner so as to provide a continuous path to ground.

(v) Mixing facilities shall comply with the fire prevention requirements of this subdivision.

(a) The mixing, loading, and ingredient transfer areas where residues or spilled materials may accumulate shall be cleaned periodically. A cleaning and collection system for dangerous residues shall be provided.

(b) A daily visual inspection shall be made of mixing, conveying, and electrical equipment to establish that such equipment is in good operating condition. A program of systematic maintenance shall be conducted on regular schedule.

(c) Heaters which are not dependent on the combustion process within the heating unit may be used within the confines of processing buildings, or compartments, if provided with temperature and safety controls and located away from combustible materials and the finished product.

(4) *Bulk delivery and mixing vehicles.*—(i) The design of vehicles shall comply with the requirements of this subdivision.

(a) Vehicles used over public highways for the bulk transportation of water gels or of ingredients classified as dangerous commodities, shall meet the requirements of the Department of Transportation and shall meet the requirements of paragraphs (d) and (g) (6) of this section.

(b) When electric power is supplied by a self-contained motor generator located on the vehicle the generator shall be at a point separate from where the water gel is discharged.

(c) The design of processing equipment and general requirements shall conform to subparagraphs (3) (iii) and (iv) of this paragraph.

(d) A positive action parking brake which will set the wheel brakes on at least one axle shall be provided on vehicles when equipped with air brakes and shall be used during bulk delivery operations. Wheel chocks shall be permitted on bulk trucks provided that a special wood or non-

(ii) Operation of bulk delivery and mixing vehicles shall comply with the requirements of this subdivision.

(a) The placarding requirements contained in DOT regulations apply to vehicles carrying water gel explosives or blasting agents.

(b) The operator shall be trained in the safe operation of the vehicle together with its mixing, conveying, and related equipment. He shall be familiar with the commodities being delivered and the general procedure for handling emergency situations.

(c) The hauling of either blasting caps or other explosives, but not both, shall be permitted on bulk trucks provided that a special wood or nonferrous-lined container is installed for the explosives. Such blasting caps or other explosives shall be in DOT-specified shipping containers; see 49 CFR Chapter I.

(*d*) No person shall be allowed to smoke, carry matches or any flame-producing device, or carry any firearms while in or about bulk vehicles affecting the mixing, transfer, or down-the-hole loading of water gels at or near the blasting site.

(*e*) Caution shall be exercised in the movement of the vehicle in the blasting area to avoid driving the vehicle over or dragging hoses over firing lines, cap wires, or explosive materials. The employer shall furnish the driver the assistance of a second person to guide the driver's movements.

(*f*) No intransit mixing of materials shall be performed.

(*g*) The location chosen for water gel or ingredient transfer from a support vehicle into the borehole loading vehicle shall be away from the blasthole site when the boreholes are loaded or in the process of being loaded.

(i) *Storage of ammonium nitrate*—(1) *Scope and definitions.*—(i) (*a*) Except as provided in subdivision (*d*) of this subdivision this paragraph applies to the storage of ammonium nitrate in the form of crystals, flakes, grains, or prills including fertilizer grade, dynamite grade, nitrous oxide grade, technical grade, and other mixtures containing 60 percent or more ammonium nitrate by weight but does not apply to blasting agents

(*b*) This paragraph does not apply to the transportation of ammonium nitrate.

(*c*) This paragraph does not apply to storage under the jurisdiction of and in compliance with the regulations of the U.S. Coast Guard (see 46 CFR Parts 146–149).

(*d*) The storage of ammonium nitrate and ammonium nitrate mixtures that are more sensitive than allowed by the "Definition of Test Procedures for Ammonium Nitrate Fertilizer" is prohibited.

(*e*) Nothing in the paragraph shall apply to the production of ammonium nitrate or to the storage of ammonium nitrate on the premises of the producing plant, provided that no distinct undue hazard to the public is created.

(ii) (*a*) The definition and test procedures for ammonium nitrate fertilizer are those found in the bulletin, "Definition and Test Procedures for Ammonium Nitrate Fertilizer", available from the National Plant Food Institute, 1700 K Street NW., Washington, DC 20006. This definition limits the contents of organic materials, metals, sulfur, etc., in a product that may be classified ammonium nitrate fertilizer.

(*b*) The standards for ammonium nitrate (nitrate oxide grade) are those found in the "Specifications, Properties, and Recommendations for Packaging, Transportation, Storage, and Use of Ammonium Nitrate", available from the Compressed Gas Association, Inc., 500 Fifth Avenue, New York, NY 10036.

(2) *General provisions.*—(i) This paragraph applies to all persons storing, having, or keeping ammonium nitrate, and to the owner or lessee of any building, premises, or structure in which ammonium nitrate is stored in quantities of 1,000 pounds or more.

(ii) Approval of large quantity storage shall be subject to due consideration of the fire and explosion hazards, including exposure to toxic vapors from burning or decomposing ammonium nitrate.

(iii) (*a*) Storage buildings shall not have basements unless the basements are open on at least one side. Storage buildings shall not be over one story in height.

(*b*) Storage buildings shall have adequate ventilation or be of a construction that will be self-ventilating in the event of fire.

(*c*) The wall on the exposed side of a storage building within 50 feet of a combustible building, forest, piles of combustible materials and similar exposure hazards shall be of fire-restrictive construction, in lieu of the fire-resistive wall, other suitable means of exposure protection such as a free standing wall may be used. The roof coverings shall be in Class C or better, as defined in the manual on Roof Coverings, NFPA 203M–1970.

(*d*) All flooring in storage and handling areas, shall be of noncombustible material or protected against inpregnation by ammonium nitrate and shall be without open drains, traps, tunnels, pits, or pockets into which any molten ammonium nitrate could flow and be confined in the event of fire.

(*e*) The continued use of an existing storage building or structure not in strict conformity with this paragraph may be approved in cases where such continued use will not constitute a hazard to life or adjoining property.

(*f*) Buildings and structures shall be dry and free from water seepage through the roof, walls and floors.

(3) *Storage of ammonium nitrate in bags, drums, or other containers.* (i) (*a*) Bags and containers used for ammonium nitrate must comply with specifications and standards required for use in interstate commerce (see 49 CFR Chapter I).

(*b*) Containers used on the premises in the actual manufacturing or processing need not comply with provisions of subdivision (*a*) of this subdivision.

(ii) (*a*) Containers of ammonium nitrate shall not be accepted for storage when the temperature of the ammonium nitrate exceeds 130° F.

(*b*) Bags of ammonium nitrate shall not be stored within 30 inches of the storage building walls and partitions.

(*c*) The height of piles shall not exceed 20 feet. The width of piles shall not exceed 20 feet and the length 50 feet except that where the building is of noncombustible construction or is protected by automatic sprinklers the length of piles shall not be limited. In no case shall the ammonium nitrate be stacked closer than 36 inches below the roof or supporting and spreader beams overhead.

(*d*) Aisles shall be provided to separate piles by a clear space of not less than 3 feet in width. At least one service or main aisle in the storage area shall be not less than 4 feet in width.

(4) *Storage of bulk ammonium nitrate.* (i) (*a*) Warehouses shall have adequate ventilation or be capable of adequate ventilation in case of fire.

(*b*) Unless constructed of noncombustible material or unless adequate facilities for fighting a roof fire are available, bulk storage structures shall not exceed a height of 40 feet.

(ii) (*a*) Bins shall be clean and free of materials which may contaminate ammonium nitrate.

(*b*) Due to the corrosive and reactive properties of ammonium nitrate, and to avoid contamination, galvanized iron, copper, lead, and zinc shall not be used in a bin construction unless suitably protected. Aluminum bins and wooden bins protected against impregnation by ammonium nitrate are permissible. The partitions dividing the ammonium nitrate storage from other products which would contaminate the ammonium nitrate shall be of tight construction.

(*c*) The ammonium nitrate storage bins or piles shall be clearly identified by signs reading "Ammonium Nitrate" with letters at least 2 inches high.

(iii) (*a*) Piles or bins shall be so sized and arranged that all material in the pile is moved out periodically in order to minimize possible caking of the stored ammonium nitrate.

(*b*) Height or depth of piles shall be limited by the pressure-setting tendency of the product. However, in no case shall the ammonium nitrate be piled higher at any point than 36 inches below the roof or supporting and spreader beams overhead.

(*c*) Ammonium nitrate shall not be accepted for storage when the temperature of the product exceeds 130° F.

(*d*) Dynamite, other explosives, and blasting agents shall not be used to break up or loosen caked ammonium nitrate.

(5) *Contaminants.*—(i) (*a*) Ammonium nitrate shall be in a separate building or shall be separated by approved type firewalls of not less than 1 hour fire-resistance rating from storage of organic chemicals, acids, or other corrosive materials, materials that may require blasting during processing or handling, compressed flammable gases, flammable and combustible materials or other contaminating substances, including but not limited to animal fats, baled cotton, baled rags, baled scrap paper, bleaching powder, burlap or cotton bags, caustic soda, coal, coke, charcoal, cork, camphor, excelsior, fibers of any kind, fish oils, fish meal, foam rubber, hay, lubricating oil, linseed oil, or other oxidizable or drying oils, naphthalene, oakum, oiled clothing, oiled paper, oiled textiles, paint, straw, sawdust, wood shavings, or vegetable oils. Walls referred to in this subdivision need extend only to the underside of the roof.

(*b*) In lieu of separation walls, ammonium nitrate may be separated from the materials referred to in subdivision (*a*) of this subdivision by a space of at least 30 feet.

(*c*) Flammable liquids such as gasoline, kerosene, solvents, and light fuel oils shall not be stored on the premises except when such storage conforms to § 1910.106, and when walls and sills or curbs are provided in accordance with subdivisions (*a*) or (*b*) of this subdivision.

(*d*) LP–Gas shall not be stored on the premises except when such storage conforms to § 1910.110.

(ii) (*a*) Sulfur and finely divided metals shall not be stored in the same building with ammonium nitrate except when such storage conforms to paragraphs (a) through (h) of this section.

(*b*) Explosives and blasting agents shall not be stored in the same building with ammonium nitrate except on the premises of makers, distributors, and user-compounders of explosives or blasting agents.

(*c*) Where explosives or blasting agents are stored in separate buildings, other than on the premises of makers, distributors, and user-compounders of explosives or blasting agents, they shall be separated from the ammonium nitrate by the distances and/or barricades specified in Table H–22 of this subpart, but by not less than 50 feet.

(*d*) Storage and/or operations on the premises of makers, distributors, and user-compounders of explosives or blasting agents shall be in conformity with paragraphs (a) through (h) of this section.

(6) *General precautions.*—(i) (*a*) Electrical installations shall conform to the requirements of subpart S of this part, for ordinary locations. They shall be designed to minimize damage from corrosion.

(vi) In areas where lightning storms are prevalent, lightning protection shall be provided. (See the Lightning Protection Code, NFPA 78–1968.)

(vii) Provisions shall be made to prevent unauthorized personnel from entering the ammonium nitrate storage area.

(7) *Fire protection.*—(i) Not more than 2,500 tons of bagged ammonium nitrate shall be stored in a building or structure not equipped with an automatic sprinkler system. Sprinkler systems shall be of approved type and installed in accordance with the Standard for the Installation of Sprinkler Systems, NFPA 13–1969.

(ii) (*a*) Suitable fire control devices such as small hose or portable extinguishers, shall be provided throughout the warehouse and in the loading and unloading areas. See the Standard for the Installation of Portable Fire Extinguishers, NFPA 10–1970, and the Standard for the Installation of Standpipe and Hose Systems, NFPA 14–1970.

(*b*) Water supplies and fire hydrants shall be available in accordance with recognized good practices.

(j) *Small arms ammunition, small arms primers, and small arms propellants*—(1) *Scope.* This paragraph does not apply to in-process storage and intraplant transportation during manufacture of small arms ammunition, small arms primers, and smokeless propellants.

(2) *Small arms ammunition.* (i) No quantity limitations are imposed on the storage of small arms ammunition in warehouses, retail stores, and other general occupancy facilities, except those imposed by limitations of storage facilities.

(ii) Small arms ammunition shall be separated from flammable liquids, flammable solids as classified in 49 CFR Part 172, and from oxidizing materials, by a fire-resistive wall of 1-hour rating or by a distance of 25 feet.

(iii) Small arms ammunition shall not be stored together with Class A or Class B explosives unless the storage facility is adequate for this latter storage.

(3) *Smokeless propellants.*—(i) All smokeless propellants shall be stored in shipping containers specified in 49 CFR 173.93 for smokeless propellants.

(ii) Not more than 20 pounds of smokeless propellants, in containers of 1 pound maximum capacity, shall be displayed in commercial establishments.

(iii) Commercial stocks of smokeless propellants over 20 pounds and not more than 100 pounds shall be stored in portable wooden boxes having walls of at least 1 inch nominal thickness.

(iv) Commercial stocks in quantities not to exceed 750 pounds shall be stored in nonportable storage cabinets having wooden walls of at least 1 inch nominal thickness. Not more than 400 pounds shall be permitted in any one cabinet.

(v) Quantities in excess of 750 pounds shall be stored in magazines in accordance with paragraph (c) of this section.

(4) *Small arms ammunition primers.*—(i) Small arms ammunition primers shall not be stored except in the original shipping container in accordance with the requirements of 49 CFR 173.107 for small arms ammunition primers.

(ii) Not more than 10,000 small arms ammunition primers may be displayed in commercial establishments.

(iii) Small arms ammunition primers shall be separated from flammable liquids, flammable solids as classified in 49 CFR Part 172, and oxidizing materials by a fire-resistive wall of 1-hour rating or by a distance of 25 feet.

(iv) Not more than 750,000 small arms ammunition primers shall be stored in any one building, except as provided in subdivision (v) of this subparagraph.

Not more than 100,000 shall be stored in any one pile. Piles shall be at least 15 feet apart.

(v) Quantities of small arms ammunition primers in excess of 750,000 shall be stored in magazines in accordance with paragraph (c) of this section.

(k) *Scope.* This section applies to the manufacture, keeping, having, storage, sale, transportation, and use of explosives, blasting agents, and pyrotechnics. This section does not apply to the sale and use (public display) of pyrotechnics, commonly known as fireworks, nor to the use of explosives in the form prescribed by the official U.S. Pharmacopeia.

§ 1926.904 Storage of explosives and blasting agents.

(a) Explosives and related materials shall be stored in approved facilities required under the applicable provisions of the Internal Revenue Service regulations contained in 26 CFR 181, Commerce in Explosives.

(b) Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents.

(c) Smoking and open flames shall not be permitted within 50 feet of explosives and detonator storage magazine.

(d) No explosives or blasting agents shall be permanently stored in any underground operation until the operation has been developed to the point where at least two modes of exit have been provided.

(e) Permanent underground storage magazines shall be at least 300 feet from any shaft, adit, or active underground working area.

(f) Permanent underground magazines containing detonators shall not be located closer than 50 feet to any magazine containing other explosives or blasting agents.

3. Regulations promulgated by the Secretary, U.S. Department of Transportation, pursuant to 18 U.S.C. Chapter 39, as amended, §§ 831–36, and Title VI and section 902(h) of the Federal Aviation Act of 1958, Pub. L. 85–726, Aug. 23, 1958, 72 Stat. 775, as amended, 49 U.S.C. §§ 1421–30, 1472(h).

a. 49 C.F.R. § 172.5 List of Hazardous Materials;

b. 49 C.F.R. § 173.51 Forbidden Explosives;

c. 49 C.F.R. § 173.52 Acceptable Explosives;

d. 49 C.F.R. § 173.53 Definitions of Class A Explosives;

e. 49 C.F.R. § 173.60 Black Powder and Low Explosives;

f. 49 C.F.R. § 173.86 New Explosives and Samples for Laboratory Examination;

g. 49 C.F.R. § 173.87 Explosives in Mixed Packaging;

h. 49 C.F.R. § 174.501 Carriers by Rail Freight—Acceptable Articles;

i. 49 C.F.R. § 174.502 Carriers by Rail Freight—Forbidden Explosives;

j. 49 C.F.R. § 175.651 Carriers by Rail Express—Acceptable Articles;

k. 49 C.F.R. § 175.652 Carriers by Rail Express—Application;

l. 49 C.F.R. § 175.675 Transportation of Explosives by the Railway Express Agency, Incorporated, in Passenger or Express Train Service;

m. 49 C.F.R. § 177.823 Shipments Made by Way of Common, Contract, or Private Carriers by Public Highway—Required Exterior Marking on Motor Vehicles and Combinations;

n. 49 C.F.R. § 177.834 Shipments Made by Way of Common, Contract, or Private Carriers by Public Highway—Loading and Unloading;

o. 49 C.F.R. § 177.835 Loading and Unloading—Explosives;

p. 49 C.F.R. § 177.848 Loading and Storage Chart of Hazardous Materials;

q. 49 C.F.R. § 178.30 Shipping Container Specifications—Specification 2L; Lining for Boxes;

r. 49 C.F.R. § 178.40 Shipping Container Specifications—Specification 3C; Seamless Steel Cylinders;

s. 49 C.F.R. § 178.116 Shipping Container Specifications—Specification 17C; Steel Drums;

t. 49 C.F.R. § 178.156 Shipping Container Specifications—Specification 10B; Wooden Barrels and Kegs (tight);

u. 49 C.F.R. § 178.165 Shipping Container Specifications—Specification 14; Wooden Boxes, nailed;

v. 49 C.F.R. § 178.168 Shipping Container Specifications—Specification 15A; Wooden Boxes, nailed;

w. 49 C.F.R. § 178.185 Shipping Container Specifications—Specification 16A; Plywood or Wooden Boxes, wirebound;

x. 49 C.F.R. § 178.209 Shipping Container Specifications—Specification 12H; Fibreboard Boxes;

y. 49 C.F.R. § 178.214 Shipping Container Specifications—Specification 23F; Fibreboard Boxes;

z. 49 C.F.R. § 178.219 Shipping Container Specifications—Specification 23H; Fibreboard Boxes.

§ 172.5 List of Hazardous Explosives

Article	Classed as	Exemptions and packing (see sec.)	Label required if not exempt	Maximum quantity in 1 outside container by rail express
Arsenic chloride (arsenous), liquid	Pois. B	173.345, 173.346	Pois	55 gallons.
Arsenic iodide, solid	Pois. B	173.364, 173.365	Pois	200 pounds.
Arsenic pentoxide, solid	Pois. B	173.364, 173.365	Pois	200 pounds.
Arsenic solid	Pois. B	173.364, 173.366	Pois	200 pounds.
Arsenic sulfide (powder), solid	Pois. B	173.364, 173.365	Pois	200 pounds.
Arsenic trichloride, liquid	Pois. B	173.345, 173.346	Pois	55 gallons.
Arsenic trioxide, solid (arsenic, white, solid, arsenous acid, solid).	Pois. B	173.364, 173.366, 173.368	Pois	200 pounds.
Arsenic, white, solid	Pois. B	173.364, 173.366	Pois	200 pounds.
Arsenical compounds or mixtures, n.o.s., liquid.	Pois. B	173.345, 173.346	Pois	55 gallons.
Arsenical compounds or mixtures, n.o.s., solid.	Pois. B	173.364, 173.367	Pois	200 pounds.
Arsenical dip, liquid (sheep dip)	Pois. B	173.345, 173.346	Pois	55 gallons.
Arsenical dust	Pois. B	173.364, 173.368	Pois	200 pounds.
Arsenical flue dust	Pois. B	173.364, 173.368	Pois	200 pounds.
Arsenous acid, solid	Pois. B	173.364, 173.365	Pois	200 pounds.
Arsenous and mercuric iodide solution, liquid.	Pois. B	173.345, 173.346	Pois	55 gallons.
Asphalt, cut-back. See *Road asphalt, or tar, liquid.				
Automobiles, motorcycles, tractors or other self-propelled vehicles.	See §§ 173.120, 173.306.			
Automobiles, motorcycles, tractors or other self-propelled vehicles, engines or other mechanical apparatus, with charged electric storage batteries, wet.	See § 173.250.			
1-Aziridinyl phosphine oxide (tris). See Tris-(1-aziridinyl) phosphine oxide.				
Bags, nitrate of soda, empty and unwashed	F.S	No exemption, 173.155(a)	F.S	25 pounds.
Barium azide—50 percent or more water wet	F.S	No exemption, 173.239	F.S	1 pound.
Barium chlorate	Oxy. M	173.153, 173.163	Oxy	100 pounds.
Barium chlorate, wet	Oxy. M	173.153, 173.163(a)(6)	Oxy	200 pounds.
Barium cyanide, solid	Pois. B	173.370	Pois	200 pounds.
Barium nitrate	Oxy. M	173.153, 173.182	Oxy	100 pounds.
Barium perchlorate	Oxy. M	173.153, 173.154	Oxy	100 pounds.
Barium permanganate	Oxy. M	173.153, 173.154	Oxy	100 pounds.
Barium peroxide (binoxide, dioxide)	Oxy. M	173.153, 173.156	Oxy	100 pounds.
Barrels, empty, See Drums, empty.				
Batteries, dry	Not regulated.			
Batteries, electric storage, wet	Cor	173.260	Corrosive	600 pounds.
Batteries, electric storage, wet, with automobiles, auto parts, engines or other mechanical apparatus.	Cor	173.250, 173.260	Corrosive	No limit.
Batteries, electric storage, wet, with containers of corrosive battery fluid.	Cor	No exemption, 173.258	Corrosive	2 gallons.
Battery charger with electrolyte (acid) or battery fluid.	See § 173.259			
Battery fluid. See Electrolyte (acid) or Alkaline corrosive battery fluid.				
Benzene (benzol)	F.L	173.118, 173.119	F.L	10 gallons.
Benzene phosphorous dichloride	Cor	173.244, 173.250a	Corrosive	4 pints.
Benzene phosphorous thiodichloride	Cor	173.244, 173.250a	Corrosive	5 pints.
Benzine	F.L	173.118, 173.119	F.L	10 gallons.
Benzol (benzene)	F.L	173.118, 173.119	F.L	10 gallons.
Benzoyl chloride	Cor	173.244, 173.247	Corrosive	1 quart.
Benzoyl peroxide	Oxy. M	No exemption, 173.157, 173.158.	Org. per	25 pounds.
Benzyl bromide (bromotoluene, alpha)	Cor	No exemption, 173.281	Corrosive	5 pints.
Benzyl chloride	Cor	173.244, 173.295	Corrosive	1 quart.
Benzyl chlorocarbonate. See Benzyl chlorol formate.				
Benzyl chloroformate	Cor	No exemption, 173.288	Corrosive	5 pints.
Beryllium compounds, n.o.s	Pois. B	173.364, 173.365	Pois	200 pounds.
Black blasting powder. See Black powder				
Black pellet powder. See Black powder				
Black powder	Expl. A	No exemption, 173.60	Expl. A	Not accepted.
Black powder igniters with empty cartridge bags.	Expl. C	No exemption, 173.106	Expl. C	150 pounds

§ 173.51 Forbidden explosives.

(a) The offering of the following explosives for transportation by common carriers by rail freight, rail express highway, or water is forbidden.

(b) Explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(c) Explosives containing an ammonium salt and a chlorate.

(d) Liquid nitroglycerin, diethylene glycol dinitrate or other liquid explosives not authorized by § 173.53 (e) and (h). (For shipment by carrier by motor vehicle other than common carriers, see § 177.822(b) of this chapter.)

(e) Explosives condemned by the Bureau of Explosives (except properly packed samples for laboratory examinations). Appeal may be made to the Department from such condemnations.

(f) Leaking or damaged packages of explosives.

(g) Condemned or leaking dynamite must not be repacked and offered for shipment unless the repacking is done by a competent person in the presence of or with the written consent of an inspector, or with the written authority of the chief inspector of the Bureau of Explosives.

(h) Firecrackers, flash crackers, salutes, or similar commercial devices which produce or are intended to produce an audible effect, the explosive content of which exceeds 12 grains each in weight, and pest control bombs, the explosive content of which exceeds 18 grains each in weight; and any such devices, without respect to explosive content, which on functioning are liable to project or disperse metal, glass or brittle plastic fragments.

(i) Fireworks that combine an explosive and a detonator or blasting cap.

(j) Fireworks containing an ammonium salt and a chlorate.

(k) Fireworks containing yellow or white phosphorus.

(l) Fireworks or fireworks compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(m) Fireworks, properly condemned by the Bureau of Explosives, except properly repacked samples for laboratory examinations.

(n) Toy torpedoes, the maximum outside dimension of which exceeds ⅞ inch, or toy torpedoes containing a mixture of potassium chlorate, black antimony and sulfur with an average weight of explosive composition in each torpedo exceeding four grains.

(o) Toy torpedoes containing a cap composed of a mixture of red phosphorus and potassium chlorate exceeding an average of one-half (0.5) grain per cap.

(p) Fireworks containing copper sulfate and a chlorate.

(q) New explosives and explosive devices except as provided for in § 173.86

(r) Loaded firearms.

[29 F.R. 18683, Dec. 29, 1964, as amended by Amdt. 173–6, 34 F.R. 7160, May 1, 1969]

§ 173.52 Acceptable explosives.

(a) For the purpose of Parts 171–179 of this chapter, acceptable explosives are divided into three classes as defined in this section, viz, (see § 172.5 of this chapter for restrictions for shipments by rail express).

(1) Class A explosives; detonating or otherwise of maximum hazard.

(2) Class B explosives: flammable hazard.

(3) Class C explosives: minimum hazard.

CLASS A EXPLOSIVES; DEFINITIONS

§ 173.53 Definition of class A explosives

(a) *Type 1.*—Solid explosives which can be caused to deflagrate by contact with sparks or flame such as produced by safety fuse or an electric squib, but cannot be detonated (see Note 1) by means of a No. 8 test blasting cap (see Note 2). Example: Black powder and low explosives.

(b) *Type 2.*—Solid explosives which contain a liquid explosive ingredient, and which, when unconfined (see Note 3), can be detonated by means of a No. 8 test blasting cap (see Note 2); or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Example: High explosives, commercial dynamite containing a liquid explosive ingredient.

(c) *Type 3.*—Solid explosives which contain no liquid explosive ingredient and which can be detonated, when unconfined (see Note 3), by means of a No. 8 test blasting cap (see Note 2); or which can be exploded in at least 50 percent of the trials in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of 4 inches or more, but cannot be exploded in more than 50 percent of the trials under a drop of less than 4 inches. Example: High explosives, commercial dynamite containing no liquid explosive ingredient, trinitrotoluene, amatol, tetryl, picric acid, urea nitrate, pentolite, and commercial boosters.

(d) *Type 4.*—Solid explosives which can be caused to detonate when unconfined (see Note 3), by contact with sparks or flame such as produced by safety fuse or an electric squib; or which can be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4) in more than 50 percent of the trials under a drop of less than 4 inches. Example: Initiating and priming explosives, lead azide, fulminate of mercury, etc., and high explosives.

(e) *Type 5.*—Desensitized liquid explosives are explosives which may be detonated separately or when absorbed in sterile absorbent cotton, by a No. 8 test blasting cap (see Note 2); but which cannot be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4), by a drop of less than 10 inches. The desensitizer must not be significantly more volatile than nitroglycerine and the desensitized explosive must not freeze at temperatures above minus 10° F. Example: High explosives, desensitized nitroglycerine.

(f) *Type 6.*—Liquid explosives that can be exploded in the Bureau of Explosives' Impact Apparatus (see Note 4) under a drop of less than 10 inches. Example: Nitroglycerin. (See § 173.51 (d).)

(g) *Type 7.*—Blasting caps (see Note 5) are small tubes, usually made of an alloy of either copper or aluminum, or of molded plastic closed at one end and loaded with a charge of initiating or priming explosives, class A—Type 4 either with or without other suitable explosives. The total weight of explosives per unit shall not exceed 150 grains. Blasting caps (see Note 5) which have been provided with a means for firing by an electric current, and sealed, are known as electric blasting caps.

(1) Detonating primers are devices for commercial use which contain a detonator and an additional charge of explosives, all assembled in a suitable envelope.

(2) Detonating fuzes, class A, are used in the military service to detonate the high explosive bursting charges of projectiles, mines, bombs, torpedoes, and grenades. In addition to a powerful detonator, they may contain several ounces of a high explosive, such as tetryl or dry nitrocellulose, all assembled in a heavy steel envelope. They may also contain a small amount of radioactive component. Those that are so made and packed that they will not cause functioning of other fuzes, explosives, or explosive devices in the same or adjacent containers are classed as class C explosives.

(h) *Type 8.*—Any solid or liquid compound, mixture or device which is not specifically included in any of the above types, and which under special conditions may be so designated and approved by the Bureau of Explosives. Example: Shaped charges, commercial.

(1) A shaped charge, commercial consists of a plastic, paper, or other suitable container comprising a charge of not to exceed 8 ounces of a high explosive containing no liquid explosive ingredient and with a hollowed-out portion (cavity) lined with a rigid material. Detonators or other initiating elements shall not be assembled in the device unless approved by the Bureau of Explosives.

NOTE 1. The detonation test is performed by placing the sample in an open-end fiber tube which is set on the end of a lead block approximately 1½ inches in diameter and 4 inches high which, in turn, is placed on a solid base. A steel plate may be placed between the fiber tube and the lead block.

NOTE 2.—A No. 8 test blasting cap is one containing two grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate, or a cap of equivalent strength.

NOTE 3. "Unconfined" as used in this section does not exclude the use of a paper or soft fiber tube wrapping to facilitate tests.

NOTE 4. The Bureau of Explosives Impact Apparatus is a testing device designed so that a guided 8-pound weight may be dropped from predetermined heights so as to impact specific quantities of liquid or solid materials under

fixed conditions. Detailed prints may be obtained from the Bureau of Explosives, 2 Pennsylvania Plaza, New York, New York, 10001.

NOTE 5. Blasting caps, blasting caps with safety fuse, or electric blasting caps in quantities of 1,000 or less are classified as class C explosives.

(i) *Ammunition for cannon.*—Ammunition for cannon is fixed, semi-fixed or separate loading ammunition which is fired from a cannon, mortar, gun, howitzer or recoilless rifle.

(j) *Ammunition for cannon with projectiles.*— Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, or shell is fixed ammunition assembled in a unit consisting of the cartridge case containing the propelling charge and primer, and the projectiles, or shell, fuzed or unfuzed. Detonating fuzes, tracer fuzes, explosive or ignition devices, or fuze parts with explosives contained therein must not be assembled in ammunition or included in the same outside package unless shipped by, for, or to the Departments of the Army, Navy, and Air Force of the United States Government or unless of a type approved by the Bureau of Explosives.

(k) *Explosive projectiles.*—Explosive projectiles are shells, projectiles, warheads, or rocket heads, loaded with explosives or bursting charges, with or without other materials, for use in cannons, guns, tubes, mortars or other firing or launching devices.

(l) *Grenades.*—Grenades, hand or rifle, are small metal or other containers designed to be thrown by hand or projected from a rifle. They are filled with an explosive or a liquid, gas, or solid material such as a toxic or tear gas or an incendiary or smoke producing material and a bursting charge. When shipped without explosives or bursting charges, see §§ 173.100(y), 173,330, 173,350, and 173.385.

(m) *Explosive bombs.*—Explosive bombs are metal or other containers filled with explosives. They are used in warfare and include aeroplane bombs and depth bombs.

(n) *Explosive mines.*—Explosive mines are metal or composition containers filled with a high explosive.

(o) *Explosive torpedoes.*—Explosive torpedoes, such as are used in warfare, are metal devices containing a means of propulsion and a quantity of high explosives.

(p) *Rocket ammunition.*—Rocket ammunition (including guided missiles) is ammunition designed for launching from a tube, launcher, rails, trough, or other launching device, in which the propellant material is a solid propellant explosive. It consists of an igniter, rocket motor, and projectile (warhead) either fuzed or unfuzed, containing high explosives or chemicals. Rocket ammunition may be shipped completely assembled or may be shipped unassembled in one outside container.

(q) *Ammunition for small arms with explosive projectiles or incendiary projectiles.*—Ammunition for small arms with explosive projectiles and ammunition for small arms with incendiary projectiles is fixed ammunition of caliber 20 millimeters to be used in machine guns or cannons, and consists of a metallic cartridge case, the primer and the propelling charge, with explosive projectile or incendiary projectile with or without detonating fuze; the component parts necessary for one firing being all in one assembly. Detonating fuzes, tracer fuzes, explosive or ignition devices or fuze parts with explosives contained therein must not be assembled in ammunition or included in the same outside package unless shipped by, for or to the Departments of the Army, Navy, and Air Force of the U.S. Government or unless of a type approved by the Department.

(r) *Chemical ammunition.*—Chemical ammunition used in warfare is all kinds of explosive chemical projectiles, shells, bombs, grenades, etc., loaded with toxic tear, or other gas, smoke or incendiary agent, also such miscellaneous apparatus as cloud-gas cylinders, smoke generators, etc., that may be utilized to project chemicals.

(s) *Booster, bursters, and supplementary charges.*—Boosters and supplementary charges consist of a casing containing a high explosive and are used to increase the intensity of explosion of the detonator of a detonating fuze. Bursters consist of a casing containing a high explosive and are used to rupture a projectile or bomb to permit release of its contents.

(t) *Jet thrust units (jato) class A explosives; rocket motors, class A explosives; igniters, jet thrust (jato), class A explosives; and igniters, rocket motor, class A explosives:*

(1) Jet thrust units (jato), class A explosives, are metal cylinders containing a mixture of chemicals capable of burning rapidly and producing considerable pressure. Under certain conditions the chemical fuel with which the unit is loaded may explode. Jet thrust units are designed to be ignited by an electric igniter. They are used to assist aeroplanes to take off.

(2) Rocket motor, class A explosives, is a device containing a propelling charge and consisting of one or more continuous type combustion unit(s) closed at one end (closure may be an igniter with a thrust plate) and with a nozzle(s) at the other end. (The rocket motor carries its own solid oxidizer-fuel combination.) The propelling charge consists of a mixture of chemicals and/or chemical compounds which when ignited is capable of burning rapidly and producing considerable pressure and which will sustain a detonation. Rocket motors, class A explosives, should be nonpropulsive in shipment (see subdivisions (i) and (ii) of this subparagraph). Rocket motors, class A explosives, are designed to be ignited by an electrically actuated device which may be an igniter, or by other means. They are used to propel and/or provide thrust for guided missiles, rockets, or spacecraft.

(i) A rocket motor to be considered "nonpropulsive" must be capable of unrestrained burning and will not move appreciably in any direction when ignited by any means. Blast deflectors, thrust neutralizers, or other similar devices must be proven adequate by test prior to authorization for use.

(ii) Rocket motors, class A explosives may be shipped in a propulsive state only under conditions approved by the Department of Defense.

(3) Igniters, jet thrust (jato), class A explosives, and igniters, rocket motor, class A explosives, are devices consisting of an electrically operated or remotely controlled ignition element and a charge of fast-burning composition meeting the definition prescribed for Type 1 class A explosives (see paragraph (a) of this section), assembled in a unit for use in igniting the propelling charge of jet thrust units or rocket motors.

(u) *Charged oil well jet perforating guns.*—Charged oil well jet perforating guns are steel tubes or metallic strips into which are inserted shaped charges connected in series by primacord. Shaped charges must be of a type described in paragraphed (h)(1) of this section, except that each shaped charge installed in the steel tub or metallic strip shall contain not over 4 ounces of high explosive. Charged oil well jet perforating guns must not be transported with blasting caps, electric blasting caps, or other firing devices affixed to or installed in the guns.

(v) *Type 9.*—Propellant explosives, class A, are solid chemicals or solid chemical mixtures which are designed to function by rapid combustion of successive layers, generally with little or no smoke. The combustion is controlled by composition, size, and form of grain. Propellant explosives, class A, include some types of smokeless powder and some types of solid propellant explosives for jet thrust units, rockets, or other devices. Any propellant explosive is class A which detonates in any one out of five trials when tested in the packages in which it is offered for transportation. In conducting the test, one propellant container shall be surrounded by inert loaded containers of the same weight, including one inert container placed on top of the propellant container. The propellant shall be ignited by means of a commercial electric squib placed within 4 inches of the bottom of the container. The presence of a crater and absence of flame shall be considered as evidences of detonation.

[29 F.R. 18683, Dec. 29, 1964, as amended by Order 72, 31 F.R. 6423, Apr. 28, 1966; Order 71, 31 F.R. 9069, July 1, 1966; Amdt. 173–6, F.R. 7160, May 1, 1969; Amdt. 173–54, 36 F.R. 18469, Sept. 15, 1971]

§ 173.60 Black powder and low explosives.

(a) Black powder and low explosives must be packed in containers complying with the following specifications:

(1) Spec. 10B (§ 178.156 of this chapter). Wooden barrels or kegs. Not over 200 pounds gross weight.

(2) Spec. 13 (§ 178.140 of this chapter) Metal kegs, not less than 7 inches long. Net weight not less than 6¼ pounds nor more than 150 pounds.

(3) Bundles of metal kegs, spec. 13 (§ 178.140 of this chapter), firmly tied together with rope and wrapped in strong burlap, canvas, or similar material,

securely sewed and roped, authorized. Net weight of powder must not exceed 100 pounds.

(4) Spec. 14, 15A, or 16A (§§ 178.165, 178.168, or 178.185 of this chapter). Wooden boxes with inside containers which must be spec. 13 (§ 178.140 of this chapter), metal kegs, or fiber or metal containers not over 1½ pounds capacity each, or cotton bags of at least 4 ounce cotton duck not over 25 pounds capacity each. The gross weight of spec. 14 boxes not to exceed 140 pounds and the gross weight of spec. 15A or 16A boxes not to exceed 200 pounds.

(5) Spec. 14, 15A, or 16A (§§ 178.165, 178.168, or 178.185 of this chapter). Wooden boxes with inside cylindrical fiber cartridges not over 5 inches diameter nor over 18 inches long with fiber at least 0.05 inch thick paraffined on outer surface with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Boxes must be completely lined with strong paraffined paper or other suitable waterproofed material without joints or other openings at the bottom or sides. Authorized gross weight not to exceed 75 pounds.

(6) Spec. 12H, 23F, or 23H (§§ 178.209, 178.214, or 178.219 of this chapter). Fiberboard boxes with inside cylindrical fiber cartridges not over 5 inches diameter nor over 18 inches long with fiber at least 0.05 inch thick paraffined on outer surface with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Authorized gross weight not to exceed 65 pounds.

(b) Black powder (not low explosives) in addition to container specified in paragraph (a) of this section, must be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, or 16A (§§ 178.165, 178.168, or 178.185 of this chapter). Wooden boxes with inside containers which must be cloth or paper bags of capacity not exceeding 25 pounds net weight, provided the completed shipping package shall be capable of standing a drop of 4 feet without rupture of inner or outer containers. The completed package must not exceed 50 pounds, net weight of black powder.

(2) Spec. 12H, 23F, or 23H (§§ 178.209, 178.214, or 178.219 of this chapter). Fiberboard boxes with inside containers which must be cloth, paper, or securely closed polyethylene bags constructed of material not less than 0.004 inch thick of capacity not exceeding 25 pounds net weight for cloth or paper bags and not exceeding 50 pounds net weight for polyethylene bags, or inside fiber or metal containers having not over 1 pound capacity each, provided the completed shipping package shall be capable of withstanding a drop of 4 feet without rupture of inner or outer containers. The tubes of the box may be eliminated and a single tube as specified in spec. 23F (§ 178.214 of this chapter) may be substituted. The completed package shall not contain more than 50 pounds net weight of black powder.

(3) Spec. 17E (§ 178.116 of this chapter). Metal drums (single-trip), not over 5 gallons capacity each, without opening except bunghole not exceeding 2.3 inches in diameter. Authorized for carload or truckload shipments only.

(c) Black pellet powder primed with an electric squib secured inside the coaxial hole of the pellet powder with loose ends of the wires of the squib effectively short-circuited may be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, or 16A (§§ 178.165, 178.168 or 178.185 of this chapter). Wooden boxes with inside cartridges which must be strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) ⅞ inch or more in diameter. Boxes must be lined as prescribed for cylindrical fiber cartridges. Gross weight not to exceed 65 pounds.

(d) Low explosives (not black powder) may in addition to the containers specified in paragraph (a) of this section, be shipped in containers complying with the following specifications:

(1) Spec. 14, 15A, or 16A (§§ 178.165, 178.168, or 178.185 of this chapter). Wooden boxes with inside containers which must be strong paper bags of capacity not exceeding 25 pounds. Gross weight of spec. 14 box must not exceed 140 pounds. Gross weight of spec. 15A or 16A box must not exceed 200 pounds.

(2) Spec. 12H, 23F, or 23H (§ 178.209, § 178.214, or § 178.219 of this chapter). Fiberboard boxes with inside containers which must be strong paper bags of capacity not exceeding 25 pounds. Gross weight must not exceed 65 pounds.

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(3) Spec. 15A (§ 178.168 of this chapter). Wooden boxes, lined, spec. 2L (§ 178.30 of this chapter). Authorized only for low explosives in the form of hard nonplastic rods or cylinders not less than ⅝-inch diameter.

(e) Each outside package must be plainly marked, stamped, or stenciled "Black Powder," or "Low Explosives," and may also show "Blasting," rifle," etc., as "Black Blasting Powder," "Black Rifle Powder," "Low Blasting Explosive" or "Black Pellet Powder," as the case may be.

(1) Inside containers of over 1½ pounds capacity each in boxes, must be packed with filling holes up, and the boxes must be marked on top "THIS SIDE UP."

(2) Additional marks, trade names, etc., may appear if desired, but such additional marking must not be more conspicuous than nor obscure the marking prescribed herein.

(f) Black powder and low explosives must not be offered for transportation by rail express, except as provided in § 173.86 and § 175.675 of this chapter.

§ 173.86 New explosives and samples for laboratory examination.

(a) New explosives including fireworks and explosive devices, other than Army, Navy, or Air Force explosive or chemical ammunition of a security classification, must be examined and approved by either the Bureau of Explosives or the Department of Defense as safe for transportation before being offered for shipment except that a sample of such explosives, fireworks, and explosive devices, not to exceed five pounds net weight, may be offered for transportation by carriers by rail freight, highway, or water for this examination. Except for shipments of sample quantities as provided for in this section, a written notification of the classification and approval accompanied by a supporting laboratory report or equivalent data must be filed with the Department before the new explosive or explosive device is offered for shipment. Samples of explosives, except liquid nitroglycerin, other than new explosives for laboratory examination not exceeding 5 pounds net weight, may be offered for transportation by carriers by rail freight, highway, or water. For the purpose of Parts 170–189 of this chapter, a new explosive, including fireworks and explosive devices, is the product of a new factory or an explosive or explosive device of an esentially new composition or character made by any factory.

(b) Before being offered for shipment, explosive articles in the experimental state must be made safe by removal of ignition elements or otherwise.

(c) Shipments of samples of explosives, fireworks, and explosive devices must be packaged, marked, and labeled (see paragraph (d)(6) of this section), and described as required by this part for the explosive contained therein.

(1) If the explosive in the sample has not been examined and approved as required by paragraph (a) of this section, a tentative classification must be assigned by:

(i) The Bureau of Explosives for other than military explosives, and

(ii) The Department of Defense (Army Material Command—AMCSF; Naval Ordnance Systems Command—ORD–048; HQ USAF, IGD/SEOE) for military explosives.

(d) *Samples of explosives and explosive articles for transportation by rail freight, rail express, or highway.* Samples of explosives (except liquid nitroglycerin), including fireworks and explosive devices for examination in a laboratory only and not intended for use or demonstration, may be offered for transportation by rail freight, rail express, or highway provided they fulfill the following requirements:

(1) Samples of explosives including fireworks and explosive devices for laboratory examination must be packed in well-secured metal cans, glass bottles, rubber containers, or compatible plastic containers not subject to static generation by contained products, or in strong water-proof paper or cardboard packages; each sample must consist of not more than one-half pound of explosive, and the interior package must be placed in sawdust or similar cushioning material, at least 2 inches thick, in a wooden box, spec. 14 or 15A (§§ 178.165 or 178.168 of this chapter).

(2) Whenever these samples of explosives for laboratory examination are contained in a metal envelope or receptacle, this receptacle must be properly cushioned with sawdust or similar cushioning material in a strong wooden box, and this interior box must be packed in a wooden box, spec. 14 or 15A (§§ 178.165 or 178.168 of this chapter), with at least 2 inches of cushioning material separating the boxes.

(3) Not more than 100 blasting caps may be shipped in one outside package for laboratory examination, and they must be packed and cushioned as provided in paragraph (d) (2) of this section.

(4) Not more than 20 half-pound samples of explosives for laboratory examination may be packed in one outside package or transported in a single car or vehicle at one time.

(5) The net weight of the explosive contents must be plainly marked by the shipper on the outside of each box offered for transportation.

(6) Each package containing a sample of an explosive for laboratory examination must be clearly marked on the outside of the package with the words "Sample for Laboratory Examination," and labeled in accordance with § 173.402 of this subchapter.

[29 F.R. 18683, Dec. 29, 1964, as amended by Amdt. 173–6, 34 FR 7160, May 1, 1969; Amdt. 173–70, 38 FR 5308, Feb. 27, 1973]

§ 173.87 Explosives in mixed packing.

(a) Unless specifically authorized by Parts 170–189 of this chapter, explosives must not be packed in this same outside package with each other or with other articles. Explosives, except blasting caps and other initiating explosives, in separate interior containers, may be shipped when packed in the same outside package of gross weight not exceeding 50 pounds, provided the weight of any interior package of explosives does not exceed 8 ounces, and provided the interior packages are so cushioned and protected as to insure their transportation without rupture or leakage of contents. The package must be marked and described with the name of the most dangerous explosive included such as "HIGH EXPLOSIVE", or "BLACK POWDER".

§ 174.501 Acceptable articles.

(a) Explosives, including samples of explosives and explosive articles not exceeding 5 pounds net weight and other hazardous materials may be accepted and transported, provided they are in proper condition and are certified for transportation by rail, highway, or water. Articles must be loaded, stayed, and handled in transit according to regulations applying to service or services used. Methods of manufacture, packing, and storage, in so far as they affect safety in transportation, must be open to inspection by a duly authorized representative of the initial carrier or by the Bureau of Explosives. Shipments of explosives or other dangerous articles not in proper condition for transportation, or loaded or stayed as required, or certified as to proper packing, marking and description as required in Parts 170–189 of this chapter, must not be accepted for transportation or transported.

§ 174.502 Forbidden explosives.

(a) The acceptance of the following articles for transportation by common carrier by rail freight, is forbidden:

(1) Diazodinitrophenol, dry.

(2) Dynamite, except gelatin dynamite, containing over 60 percent of liquid explosive ingredient.

(3) Dynamite having an unsatisfactory absorbent, or one that permits leakage of a liquid explosive ingredient under any conditions liable to exist during transportation or storage.

(4) Explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(5) Explosives containing an ammonium salt and a chlorate.

(6) Explosives condemned by the Bureau of Explosives (except properly packaged samples for laboratory examinations).

(7) Explosives not packed, marked described, and certified, in accordance with Parts 170–189 of this chapter.

(8) New explosives except as provided in § 173.86 of this chapter.

(9) Condemned or leaking dynamite must not be repacked and offered for shipment unless the repacking is done by a competent person in the presence of or with the written consent of, an inspector, or with the written authority of the chief inspector, of the Bureau of Explosives.

(10) Leaking or damaged packages of explosives must not be accepted for transportation or transported by rail. Should any package of high explosives when offered for shipment show excessive dampness or be moldy or show out-

ward signs of any oily stain or other indication that absorption of the liquid part of the explosive is not perfect, or that the amount of the liquid part is greater than the absorbent can carry, the package must be refused in every instance. The shipper must substantiate any claim that a stain is due to contact with material other than the liquid explosive ingredient of an explosive. In case of doubt the package must be rejected.

(11) Firecrackers, flash crackers, or salutes, the explosive contents of which exceed 12 grains each in weight.

(12) Fireworks that combine an explosive and a detonator or blasting cap.

(13) Fireworks containing an ammonium salt and a chlorate.

(14) Fireworks containing yellow or white phosphorus.

(15) Fireworks or fireworks compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 75° C. (167° F.).

(16) Fireworks properly condemned by the Bureau of Explosives, except properly repacked samples for laboratory examinations.

(17) Toy caps containing more than an average of twenty-five hundredths of a grain of explosive composition per cap.

(18) Toy torpedoes the maximum outside dimension of which exceeds 7/8 inch, or toy torpedoes containing a mixture of potassium chlorate, black antimony and sulfur with an average weight of explosive composition in each torpedo exceeding four grains.

(19) Toy torpedoes containing a cap composed of a mixture of red phosphorus and potassium chlorate exceeding an average of one-half (0.5) grain per cap.

(20) Fulminate of mercury, dry.

(21) Guanyl nitrosamino guanylidene hydrazine, dry.

(22) Lead azide, dry.

(23) Lead styphnate (lead trinitroresorcinate), dry.

(24) Nitroglycerin, liquid.

(25) Nitro mannite, dry.

(26) Nitrosoguanidine, dry.

(27) Pentaerythrite tetranitrate, dry.

(28) Tetrazene (guanyl nitrosamino guanyl tetrazene), dry.

(29) Fireworks containing copper sulfate and a chlorate.

[29 F.R. 18774, Dec. 29, 1964, as amended by Order 67, 30 F.R. 7423, June 5, 1965]

§ 175.651 Acceptable articles.

(a) Hazardous materials, except such as will not be accepted, may be offered for transportation to rail express carriers engaged in interstate or foreign commerce and transported, provided they are in proper condition for transportation and are certified that the regulations in Parts 170–189 of this chapter have been complied with, and provided their method of manufacture, packing and storage, so far as they affect safe transportation, are open to inspection by a duly authorized representative of the initial carrier or of the Bureau of Explosives. Shipments of explosives or other dangerous articles not in proper condition for transportation, or loaded or stayed as required or certified as to proper packing, marking and description as required in Parts 170–189 of this chapter must not be accepted for transportation or transported.

§ 175.652 Application.

(a) Parts 170–189 of this chapter apply to all shipments of hazardous materials as defined in Part 173 of this chapter including carriers' materials and supplies.

§ 175.675 Explosives via Railway Express Agency, Inc.

(a) Except as provided in this section shipments of explosives may be tendered for transportation by Railway Express Agency in passenger or express train service only when the Department finds that an emergency requires such expedited movement. Emergency shipments shall be subject to regulations which the Department deems advisable or necessary in the interest of the public in each emergency:

Exception No. 1. Samples of explosives for laboratory examination, fireworks, or other similar authorized explosives may continue to be transported in passenger or express train service, subject to the published regulations. (See §§ 172.5 and 173.86(d) of this chapter.)

Exception No. 2. In time of war or of national emergency proclaimed by the President, shipments of explosives by, for or to the Armed Forces of the United States of America may be tendered for transportation in passenger or express train service when such shipments comply with the special regulations furnished to the Department of Defense, Railroads and the Railway Express Agency, Incorporated.

§ 177.823 Required exterior marking on motor vehicles and combinations.

(a) Every carrier operating, hauling, or in any manner using, a motor vehicle or trailer containing any hazardous material as specified in pararaphs (a)(1) and (b) of this section shall cause every motor vehicle, trailer, or combination vehicle, at all times while containing such explosive or other dangerous article, or combination of such articles, to display markings or placards in accordance with the following requirements.

(1) The marking or placards required to be displayed on each motor vehicle or trailer shall be as follows:

Commodity	*Type of marking or placard*
Explosives, class A, any quantity or a combination of class A and class B explosives.	EXPLOSIVES A (Red letters on white background).
Explosives, class B, any quantity	EXPLOSIVES B (Red letters on white background).
Poison, class A, any quantity; Poison, class B, 1000 pounds or more gross weight.	POISON (Blue letters on white background).
Flammable liquid, 1000 pounds or more gross weight; flammable solid, 1000 pounds or more gross weight.	FLAMMABLE (Red letters on white background).
Oxidizing material—1000 pounds or more gross weight.	OXIDIZERS (Yellow letters on black background).
Nonflammable compressed gas—1000 pounds or more gross weight.	COMPRESSED GAS (Green letters on white background).
Corrosive liquid—1000 pounds or more gross weight.	CORROSIVES (Blue letters on white background).
Flammable compressed gas—1000 pounds or more gross weight.	FLAMMABLE GAS (Red letters on white background).
Radioactive material requiring "radioactive yellow-III" label, any quantity (see § 173.414(d)).	RADIOACTIVE (Black letters on yellow background).
Mixed ladings—see paragraph (a)(4) of this section.	DANGEROUS (Red letters on white background).

(2) Each marking or placard shall consist of letters not less than 4 inches high, in the color specified, using approximately a ⅝-inch stroke. The placard must be larger than the lettering required thereon by at least 1 inch at the top and bottom sides. Such marking or placard described in subparagraph (a)(1) shall be contained in an area on the vehicle which has no other marking, lettering, or graphic display, for at least 3 inches in each direction, except as specified in paragraphs (a)(4) and (c) of this section.

(3) Such markings or placards shall be displayed at the front, rear, and on each side of the motor vehicle or trailer, or other cargo carrying body while it contains hazardous material of such type and in such quantity as specified in paragraphs (a)(1), (b), and (c) of this section. The front marking or placard may be displayed on the front of either the truck, truck body, truck tractor or the trailer.

(4) Any motor vehicle, trailer, or other cargo-carrying body containing more than one kind of hazardous material requiring different placards under the provisions of subparagraph (a)(1) of this paragraph, the aggregate gross weight of which totals 1,000 pounds or more, must be marked or placarded "DANGEROUS" instead of being marked or placarded as required by that subparagraph. Any such vehicle which contains any quantity of explosives class A, explosives class B, poison class A, or radioactive materials requiring labeling as described in § 173.416(c) of this subchapter, must display the marking or placard "EXPLOSIVES A," "EXPLOSIVES B," "POISON," or "RADIOACTIVE," as appropriate, in addition to the marking or placard "DANGEROUS." If explosives class A and explosives class B are loaded on the same vehicle, the "EXPLOSIVES B" marking need not be displayed.

(5) In any combination of two or more vehicles containing hazardous materials each vehicle shall be marked or placarded as to its contents and in accordance with paragraphs (a)(1) and (a)(4) of this section.

(b) Tank motor vehicles:

(1) Every tank motor vehicle or tank trailer used for the transportation of any hazardous material, regardless of quantity or whether loaded or empty, shall be marked or placarded in accordance with the requirements of paragraph (a) of this section except as otherwise provided in subparagraphs (2), (3), and (4) of this paragraph: *Provided, however*, That no such marking or placard shall be displayed during such time as such vehicle or trailer is laden only with a commodity not classified as a dangerous article.

(2) Tank motor vehicles transporting gasoline may be marked or placarded "GASOLINE" in lieu of the required "FLAMMABLE" marking or placard and in the same size and color as required for the "FLAMMABLE" marking or placard.

(3) Tank motor vehicles transporting any flammable compressed gas shall be marked in leters at least 4 inches high with the words "FLAMMABLE GAS" or "FLAMMABLE COMPRESSED GAS". In addition, the common name of the contents shall be marked on the tank in letters at least 2 inches high using approximately a ¼-inch stroke, in colors specified in paragraph (a)(1) of this section.

(4) Tank motor vehicles transporting any nonflammable compressed gas shall be marked in letters not less than 4 inches with the words, "COMPRESSED GAS". In addition, the common name of the contents shall be marked on the tank in letters at least 2 inches high using approximately a ¼-inch stroke, in the colors specified in paragraph (a)(1) of this section.

(5) Specifications MC 330 and MC 331 cargo tanks shall be durably marked in letters at least two inches high in the area immediately adjacent to the identification plate, "QT" to indicate construction of quenched and tempered steel or "NQT" to indicate construction of other than quenched and tempered steel.

(c) In addition to displaying the marking or placards required by paragraphs (a) and (b) of this section, a carrier shall display markings or placards reading "CARGO FIRE—AVOID WATER" or words of similar meaning that denote the incompatibility of water with the lading, in letters at least 2 inches high, when such wording is specified or requested by the shipper on the shipping papers, or when the carrier knows that such warning is appropriate. Such wording shall be displayed immediately adjacent to all required marking or placards on the truck, trailer or trailers containing the commodity involved.

(d) The marking or placarding required by this section shall be removed from or covered on any motor vehicle to which it is attached when such vehicle does not contain the article for which the marking is required, except in the case of tank motor vehicles used exclusively for transportation of the article for which such marking is required.

[Order 69, 31 F.R. 11550, Sept. 1, 1966, as amended by Amdt. 177–1, 33 F.R. 2389, Jan. 31, 1968; Amdt. 177–3, 33 F.R. 14933, Oct. 4, 1968, Amdt. 177–24, 38 F.R. 5315, Feb. 27, 1973]

§ 177.834 General requirements.

(a) *Containers secured in vehicle.* Any tank, barrel, drum, or cylinder, not designed to be permanently attached to a motor vehicle, containing any flammable liquid, compressed gas, corrosive material, or poisonous article, must be reasonably secured against movement within the motor vehicle by which it is being transported.

(b) *No hazardous materials on pole trailers.* No hazardous materials may be loaded into or on or transported in or on any pole trailer.

(c) *No smoking while loading or unloading.* Smoking on or about any motor vehicle while loading or unloading any explosive, flammable liquid, flammable solid, oxidizing material, or flammable compressed gas is forbidden.

(d) *Keep fire away, loading and unloading.* Extreme care shall be taken in the loading or unloading of any explosive, flammable liquid, flammable solid, oxidizing material, or flammable compressed gas into or from any motor vehicle to keep fire away and to prevent persons in the vicinity from smoking, lighting matches, or carrying any flame or lighted cigar, pipe, or cigarette.

(e) *Handbrake set while loading and unloading.* No hazardous material shall be loaded into or on, or unloaded from, any motor vehicle unless the handbrake

be securely set and all other reasonable precautions be taken to prevent motion of the motor vehicle during such loading or unloading process.

(f) *Use of tools, loading and unloading.* No tools which are likely to damage the effectiveness of the closure of any package or other container, or likely adversely to affect such package or container, shall be used for the loading or unloading of any explosive or other dangerous article.

(g) *Prevent relative motion between containers.* Containers of explosives, flammable liquids, flammable solids, oxidizing materials, corrosive materials, compressed gases, and poisonous liquids or gases, must be so braced as to prevent motion thereof relative to the vehicle while in transit. Containers having valves or other fittings must be so loaded that there will be the minimum likelihood of damage thereto during transportation.

(h) *Precautions concerning containers in transit: Fueling road units.* Reasonable care should be taken to prevent undue rise in temperature of containers and their contents during transit. There must be no tampering with such container of the contents thereof nor any discharge of the contents of any container between point of origin and point of billed destination. Discharge of contents of any container, other than a cargo tank, must not be made prior to removal from the motor vehicle. Nothing contained in this paragraph shall be so construed as to prohibit the fueling of machinery or vehicles used in road construction or maintenance.

(i) *Tank motor vehicles attended, loading and unloading.* Under no circumstances shall a tank motor vehicle be left unattended during the loading or unloading process. For the purpose of this part, the delivery hose, when attached to the motor vehicle, shall be deemed a part thereof.

(j) *Prohibited loading combinations.* In any single driven motor vehicle or in any single unit of a combination of motor vehicles, hazardous materials shall not be loaded together if prohibited by loading and storage chart, § 177.848. This section shall not be so constructed as to forbid the carrying of materials essential to safe operation of motor vehicles. (See Motor Carrier Safety Regulations, Part 393 of this chapter.)

(k) *Access to mixed ladings.* Flammable solids, oxidizing materials, or corrosive liquids, when transported on a motor vehicle with other lading not otherwise forbidden, shall be so loaded as to provide ready access thereto for shifting or removal.

(l) *Truck bodies or trailers equipped with heaters or automatic refrigeration apparatus.* Except as provided in subparagraph (1) of this paragraph flammable liquids and flammable gases must not be loaded in truck bodies or trailers equipped with heaters or automatic refrigerating apparatus unless the automatic apparatus is rendered inoperative. The fuel tanks for such apparatus must be empty or removed from the vehicle, except that liquefied petroleum gas fuel tanks exterior to the vehicle body may have their valves closed and disconnected from the fuel feed lines in place of being emptied or removed.

(1) This prohibition does not apply, and heating or refrigeration apparatus may be operated on motor vehicles loaded with flammable liquids and flammable gases, when the lading space is equipped with no electrical apparatus other than of nonsparking or explosion-proof types, no combustion apparatus in the lading space, and no connection for return of air from the lading space to any combustion apparatus. The heating system must be such that no part of the lading is heated over 130° F., and conform to § 293.77 of this chapter.

(m) Tanks constructed and maintained in compliance with spec. 106A or 110A (§§ 179.300, 179.301) that are authorized for the shipment of hazardous materials by highway in Part 173 of this chapter must be carried in accordance with the following requirements:

(1) Tanks must be securely chocked or clamped on vehicles to prevent any shifting.

(2) Equipment suitable for handling a tank must be provided at any point where a tank is to be loaded upon or removed from a vehicle.

(3) No more than two cargo carrying vehicles may be in the same combination of vehicles.

(4) Compliance with § 174.560 of this chapter for combination rail freight, highway shipments and §§ 174.532 and 174.533 of this chapter for trailer-on-flat-car service is required.

(n) Specification 56 or 57 (§§ 178.251, 178.252, 178. 253 of this chapter) portable tanks containing hazardous materials may not be stacked on each other nor may any other freight be stacked on them during transportation.

(18 U.S.C. 831–835; sec. 9, 49 U.S.C. 1657) [29 F.R. 18795, Dec. 29, 1964. Redesignated at 32 F.R. 5606, Apr. 5, 1967, and amended by Amdt. 177–10, 35 F.R. 1109, Jan. 28, 1970; Amdt. 177–17, 36 F.R. 18469, Sept. 15, 1971; Amdt. 177–60, 37 F.R. 2886, Feb. 9, 1972; Amdt. 177–21, 37 FR 5950, Mar. 23, 1972; Amdt. 177–24, 38 F.R. 5313, Feb. 27, 1973]

§ 177.835 Explosives.

(See also § 177.834 (a) to (k).)

(a) *Engine stopped.* No explosives shall be loaded into or on or be unloaded from any motor vehicle with the engine running.

(b) *Care in loading, unloading, or other handling of explosives.* No bale hooks or other metal tools shall be used for the loading, unloading, or other handling of explosives, nor shall any package or other container of explosives, except barrels or kegs, be rolled. No packages of explosives shall be thrown or dropped during process of loading or unloading or handling of explosives. Special care shall be exercised to the end that packages or other containers containing explosives shall not catch fire from sparks or hot gases from the exhaust tailpipe.

(1) Whenever tarpaulins are used for covering explosives, they shall be secured by means of rope or wire tie downs. Explosives placards or markings required by § 177.823 shall be secured, in the appropriate locations, directly to the equipment transporting the explosives. If the vehicle is provided with placard boards, the placards must be applied to these boards.

(c) *Explosives on vehicles in combination.* Class A explosives may not be loaded into or carried on any vehicle of a combination of vehicles if:

(1) More than two cargo carrying vehicles are in the combination;

(2) Any full trailer in the combination has a wheel base of less than 184 inches;

(3) Any vehicle in the combination is a tank motor vehicle which is required to be marked or placarded under § 177.823, or

(4) The other vehicle in the combination contains any:

(i) Initiating explosive,

(ii) Packages of radioactive materials bearing "Yellow III" labels.

(iii) Class A or B poisons, or

(iv) Hazardous materials in a portable tank or a DOT specification 106A or 110A tank.

(d) [Reserved]

(e) *No sharp projections inside body of vehicles.* No motor vehicle transporting any kind of explosive shall have on the interior of the body in which the explosives are contained, any inwardly projecting bolts, screws, nails, or other inwardly projecting parts likely to produce damage to any package or container of explosives during the loading or unloading process or in transit.

(1) All fuel tanks for heaters or refrigerating machinery with which truck bodies or trailers are equipped shall be drained and all automatic heating or refrigerating machinery shall be rendered inoperative by disconnection of the automatic controls or the source of power for their operation.

(f) *Explosives vehicles, floors tight and lined.* Motor vehicles transporting class A or class B explosives shall have tight floors, shall have that portion of the interior in contact with the load lined with either non-metallic material or non-ferrous metals, except that the lining is not required for truck load shipments loaded by the Departments of the Army, Navy or Air Force of the United States Government provided the explosives are of such nature that they are not liable to leakage of dust, powder, or vapor which might become the cause of an explosion. The interior of the cargo space must be in good condition so that there will not be any likelihood of containers being damaged by exposed bolts, nuts, broken side panels or floor boards or any similar projections.

(g) No blasting cap, regardless of type, may be transported on the same motor vehicle with any Class A or Class B explosive unless—

(1) It is packed in a specification MC 201 (§ 178.318 of this subchapter) container, or

(2) It is packed and loaded in accordance with a method approved by the Department. One method approved by the Department is as follows:

(i) The caps are packed in packagings prescribed in § 173.66(g) of this subchapter which in turn are loaded into portable containers or separate compartments meeting the requirements of the Institute of Makers of Explosives' Standard entitled "IME Standard for the Safe Transportation of Electric Blasting Caps in the Same Vehicle With Other Explosives," dated November 5, 1971 (IME Safety Library Publication No. 22).

(h) *Lading within body or covered tailgate closed.* Except as provided in paragraphs (g), (k) and (m) of this section, dealing with the transportation of liquid nitroglycerin desensitized liquid nitroglycerin or diethylene glycol dinitrate, other than as defined in § 173.53(e) of this chapter, all of that portion of the lading of any motor vehicle which consists of explosives shall be contained entirely within the body of the motor vehicle or within the horizontal outline thereof, without overhang or projection of any part of the load and if such motor vehicle has a tailboard or tailgate, it shall be closed and secured in place during such transportation. Every motor vehicle transporting explosives must either have a closed body or have the body thereof covered with a tarpaulin, and in either event care must be taken to protect the load from moisture and sparks, except that subject to other provisions of these regulations explosives other than black powder may be transported on flat-bed vehicles if the explosive portion of the load on each vehicle is packed in fire and water resistant containers or covered with a fire and water resistant tarpaulin.

(i) *Explosives to be protected against damage by other lading.* No motor vehicle transporting any explosive may transport as a part of its load any metal or other articles or materials likely to damage such explosive or any package in which it is contained, unless the different parts of such load be so segregated or secured in place in or on the motor vehicle and separated by bulkheads or other suitable means as to prevent such damage.

(j) *Transfer of explosives en route.* No class A or class B explosive shall be transferred from one container to another, or from one motor vehicle to another vehicle, or from another vehicle to a motor vehicle, on any public highway, street, or road, except in case of emergency. In such cases red electric lanterns, red emergency reflectors or red flags shall be set out in the manner prescribed for disabled or stopped motor vehicles. (See Motor Carrier Safety Regulations, Part 392 of this chapter.) In any event, all practicable means, in addition to these hereinbefore prescribed, shall be taken to protect and warn other users of the highway against the hazard involved in any such transfer or against the hazard occasioned by the emergency making such transfer necessary.

(k) *Loading requirements for liquid nitroglycerin, desensitized liquid nitroglycerin, or diethylene glycol dinitrate.* Liquid nitroglycerin, desensitized liquid nitroglycerin, or diethylene glycol dinitrate, other than as defined in § 173.53(e) of this chapter, may be accepted for transportation and transported only by motor carriers other than common carriers if it be loaded into or on a truck having the type of body specified in spec. MC200 (§ 178.315 of this chapter). No liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate may be loaded directly above any other explosive, or in any quantity in excess of 900 quarts on one motor vehicle or 10 quarts in any one individual container. Additional quantities of explosives, other than nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, excepting any type of blasting or percussion cap or other detonating device, may be carried on such motor vehicle in a closed or covered bed or body which shall be firmly bolted or fastened above the lid of the compartment containing the nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate. In no case shall the net load be more than 7,500 pounds. (See paragraph (m) of this section and spec. MC201 (§ 178.318 of this chapter).

(l) *Separation of tools and supplies for preparing charges.* Motor vehicles transporting liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, may also transport the tools and supplies necessary for preparing and firing charges thereof: *Provided,* That such tools and supplies be properly secured in place so as to prevent their coming in contact with the body above specified.

(m) *Caps or other explosives.* Any explosive, including desensitized liquid explosives as defined in § 173.53(e) of this subchapter, other than liquid nitroglycerin, desensitized liquid nitroglycrein or diethylene glycol dinitrate, transported on any motor vehicle transporting liquid nitroglycerin, desensitized liquid nitroglycerin or diethylene glycol dinitrate, must be segregated, each kind from every other kind, and from tools or other supplies. Blasting caps must be packed in specification MC 201 (§ 178.318 of this subchapter) containers.

[29 FR 18795, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967 and amended by Amdt. 177–17, 36 FR 18469, Sept. 15, 1971; Amdt. 177–22, 37 FR 21531, Oct. 12, 1972]

Subpart C—Loading and Storage Chart of Hazardous Materials

§ 177.848 Loading and storage chart of hazardous materials.

(a) Hazardous materials must not be loaded, transported or stored together, except as provided in the Loading and Storage Chart of Hazardous Materials shown in this section.

The following table shows the hazardous materials which must not be loaded or stored together. The letter X at an intersection of horizontal and vertical columns shows that these articles must not be loaded or stored together, for example: Detonating fuzes class A, with or without radioactive components X horizontal column must not be loaded or stored with high explosives or propellant explosives, class A b vertical column.		a	b	c	d	e	f	g	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Low explosives or black powder	High explosives or propellant explosives, class A	Initiating or priming explosives, wet: Diazodinitrophenol, fulminate of mercury, or pentaerythrite tetranitrate	Blasting caps, with or without safety fuse (including electric blasting caps), detonating primers	Ammunition for cannon with explosive projectiles, ans projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles or shell; ammunition for small arms with incendiary projectiles; ammunition for small arms with explosive projectiles; rocket ammunition with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles; boosters (explosive); bursters (explosive); and supplementary charges (explosive) without detonators [4]	Explosive projectiles; bombs; torpedoes; mines; rifle or hand grenades (explosive); jet thrust units (jato), class A; igniters, jet thrust, class A; rocket motors, class A; igniters, rocket motor, class A [4]	Detonating fuzes, class A, with or without radioactive components	Ammunition for cannon with empty, inert-loaded or solid projectiles, or without projectiles; rocket ammunition with empty, inert-loaded or solid projectiles	Propellant explosives, class B; jet thrust units (jato), class B; igniters, jet thrust, class B; rocket motors, class B; rocket engines (liquid), class B; igniters, rocket motor, class B; starter cartridges, jet engine, class B	Fireworks, special or railway torpedoes	Small arms ammunition, or cartridges, practice ammunition.	Primers for cannon or small arms, empty cartridge bags—black powder igniters, empty cartridge cases, primed, empty grenades, primed, combination primers or percussion caps, toy caps, explosive cable cutters, explosive rivets	Percussion fuzes, tracer fuzes or tracers	Time, combination or detonating fuzes, class C	Cordeau detonant fuse, safety squibs, fuse lighters, fuse igniters, delay electric igniters, electric squibs, instantaneous fuse or igniter cord	Fireworks, common,	Flammable liquids or flammable gases; Flammable liquid or flammable gas label.	Flammable solids or oxidizing materials; Flammable solid, oxidizer, or organic peroxide label.	Corrosive liquids; Corrosive label.	Nonflammable gases; Nonflammable gas label.	Poisonous gases or liquids, in tank car tanks, cylinders, projectiles or bombs, poison gas label	Radioactive materials
CLASS A EXPLOSIVES																							
Low explosives or black powder	(*)			X													X	X	X	X	X	X	
High explosives or propellant explosives, class A	(*)			X	X*												X	X	X	X	X	X	X*
Initiating or priming explosives, wet: Diazodinitrophenol, fulminate of mercury, or pentaerythrite tetranitrate																							

§ 178.30 Specification 2L lining for boxes.

§ 178.30–1 Box lining.

(a) Box lining must be of strong paraffined paper, or other suitable material, without joints or other openings at the bottom or at sides of box, and shall fully protect contents in contact with top of box.

(b) Tensile strength of material must be at least 35 pounds with the grain and 17 pounds across grain, tested by direct pull on strips measuring 3" by 1". Average results of three or more tests with the grain and three or more across grain shall be used.

(c) Material shall be impervious to water and nitroglycerin at 77° F. Test for imperviousness shall consist of folding material into cones, loosely to avoid breakage at creases. Cones tested for nitroglycerin shall be filled to 1" depth; those for water to 2". No leakage of liquid shall occur during 24 hours' exposure.

(d) Material must transmit no oily or greasy stain to unglazed paper. Test shall consist of placing one thickness of material, with two thicknesses of unglazed paper on each side, in an oven at 104° F. for 24 hours, under pressure of a lead disk 1½" thick and of 10 pounds weight resting edgewise on the paper.

(e) Saturating paraffin, when used, shall have melting point at 125° F. or above. Test shall consist of extracting paraffin from 1 ounce or more of material with ether. After evaporation of all ether, paraffin shall be melted and poured upon the surface of water contained in a hemispherical dish approximately 3¾" in diameter. Dish shall be three-fourths full of water above melting point of paraffin. Thermometer shall be placed with bulb three-fourths immersed in center of dish. Water and paraffin shall be allowed to cool until paraffin upon the surface of water commences to solidify. Temperature shall then be read and recorded as melting point of paraffin.

§ 178.30–2 Bag.

(a) Bag complying with requirements of paragraphs (b), (c), and (d) of this section also authorized.

(b) Material must be: 2 sheets of shipping sack Kraft paper joined by asphaltum, or equivalent; outer sheet at least 80 pounds and inner sheet at least 80 pounds per ream (500 sheets 24" x 36"); inner sheet coated with wax, or equivalent, with melting point at least 125° F. compliance with § 178.30–1 (b) and (c) required.

(c) Seams must be pasted with adhesive not affected by nitroglycerin.

(d) Completed bag must be formed to fit outside container without undue strain and must be impervious to seepage of nitroglycerin.

§ 178.40 Specification 3C; seamless steel cylinders.

§ 178.40–1 Compliance.

(a) Required in all details.

§ 178.40–2 Type, size, and service pressure.

(a) *Type and size.* Seamless; not over 1,000 pounds water capacity (nominal).

(b) *Service pressure.*[1] At least 90 to not over 300 pounds per square inch.

§ 178.40–3 Inspection by whom and where.

(a) By competent inspector; chemical analyses and tests, as specified, to be made within limits of the United States. Interested inspectors are authorized.

§ 178.40–4 Duties of inspector.

(a) Inspect all material and reject any not complying with requirements; for cylinders made by billet-piercing process, billets to be inspected after nick and cold break.

(b) Verify chemical analysis of each heat of material by analysis or by obtaining certified analysis: *Provided*, That a certificate from the manufacturer thereof, giving sufficient data to indicate compliance with requirements, is acceptable when verified by check analyses of samples taken from one cylinder out of each lot of 200 or less.

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[1] The "service pressure" limits the use of the cylinder. It is shown by marks on cylinder; for example, DOT–3C300 indicates the service pressure as 800 pounds per square inch.

(c) Verify compliance of cylinders with all requirements including markings; inspect inside before closing in both ends; verify heat treatment as proper; obtain samples for all tests and check chemical analyses; witness all tests; verify threads by gauge; report volumetric capacity and tare weight (see report form) and minimum thickness of wall noted.

(d) Render complete report (§ 178.40–22) to purchaser, cylinder maker, and the Bureau of Explosives.

§ 178.40–5 Steel.

(a) Open-hearth or electric steel of uniform quality. Content percent for the following not over: Carbon, 0.55; phosphorus, 0.045; sulphur, 0.050.

§ 178.40–6 Identification of material.

(a) Required; any suitable method except that plates and billets for hotdrawn cylinders shall be marked with heat number.

§ 178.40–7 Defects.

(a) Material with seams, cracks, laminations, or other injurious defects, not authorized.

§ 178.40–8 Manufacture.

(a) By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection; no fissure or other defect acceptable that is likely to weaken the finished cylinder appreciably; reasonably smooth and uniform surface finish required. If not originally free from such defects, the surface may be machined or otherwise treated to eliminate these defects. The thickness of the bottoms of cylinders welded or formed by spinning is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thickness to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

§ 178.40–9 Welding or brazing.

(a) Welding or brazing for any purpose whatsoever is prohibited except as follows:

(1) Welding or brazing is authorized for the attachment of neckrings and footrings which are non-pressure parts, and only to the tops and bottoms of cylinders having a service pressure of 500 pounds per square inch or less. Cylinders, neckings, and footrings must be made of weldable steel, carbon content of which must not exceed 0.25 percent except in the case of 4130X steel which may be used with proper welding procedure.

(2) As permitted in § 178.40–8.

§ 178.40–10 Wall thickness.

(a) The wall stress shall not exceed 24,000 pounds per square inch. Minimum wall 0.090'' for any cylinder over 5'' outside diameter.

(b) Calculation must be made by the formula:

$$S=\frac{P(1.3D^2+0.4d^2)}{D^2-d^2}$$

where

S=wall stress in pounds per square inch;
P=minimum test pressure prescribed for water jacket test or 450 pounds per square inch whichever is the greater;
D=outside diameter in inches;
d=inside diameter in inches.

§ 178.40–11 Heat treatment.

(a) The completed cylinders must be uniformly and properly heat-treated prior to tests.

§ 178.40–12 Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings

(a) Threads required, to be clean cut, even, without checks, and to gauge.

(b) Taper threads, when used, to be of length not less than as specified for American Standard taper pipe threads.

(c) Straight threads having at least 6 engaged threads are authorized; to have tight fit and calculated shear strength at least 10 times the test pressure of the cylinder; gaskets required, adequate to prevent leakage.

§ 178.40–13 Safety devices and protection for valves, safety devices, and other connections, if applied.

(a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g) of this chapter).

[29 F.R. 18826, Dec. 29, 1964, as amended by Amdt. 178–1, 33 F.R. 14934, Oct. 4, 1968]

§ 178.40–14 Hydrostatic test.

(a) By water-jacket, or other suitable method, operated so as to obtain accurate data. Pressure gauge must permit reading to accuracy of 1 percent. Expansion gauge must permit reading of total expansion to accuracy either of 1 percent or 0.1 cubic centimeter.

(b) Pressure must be maintained for 30 seconds and sufficiently longer to insure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test must not exceed 90 percent of the test pressure. If, due to failure of the test apparatus the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 pounds per square inch, whichever is the lower.

(c) Permanent volumetric expansion must not exceed 10 percent of total volumetric expansion at test pressure.

(d) Cylinders must be tested as follows: 1 cylinder out of each lot of 200 or less; to at least 3 times service pressure. Others must be examined under pressure of 2 times service pressure and show no defect. If tested cylinder fails each cylinder in the lot may be tested; those passing are acceptable.

§ 178.40–15 Flattening test.

(a) Between knife edges, wedge shaped, 60° angle, rounded to ½'' radius; test 1 cylinder[1] taken at random out of each lot of 200 or less, after hydrostatic test.

§ 178.40–16 Physical test.

(a) *To determine yield strength, tensile strength, elongation, and reduction of area of material.* Required on 2 specimens cut from 1[1] cylinder taken at random out of each lot of 200 or less.

(b) Specimens must be gauge length 8 inches with width not over 1½ inches or, gauge length 2 inches with width not over 1½ inches; *Provided*, That gauge length at least 24 times thickness with width not over 6 times thickness is authorized when cylinder wall is not over 3/16 inch thick. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold by pressure only, not by blows; when specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens. Heating of specimen for any purpose is not authorized.

(c) The yield strength in tension shall be the stress corresponding to a permanent strain of 0.2 percent of the gauge length.

(1) The yield strength shall be determined by either the "offset" method or the "extension under load" method as prescribed in ASTM Standard E8–57T.

(2) In using the "extension under load" method, the total strain (or "extension under load") corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations shall be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram shall be plotted and the yield strength determined from the 0.2 percent offset.

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[1] For lots of 30 or less physical and flattening tests are authorized to be made on a ring at least 8 inches long cut from each cylinder and subjected to same heat treatment as the finished cylinder.

(3) For the purpose of strain measurement, the initial strain shall be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator reading being set at the calculated corresponding strain.

(4) Cross-head speed of the testing machine shall not exceed ⅛ inch per minute during yield strength determination.

§ 178.40–17 Acceptable results for physical and flattening tests.

(a) Either of the following:

(1) Elongation at least 40 percent for 2 inch gauge length or at least 20 percent in other cases, yield strength not over 73 percent of tensile strength; flattening test not required.

(2) Elongation at least 20 percent for 2 inch gauge length or 10 percent in other cases; yield strength not over 73 percent of tensile strength; flattening required, without cracking; to 6 times wall thickness.

§ 178.40–18 Leakage test.

(a) All spun cylinders and plugged cylinders (see Notes 1 and 2) must be tested for leakage by gas or air pressure after the bottom has been cleaned and is free from all moisture. Pressure, approximately the same as but no less than service pressure, must be applied to one side of the finished bottom over an area of at least 1/16 of the total area of the bottom but not less than ¾ inch in diameter, including the closure, for at least one minute, during which time the other side of the bottom exposed to pressure must be covered with water and closely examined for indications of leakage. Leakers must be rejected. (See Note 1, § 178.40–19.)

NOTE 1: A spun cylinder is one in which an end closure in the finished cylinder has been welded by the spinning process.

NOTE 2: A plugged cylinder is one in which a permanent closure in the bottom of a finished cylinder has been effected by a plug.

NOTE 3: As a safety precaution, if the manufacturer elects to make this test before the hydrostatic test, he should design his apparatus so that the pressure is applied to the smallest area practicable, around the point of closure, and so as to use the smallest possible volume of air or gas.

§ 178.40–19 Rejected cylinders.

(a) Reheat treatment authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests. Repair by welding or spinning is not authorized.

NOTE 1: Spun cylinders rejected under the provisions of § 78.40–18 may be removed from the spun cylinder category by drilling to remove defective material, tapping and plugging.

§ 178.40–2 Marking.

(a) Marking on each cylinder by stamping plainly and permanently on shoulder, top head, or neck as follows:

(1) DOT–3C followed by the service pressure (for example DOT–3C300, etc.).

(2) A serial[1] number and an identifying symbol (letters); location[2] of number to be just below or immediately following the DOT mark; location[2] of symbol to be just below or immediately following the number. The symbol and numbers must be those of purchaser, user, or maker. The symbol must be registered with the Bureau of Explosives; duplications unauthorized.

Examples:

DOT–3C300
1234
XY
DOT–3C300–1234–XY

(3) Inspector's official mark near serial number; date of test (such as 5–50 for May 1950), so placed that dates of subsequent tests can be easily added; and word "*SPUN*" or "*PLUG*" near DOT mark when an end closure in the finished cylinder has been welded by the spinning process, or affected by plugging.

[29 F.R. 18826, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5749, Apr. 23, 1965]

§ 178.40–21 Size of marks.

(a) At least ¼" high if space permits.

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[1] Lot numbers, not over 500 cylinders in each lot, authorized for cylinders not over 2 inches outside diameter and for cylinders over 2 inches outside diameter when the volumetric capacity does not exceed 60 cubic inches.

[2] Symbol in front of or following the number with ample space between is also authorized. Other variation in location authorized only when necessitated by lack of space.

§ 178.40–22 Inspector's report.

(a) Required to be clear, legible, and in following form:

(Place)_____
(Date)_____

Gas cylinders

Manufactured for_____ Company
Location at_____
Manufactured by_____ Company
Location at_____
Consigned to_____ Company
Location at_____
Quantity _____
Size _____ inches outside diameter by_____
The material used was verified as to chemical analysis and record thereof is attached hereto. The heat numbers_____
(were—were not)

marked on the material.

All material, such as plates, billets and seamless tubing, was inspected and each cylinder was inspected both before and after closing in the ends; all that was accepted was found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processes of manufacture and heat treatment of cylinders were supervised and found to be efficient and satisfactory.

The cylinder walls were measured and the minimum thickness noted was _____ inch. The outside diameter was determined by a close approximation to be _____ inches. The wall stress was calculated to be _____ pounds per square inch under an internal pressure of _____ pounds per square inch.

Hydrostatic tests, flattening test, tensile tests of material, and other tests, as prescribed in specification No. DOT–3C were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification. Records thereon are attached hereto.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with the requirements of Department of Transportation specification No. 3C except as follows:

Exceptions: _____
_____
_____
_____

(Signed) _____
Inspector.

(Place)_____
(Date)_____

RECORD OF CHEMICAL ANALYSIS OF MATERIAL FOR CYLINDERS

Numbered_____ to _____ inclusive.
Size_____ inches outside diameter by _____ inches long
Made by _____ Company
For _____ Company

NOTE: Any omission of analyses by heats, if authorized, must be accounted for by notation hereon reading "The prescribed certificate of the manufacturer of material has been secured, found satisfactory, and placed on file," or by attaching a copy of the certificate.

Test No.	Heat No.	Check analysis No.	Cylinders represented (serial Nos.)	Chemical analysis						
				C	P	S	Si	Mn	Ni	Cr

The analyses were made by _____
(Signed)_____
(Place)_____
(Date)_____

RECORD OF PHYSICAL TESTS OF MATERIAL FOR CYLINDERS

Numbered _____ to _____ inclusive.
Size _____ inches outside diameter by _____ inches long
Made by _____ Company
For _____ Company

Test No.	Cylinders represented by test (Serial Nos.)	Yield strength (pounds per square inch)	Tensile strength (pounds per square inch)	Elongation (percent in 8 inches)	Reduction of area (percent)	Flattening test

(Signed) _____
(Place) _____
(Date) _____

RECORD OF HYDROSTATIC TESTS ON CYLINDERS

Numbered _____ to _____ inclusive.
Size _____ inches outside diameter by _____ inches long
Made by _____ Company
For _____ Company

Serial numbers of cylinders tested arranged numerically	Actual test pressure (pounds per square inch)	Total expansion (cubic centimeters) [1]	Permanent expansion (cubic centimeters) [1]	Percent ratio of permanent expansion to total expansion [1]	Tare weight (pounds) [2]	Volumetric capacity [3]

NOTE: When specifications require test for only 1 out of each lot of 200 or less cylinders, the check on the others must be indicated by a notation hereon reading, "Each cylinder was subjected to a pressure of _____ pounds per square inch and showed no defect."

[1] If the tests are made by a method involving the measurement of the amount of liquid forced into the cylinder by the test pressure, then the basic data, on which the calculations are made, such as the pump factors, temperature of liquid, coefficient of compressiblity of liquid, etc., must also be given.
[2] Do not include removable cap but state whether with or without valve. These weights must be accurate to a tolerance of 1 percent.
[3] Report approximate maximum and minimum volumetric capacity for the lot.

(Signed) _____

§ 178.116 Specification 17E; steel drums.

Single trip container. Removable head containers not authorized.

§ 178.116–1 Compliance.

(a) Required in all details.

§ 178.116–2 Rated capacity.

(a) Rated capacity as marked, see § 178.116–10(a)(3). Minimum actual capacity of containers shall be not less than rated (marked) capacity plus 4 percent. Maximum actual capacity shall not be greater than rated (marked) capacity plus 5 percent or rated (marked) capacity plus 4 percent plus 1 quart whichever is the greater.

§ 178.116–3 Composition.

(a) Sheets for body and heads to be low carbon, open hearth or electric steel.

§ 178.116–5 Seams.

(a) Body seams welded.

§ 178.116–6 **Parts and dimensions.**

(a) Parts and dimensions as follows:

Marked capacity not over (gallons)	Type of container	Minimum thickness, uncoated sheets (gauge)		Rolling hoops	
		Body sheet	Head sheet	Type	Minimum size (gauge or inch)	Minimum weight (pound per foot)
5	Straight side	24	24	None		
10	do	22	22	do		
30	do	19	19	(1)		
55	do	[2] 18	18	(1)		

[1] Rolled or swedged in hoops.
[2] 20 gauge authorized.

(b) Steel sheets of specified gauges shall comply with the following:

[In inches]

Gauge No.	Nominal thickness[1]	Minimum thickness[1]
18	0.0478	0.0428
19	.0418	.0378
20	.0359	.0324
22	.0299	.0269
24	.0239	.0209

[1] Thickness shall be measured at any point on the sheet not less than ⅜ inch from an edge.

§ 178.116–7 **Convex heads.**

(a) Convex (crowned) heads, not extending beyond level of chime, required for drums of 25 gallons capacity or over. Convexity to be minimum of ⅜".

§ 178.116–8 **Closures.**

(a) Adequate to prevent leakage; gaskets required.

(b) Closing part (plug cap plate etc., see Note 1) must be of metal as thick as prescribed for head of container: *Provided*, That thinner metal closures or closures of other material are authorized for containers of 12 gallons capacity or less when opening to be closed is not over 2.7 inches in diameter and closures, except threaded metal closures, are fitted with outside sealing devices which cannot be removed without destroying the closure or sealing device (see paragraph (d) of this section).

NOTE 1: This does not apply to cap seal over a closure which complies with all requirements.

(c) For closure with threaded plug or cap, the seat (flange, etc.) for plug, or cap, must have 3 or more threads; two drainage holes of not over 5/16 inch diameter are allowed. Plug, or cap, must have sufficient length of thread to engage 3 threads when screwed home with gasket in place: *Provided*, That for containers having a capacity of 12 gallons and less the seat (flange, etc.) for plug or cap, must have two or more complete threads and plug, or cap, must have sufficient length of thread to engage two threads when screwed home with gasket in place.

(d) Closures of screw-thread type or closed by positive means, of any material or design, may be authorized by the Bureau of Explosives for use, upon satisfactory proof of efficiency.

§ 178.116–9 **Defective containers.**

(a) Leaks and other defects to be repaired by method used in constructing container, not by soldering.

§ 178.116–10 Marking.

(a) Marking on each container by embossing on head with raised marks, or by embossing or die tamping on footring on drums equipped with footrings, or on metal plates securely attached to drum by brazing or welding not less than 20 percent of the perimeter as follows:

(1) DOT–17E. The letters STC: located near the DOT mark to indicate "single-trip container." In addition, when the container is of stainless steel, the type of steel used in body and head sheets as identified by American Iron and Steel Institute type number, and also the letters HT following steel designation on containers subjected to stress-relieving or heat-treatment during manufacture (for example, DOT–17E–304 or DOT–17E–304 HT as applicable) shall be shown. These marks shall be understood to certify that the container complies with all specification requirements.

(2) Name or symbol (letters) of maker; this must be recorded with the Bureau of Explosives.

(3) Gauge of metal in thinnest part, rated capacity in gallons, and year of manufacture (for example, 12–55–50). When gauge of metal in body differs from that in head, both must be indicated with slanting line between and with gauge of body indicated first (for example 14/12–55–50 for body 14 gauge and head 12 gauge).

[29 F.R. 18993, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5755, Apr. 23, 1965]

§ 178.116–11 Size of markings.

(a) Size of markings (minimum): ½ high for 33-gallon or less, ¾" for over 33 and not over 55 gallons.

§ 178.116–12 Type tests.

(a) Samples taken at random and closed as for use, shall withstand prescribed tests without leakage. Tests to be made of each type and size by each company starting production and to be repeated every 4 months. Samples last tested to be retained until further tests are made or for 1 year, whichever period is shorter. The type tests are as follows:

(1) Test by dropping, filled with water to 98 percent capacity, from height of 4 feet onto solid concrete so as to strike diagonally on chime, or when without chime seam, to strike on other circumferential seam; also additional drop test on any other parts which might be considered weaker than the chime. Closing devices and other parts projecting beyond chime or rolling hoops must also be capable of withstanding this test.

(2) Hydrostatic pressure test of 15 pounds per square inch sustained for 5 minutes.

[29 F.R. 18893, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5755, Apr. 23, 1965]

§ 178.116–13 Leakage test.

(a) Each container shall be tested, with seams under water or covered with soapsuds or heavy oil, by interior air pressure of at least 7 pounds per square inch for containers over 12 gallons capacity and at least 5 pounds for others. Equally efficient means of testing are authorized upon demonstration and proof of satisfactory tests to representative of Bureau of Explosives. Leakers shall be rejected or repaired and retested.

§ 178.156 Specification 10B; wooden barrels and kegs (tight).

§ 178.156–1 Compliance.

(a) Required in all details.

§ 178.156–2 Staves and heading.

(a) To be of white oak, chestnut oak, red oak, black cherry, Douglas fir, beech, sweet birch, yellow birch, sugar (hard) maple, or Scandinavian pine; quarter sawed with the grain, from straight-grained timber, so no annual ring shall slope over half the thickness of stave or head; thoroughly kiln dried, moisture content 7 percent to 11 percent; free from rotten sap, checks, pitch pockets, cat faces, seed and worm holes in excess of 15 in one container, and other defects that show through on both sides.

§ 178.156–3 Hoops.

(a) To be of cooperage-grade hoop steel.

§ 178.156–4 Staves.

(a) Staves to be sawed evenly and circular; croze center to be within 1⅛" of end of stave; stave end to have ⅛" free from bevel.

§ 178.156–5 Haeding.

(a) Heading of uniform thickness and properly circled; planed on outside and properly jointed and glued, or doweled and flagged; dowel diameter not over 5/12" thickness of head.

§ 178.156–6 The barrel.

(a) Stave joints reasonably flush on outside. Lathing is forbidden.

(b) Worm and seed holes to be plugged; over 15 not authorized in one container.

§ 178.156–7 Parts required and dimensions.

(a) Parts required and dimensions as follows (10 percent excess capacity authorized):

(1) Staves, when finished on outside:

Capacity of container, not over (gallons)	Maximum (inches)			Minimum	
	Length	Width	Bilge Circle	Staves (number)	Thickness (inch)
50	34	6	84	19	[1] 1/16
30	30	5	74	16	⅝
15	24	4½	54	14	9/16
10	22	4¼	50	12	½
5	18	4	40	10	½

NOTES

Foregoing thicknesses are of staves finished on 1 side. One-sixteenth inch must be added for unfinished staves.
Foregoing maximum lengths are authorized to be increased 6 percent or less, provided the thickness of stave is increased at least one-sixteenth inch for each increase of 1 inch in length or fraction thereof.

(2) Heading, after planing:

Capacity of container, not over (gallons)	Maximum		Minimum (inches)	
	Pieces (number)	Diameter (inches)	Thickness	Width
50	6	21	¾	2½
30	6	18	⅝	2½
15	5	14	9/16	2
10	5	13	½	2
5	4	11	½	2

Note: Because of the present emergency and until further order of the Department, for barrels of not over 50 gallons capacity, maximum number of pieces may be 7 provided they have a minimum thickness of ½ inch.

(3) Hoops, number and size:

Capacity of container, not over (gallons)	Minimum number of hoops	Minimum size of hoops (inches in width and Birmingham gauge)							
		Head		1st quarter		2d quarter		Bilge	
		Inch	Gauge	Inch	Gauge	Inch	Gauge	Inch	Gauge
50	[1] 8	[2] 1¾	[2] 17	1½	18	1½	18	[2] 1¾	[2] 17
30	6	1½	18	1¼	19	----------		1½	18
15	6	1¼	19	1⅛	19	----------		1¼	19
10	6	1⅛	19	1	19	----------		1⅛	19
5	[2] 6	1	19	1	19	----------		1	19

[1] Because of the present emergency and until further order of the Department, the minimum number of hoops is authorized to be reduced to 6 by eliminating second quarter hoops.
[2] Because of the present emergency and until further order of the Department, the minimum number of hoops is authorized to be reduced to 4 by eliminating first quarter hoops if head and bilge hoops of 1¾ inch by 17 guage are used.
[3] 2 inch by 18 guage hoops are also authorized.

§ 178.156–8 Closures.

(a) To be such as to prevent leakage in transit. Bungholes in staves must be not over 2″ diameter.

§ 178.156–9 Lining.

(a) To be as prescribed in Part 173 of this chapter or otherwise appropriate for the contents.

§ 178.156–10 Type test.

(a) Sample container at least 2 days old shall not increase more than 10 percent on diameter of head when all hoops above bilge are removed.

§ 178.156–11 Leakage test.

(a) Required for each lined container; by pressure at time of sizing or air pressure of at least 5 pounds per square inch; leakers to be repaired and retested.

§ 178.156–12 Marking.

(a) Marking on each container by the maker. By hot branding iron on head as follows:

(1) DOT–10B. This mark shall be understood to certify that the container complies with all specification requirements.

(2) Name or symbol (letters) of maker; this must be registered with the Bureau of Explosives and located just above, below, or following the mark specified in subparagraph (1) of this paragraph.

(3) Date of manufacture (for example, 7—50 for July 1950) located near the maker's mark.

NOTE 1: Because of the present emergency and until further order of the Department, date of manufacture may be omitted.

[29 F.R. 18927, Dec. 29, 1964; as amended by Amdt. 178–21, 36 F.R. 18469, Sept. 15, 1971]

§ 178.156–13 Size of markings.

(a) Size of markings (minimum): ¾″ high for over 30-gallon size, ½″ for others.

§ 178.165 Specification 14; wooden boxes, nailed.

§ 178.165–1 Compliance.

(a) Required in all details.

§ 178.165–2 Lumber.

(a) White pine or wood of at least equal strength, well seasoned, commercially dry, and free from decay, loose knots, knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within one-half its length.

§ 178.165–3. Nails.

(a) Cement coated, except as otherwise authorized, or screws of equal efficiency.

§ 178.165–4 Ends, sides, tops, and bottoms.

(a) Ends, sides, tops, and bottoms, as follows:

(1) Parts of 1-piece.

(2) Parts Linderman-joint glued.

(3) Parts tongued, grooved, and glued.

(4) Parts butt-joint glued, provided the joined surfaces are planed before gluing so as to assure full contact. After immersion in water for 24 hours at 70° F., the part must not fail at the joint when it is broken.

(b) Tongued, grooved and glued joints in uncleated ends must also be fastened with corrugated fasteners not over 8″ apart, within 3″ of each end of joint and having penetration ⅝ thickness of end.

§ 178.165–5 Cleated ends.

(a) Double cleated, 2 vertical and 2 horizontal. Nails staggered at 2″ intervals and clinched; cement coating not required.

§ 178.165–6 **Sides, tops, and bottoms.**

(a) Of size to extend out over cleats, if any.

§ 178.165–7 **Lock and dovetail corners.**

(a) Glued.

§ 178.165–8 **Parts and dimensions.**

(a) Parts and dimensions as follows:

Authorized gross weight (maximum) (pounds)	Type of box	Thickness of lumber (minimum) (inches)				Nails (minimum size)[4]	
		Ends[3]	Sides	Tops and bottoms[2]	Cleats	Into ends or cleats (Penny)	Into sides (Penny
35	Lock[1] Corner	7/16	7/16	5/16		5d	5d
65	Lock[1] Corner	1/2	1/2	3/8		5d	5d
75	Plain Nailed	7/8	1/2	1/2		7d	5d
75	Double Cleat	3/8	3/8	3/8	1/2×1 1/2	5d	
140	Plain Nail	1 1/16	5/8	5/8		8d	7d
140	Lock[1] Corner	5/8	5/8	5/8		7d	7d
140	Double Cleat	3/4	5/8	5/8	3/4×1 7/8	7d	7

[1] Or dovetail.

[2] Tops and bottoms may be made of paper covered veneer board of good quality Douglas fir, or lumber of equal quality, having minimum thickness of 1/4 inch and free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength. Paper covering shall be at least Kraft untreated liner-board having a basis weight of 42 pounds per 1,000 square feet and shall be secured to veneer core by adhesive in such manner as to form a satisfactorily laminated board. Board ends must be provided with such reinforcement as may be necessary to provide strength for nailing.

[3] As provided by § 173.65(a)(1), Note 1, of this chapter, boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1 5/8 inches from top edge of end of box.

[4] Coated wire staples are authorized in lieu of nails when used for fastening tops to boxes. Staples must be of such size and spaced and driven as to provide closure efficiency equivalent to that in §§ 178.165–11 and 178.165–12.

§ 178.165–9 **Joints in sides and ends.**

(a) Staggered; except for ends cleated as prescribed.

§ 178.165–10 **Tops and bottoms.**

(a) Must fit evenly on frame of box.

§ 178.165–11 **Cleated boxes.**

(a) Sides, top, and bottom must be secured to ends by nails driven into cleats, not into end boards.

§ 178.165–12 **Nails in each nailing edge (minimum number).**

(a) At least equal to length of edge in inches divided by 2; when number of nails is at least equal to length of edge divided by 1 3/4, 4d nails are authorized where 5d nails are prescribed.

Exception: Eight inch spacing authorized for nailing tops and bottoms to sides.

NOTE 1: Because of the present emergency and until further order of the Department, the following exception is authorized for nailing tops to boxes: When 7d and 8d nails are required by § 178.165–8, 6d nails are authorized if number of nails used is at least equal to length of end edge divided by 1 3/4 and length of side edge divided by 6.

§ 178.165–13 **Marking.**

(a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT–14

(1) This mark shall be understood to certify that box complies with all specification requirements.

§ 178.168 Specifications 15A; wooden boxes, nailed.

§ 178.168–1 Compliance.

(a) Required in all details.

§ 178.168–2 Closed[1] box.

(a) Parts and pieces to be in close contact.

§ 178.168–3 Ends.

(a) One-piece, or equivalent (see § 178.168–5, or cleated as prescribed; joints tongued, grooved, and glued. Style 1 or style 6 boxes may have milled depressions in each end of box for hand-holds, of not more than ⅜ inch in depth and not exceeding one-third of the width of the box, only when ends are of lumber at least ¾ inch in thickness.

(b) As provided by § 173.65 (a)(1), Note 1, of this chapter, wooden boxes, having inside metal containers which are tightly and securely closed, may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1⅝ inches from top edge of end of box.

§ 178.168–4 Sides, top, and bottom.

(a) Joints tongued, grooved, and glued, or one-piece equivalent, except that boxes for shipment of high explosives may have tops and bottoms made of paper-covered veneer board of good quality Douglas fir, or lumber of equal quality, having minimum thickness of ⅛ inch and free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength. Paper covering shall be at least kraft untreated linerboard having a basis weight of 42 pounds per 1,000 square feet and shall be secured to veneer core by adhesive in such manner as to form a satisfactorily laminated board. Board ends must be provided with such reinforcement as may be necessary to provide strength for nailing, and when used lumber thicknesses specified by § 178.168–12 do not apply.

§ 178.168–5 One-piece equivalents.

(a) Parts are considered equivalent to one-piece as follows:

(1) Parts Linderman-joint glued.

(2) Parts at least ½" thick, tongued and grooved and glued, with 2 or more corrugated fasteners on each joint.

(3) Parts butt-joint glued, provided the joined surfaces are planed before gluing, so as to assure full contact. After immersion in water for 24 hours at 70° F. the part must not fail at the joint when it is broken.

(b) Corrugated fasteners (as prescribed for one-piece equivalents): 1" wide; penetration ⅘ thickness of part; within 3" of end of joint and not over 8" apart; for 3 or more, drive alternately into opposite sides of part.

§ 178.168–6 Gluing efficiency.

(a) Shall be determined for boxes for gross eight of 150 pounds or less. When filled with sand and sawdust to marked gross weight, the boxes must be able to withstand 8 drops of 12", one on each corner, onto solid concrete without exposure of contents.

§ 178.168–7 Lumber.

(a) To be well seasoned, commercially dry, and free from decay, loose knots that would interfere with nailing, and other defects that would materially lessen the strength. Grain of wood in cleats must not cross cleat within ½ its length.

§ 178.168–8 Nails.

(a) Cement coated, unless otherwise authorized herein, of size specified for "sinkers" and "coolers" as generaly known to the trade.

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[1] Openings for filling device of inside container authorized if device is properly protected.

§ 178.168–9 **Grouping of principal woods.**

(a) Grouping as follows:

GROUP 1

White pine.
Norway pine.
Aspen (popple).
Spruce.
Western (yellow) pine.
Cottonwood.
Balsam fir.
Yellow poplar.
Cedar.
Redwood.
Butternut.
Cucumber.
Chestnut.
Sugar pine.
Cypress.
Basswood.
Willow.
Noble fir.
Magnolia.
Buckeye.
White fir.
Alpine fir.
Lodgepole pine.
Jack pine.

GROUP 2

Southern yellow pine.
Hemlock.
North Carolina pine.
Douglas fir.
Larch (tamarack).

GROUP 3

White elm.
Red gum.
Sycamore.
Pumpkin ash.
Black gum.
Black ash.
Tupelo.
Maple—soft or silver.

GROUP 4

Hard maple.
Beech.
Oak.
Hackberry.
Birch.
Rock elm.
Hickory.
White ash.

§ 781.168–10 **Width of pieces.**

(a) At least 2½".

§ 178.168–11 **Width of cleats.**

(a) Twice the prescribed thickness plus ¾".

§ 178.168–12 **Thickness of lumber.**

(a) Nailed boxes not cleated (Style 1). Authorized gross weight not over 100 pounds, see Note 1. Sides as in Table 1; top and bottom as in Table 1A; ends as in Table 5.

(b) Glued-lock-corner boxes (Style 6). Authorized gross weight not over 150 pounds. Sides as in Table 3; top and bottom as in Table 1A; ends as in Table 3A. Or, sides as in Table 2; top and bottom as in Table 1A; end as in Table 4.

(c) Single-cleated boxes (Style 4 or 5). Authorized gross weight not over 200 pounds, see Note 2. Sides as in Table 1; top and bottom as in Table 1A; ends and cleats as in Table 3A.

(d) Double-cleated boxes (Style 2, 2½ or 3). Authorized gross weight not over 500 pounds, see Note 3. Sides as in Table 1; top and bottom as in Table 1A; end and cleats as in Table 2A. Or, sides as in Table 1; top and bottom as in Table 1A; cleats as in Table 3B; ends not thinner than thickest side or top.

NOTE 1: When group 2 woods are used the gross weight may be increased to 110 pounds.
NOTE 2: When group 2 woods are used the gross weight may be increased to 220 pounds.
NOTE 3: When group 2 woods are used the gross weight may be increased to 550 pounds.

(e) Tables are as follows (dimensions of materials finished or resawed):

TABLE 1

[In inches]

Depth of box (inches)	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 1A

[In inches]

Width of box (inches)	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14
Authorized gross weight (pounds)	Minimum thickness of part					
15	5/16	5/16	5/16	5/16	5/16	5/16
25	5/16	5/16	5/16	5/16	5/16	5/16
35	5/16	5/16	5/16	5/16	5/16	5/16
45	11/32	11/32	11/32	11/32	11/32	11/32
55	3/8	11/32	11/32	11/32	11/32	11/32
65	3/8	3/8	11/32	11/32	11/32	11/32
75	7/16	3/8	3/8	11/32	11/32	11/32
85	7/16	7/16	3/8	3/8	11/32	11/32
100	1/2	7/16	7/16	3/8	3/8	11/32
125	9/16	1/2	1/2	7/16	3/8	3/8
150	5/8	9/16	9/16	1/2	7/16	3/8
175	5/8	5/8	9/16	1/2	1/2	7/16
200	11/16	5/8	5/8	9/16	1/2	7/16
250	25/32	3/4	11/16	5/8	9/16	1/2
300	13/16	13/16	3/4	11/16	5/8	9/16
350	15/16	7/8	13/16	3/4	11/16	5/8
400	1	15/16	7/8	13/16	3/4	11/16
500	1 1/8	1 1/16	1	15/16	7/8	3/4

TABLE 2

[In inches]

Depth of box (inches)	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	1/32	1/32	1/32	1/32	1/32	1/32
25	1/32	1/32	1/32	1/32	1/32	1/32
35	3/64	1/32	1/32	1/32	1/32	1/32
45	3/64	3/64	3/64	1/32	1/32	1/32
55	1/16	3/64	3/64	3/64	1/32	1/32
65	1/16	1/16	1/16	3/64	3/64	3/64
75	1/16	1/16	1/16	1/16	3/64	3/64
85	1/16	1/16	1/16	1/16	1/16	1/16
100	3/32	1/16	3/32	1/16	1/16	1/16
125	3/32	3/32	3/32	3/32	1/16	1/16
150	1/8	3/32	3/32	3/32	3/32	1/16
175	1/8	1/8	1/8	3/32	3/32	3/32
200	5/32	1/8	1/8	1/8	1/8	3/32
250	3/16	5/32	5/32	1/8	1/8	1/8
300	7/32	3/16	3/16	5/32	5/32	5/32
350	1/4	7/32	7/32	3/16	3/16	5/32
400	9/32	1/4	1/4	7/32	7/32	3/16
500			9/32	1/4	1/4	7/32

TABLE 2A

[In inches]

Smallest dimension of end	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	1/32	1/32	1/32	1/32	1/32	1/32
25	1/16	1/16	1/16	1/16	1/16	1/16
35	1/16	1/16	1/16	1/16	1/16	1/16
45	1/16	1/16	1/16	1/16	1/16	1/16
55	1/16	1/16	1/16	1/16	1/16	1/16
65	1/32	1/16	1/16	1/16	1/16	1/16
75	3/64	1/32	1/32	1/16	1/16	1/16
85	3/64	3/64	3/64	1/32	1/16	1/16
100	1/16	3/64	3/64	3/64	1/32	1/16
125	3/64	1/16	1/16	1/16	3/64	1/32
150	1/16	3/64	1/16	1/16	1/16	3/64
175	3/32	1/16	3/64	1/16	1/16	1/16
200	1/8	3/32	1/16	3/64	1/16	1/16
250	5/32	1/8	3/32	1/16	3/64	1/16
300	3/16	5/32	1/8	3/32	1/16	3/64
350	7/32	3/16	5/32	1/8	3/32	1/16
400	1/4	7/32	3/16	5/32	1/8	3/32
500			1/4	3/16	5/32	1/8

TABLE 3

[In inches]

Depth of box (inches)	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	5/16	5/16	5/16	5/16	5/16	5/16
25	3/8	11/32	11/32	11/32	11/32	11/32
35	7/16	7/16	3/8	11/32	11/32	11/32
45	1/2	1/2	7/16	7/16	3/8	11/32
55	9/16	1/2	1/2	7/16	7/16	3/8
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	2 5/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	2 5/32
300	1 5/16	1 1/16	1 1/8	1 1/16	15/16	7/8
350		1 5/16	1 1/4	1 1/8	1	15/16
400				1 1/4	1 1/8	1
500					1 1/4	1 1/8

TABLE 3A

[In inches]

Smallest dimension of end	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	11/32	11/32	11/32	11/32	11/32	11/32
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	1/2	1/2	7/16	7/16	7/16	7/16
55	9/16	1/2	1/2	7/16	7/16	7/16
65	9/16	9/16	9/16	1/2	7/16	7/16
75	5/8	5/8	9/16	1/2	1/2	7/16
85	11/16	11/16	5/8	9/16	1/2	1/2
100	3/4	11/16	11/16	5/8	9/16	1/2
125	13/16	3/4	3/4	11/16	5/8	9/16
150	15/16	7/8	13/16	3/4	11/16	5/8
175	1	15/16	7/8	13/16	3/4	11/16
200	1 1/16	1	15/16	7/8	2 5/32	11/16
250	1 1/8	1 1/16	1	15/16	7/8	2 5/32
300	1 5/16	1 1/16	1 1/8	1 1/16	15/16	7/8
350		1 5/16	1 1/4	1 1/8	1	15/16
400				1 1/4	1 1/8	1
500					1 1/4	1 1/8

TABLE 3B

[In inches]

Smallest dimension of end	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	7/16	7/16	7/16	7/16	7/16	7/16
25	7/16	7/16	7/16	7/16	7/16	7/16
35	7/16	7/16	7/16	7/16	7/16	7/16
45	1/2	1/2	7/16	7/16	7/16	7/16
55	9/16	1/2	1/2	7/16	7/16	7/16
65	9/16	9/16	9/16	1/2	1/2	7/16
75	5/8	5/8	9/16	9/16	1/2	1/2
85	11/16	11/16	5/8	9/16	9/16	1/2
100	3/4	3/4	11/16	5/8	5/8	9/16
125	13/16	3/4	3/4	11/16	11/16	5/8
150	15/16	13/16	13/16	3/4	3/4	11/16
175	1	15/16	7/8	13/16	2 1/32	1 1/16
200	1 1/16	1	15/16	7/8	7/8	2 1/32
250	1 1/8	1 1/16	1	15/16	15/16	7/8
300	1 3/16	1 1/8	1 1/16	1 1/16	1	15/16
350		1 3/16	1 1/8	1 1/8	1 1/16	1
400			1 3/16	1 1/4	1 1/4	1 1/8
500						1 3/16

TABLE 4

[In inches]

Smallest dimension of end	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	7/16	7/16	7/16	7/16	7/16	7/16
25	7/16	7/16	7/16	7/16	7/16	7/16
35	1/2	1/2	7/16	7/16	7/16	7/16
45	9/16	9/16	1/2	1/2	1/2	7/16
55	5/8	9/16	9/16	1/2	1/2	1/2
65	11/16	5/8	5/8	9/16	1/2	1/2
75	3/4	11/16	5/8	5/8	9/16	1/2
85	2 3/32	3/4	11/16	5/8	5/8	9/16
100	7/8	13/16	3/4	11/16	11/16	5/8
125	15/16	7/8	13/16	3/4	13/16	11/16
150	1	15/16	15/16	7/8		

TABLE 5

[In inches]

Smallest dimension of end	Not over 8 in	Not over 9 in	Not over 10 in	Not over 12 in	Not over 14 in	Over 14 in
Authorized gross weight (pounds)	Minimum thickness of part					
15	1/2	1/2	1/2	1/2	1/2	1/2
25	1/2	1/2	1/2	1/2	1/2	1/2
35	5/16	9/32	1/2	1/2	1/2	1/2
45	11/32	5/16	9/32	9/32	1/2	1/2
55	3/4	11/32	5/16	5/16	9/32	1/2
65	13/32	3/4	11/32	5/16	5/16	9/32
75	7/16	13/32	3/4	11/32	5/16	9/32
85	15/32	7/16	13/32	3/4	11/32	5/16
100	1	15/32	7/16	13/32	3/4	11/32

§ 781.168–13 Reduced thicknesses.

(a) Reduction in thicknesses is authorized as in paragraphs (a) to (d) of this section except that reduced thicknesses must be not less than:

(1) Sides, top, and bottom: Minimum 5/16" for boxes up to 35 pounds authorized gross weight and 3/8" above that weight.

(2) Ends or cleats: Minimum 7/16".

(b) Sides of one-piece or equivalent: 12½ percent.

(c) Any part or cleat of Group 3 or 4 wood: 20 percent.

(d) Sides, top, and bottom when to be strapped as per § 178.168–19 (b): 20 percent for 1 strap; 35 percent for 2 straps.

CONVERSION TABLE

Specified thickness (inches)	Reduced thickness corresponding to percent reduction		
	12½	20	35
9/32	1/4	1/4	1/4
5/16	9/32	1/4	1/4
11/32	5/16	9/32	1/4
3/8	5/16	5/16	1/4
7/16	3/8	11/32	9/32
1/2	7/16	3/8	5/16
9/16	1/2	7/16	3/8
5/8	9/16	1/2	7/16
11/16	5/8	9/16	7/16
3/4	5/8	5/8	1/2
23/32	11/16	5/8	1/2
13/16	11/16	5/8	1/2
7/8	3/4	11/16	9/16
15/16	13/16	3/4	5/8
1	7/8	13/16	5/8
1 1/16	15/16	7/8	11/16
1 1/8	1	7/8	3/4
1 3/16	1 1/16	15/16	23/32
1 1/4	1 1/8	1	13/16
1 5/16	1 3/8	1 1/16	7/8

§ 178.168–14 Assembly.

(a) By nailing; screws, hinges and hasp, or other device of equal efficiency are authorized; nails should be driven flush.

§ 178.168–15 Nails and nailing.

(a) Cement coated nails of size and with spacing detailed in §§ 178.168–16 and 178.168–17.

(b) At cleated edges drive at least 40 percent of nails into cleats.

(c) Nails fastening cleats to be staggered and clinch 1/8"; uncoated nails authorized.

(d) Nailing tops and bottoms to sides permitted but not required.

§ 178.168–16 Nails; kind and dimensions.

(a) Cement[2] coated of gauge and length as for "sinkers" and "coolers" as generally known to the trade; size[3] in "penny" as follows:

Species of wood holding points of nails	Thickness of material holding points of nails (inches)										
	3/8 or less	7/16	1/2	9/16	5/8	11/16	3/4	25/32	13/16	7/8	15/16 or more
Group 1	4	5	5	6	7	7	8	8	8	9	1
Group 2	4	4	5	5	6	6	7	7	7	8	
Group 3	3	4	4	5	5	6	6	7	7	7	
Group 4	3	3	4	4	4	5	5	6	6	7	

§ 178.168–17 Nail spacing.[4]

(a) Nail spacing as follows:

[In inches]

Nails (size)	Maximum spacing when driven into end and cleats	
	Side grain	End grains
Threepenny	1¼	1
Fourpenny	1½	1¼
Fivepenny	1¾	1½
Sixpenny	2	1¾
Sevenpenny	2¼	2
Eightpenny	2½	2¼
Ninepenny	2¾	2½
Tenpenny	3	2½

§ 178.168–18 Marking.

(a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT-15A***

(1) The stars must be replaced by authorized gross weight (for example, DOT–15A100, etc.). This mark shall be understood to certify that box complies with all specification requirements.

(b) The words "ONE STRAP", or "TWO STRAPS", etc., when straps are required (see § 178.168–13(d)); this to be placed above or below the rectangle.

(c) Marks may also be applied as follows:

DOT–15A

NO STRAP XXX LBS.
ONE STRAP XXX LBS.
TWO STRAPS XXX LBS.

(1) The "X's" must be replaced by authorized gross weights as authorized for the strapping conditions.

§ 178.168–19 Closing for shipment.

(a) Box to be securely closed. Nails, if used, to be as prescribed in §§ 178.168–16 and 178.168–17.

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[2] Uncoated nails authorized when increased 25 percent in number.

[3] Nails 1-penny smaller authorized when spaced as for 2-penny smaller. Nails 2-penny smaller authorized, but not less than 3-penny when thickness of material nailed through does not exceed ½ of thickness of material holding points of nails.

[4] To determine number of nails, divide length of nailing edge by spacing; fractions greater than ½ are considered as whole numbers.

(b) Metal straps, as specified by marks on box, must encircle sides, top, and bottom as follows:

(1) One nailless strap: At center of box.

(2) Two or more nailless straps: Outer two about 1/6 of box length from ends and other equally spaced between.

(3) Nailed straps: At ends of sides, top, and bottom; use same size nails as for closing and space not over twice as far apart.

(4) Size of flat straps must be as follows:

[In inches]

Authorized gross weight (pounds)	Cross-section size when number of strap is—		
	1	2	3
50	1/2 x 0.020	3/4 x 0.015	
100	5/8 x 0.020	1/2 x 0.018	
200	3/4 x 0.023	5/8 x 0.020	1/2 x 0.018
300		5/8 x 0.023	1/2 x 0.020
400		3/4 x 0.020	1/2 x 0.023
500		3/4 x 0.023	5/8 x 0.023

(5) Wires, Washburn and Moen gauge, authorized as follows:

Authorized gross weight (pounds)	Gauge of wires when number of straps is—		
	1	2	3
50	12	14	
100	11	12	
200	9	11	12
300		10	11
400		10	11
500		9	10

§ 178.185 Specification 16A; plywood or wooden boxes, wirebound.

§ 178.185–1 Compliancce.

(a) Required in all details. Authorized tolerances. Cleats, battens, and handles, minus 1/32"; single thickness veneer, minus 5 percent; resawn boards, 1/64" below specified thickness for boards up to 7/32" thick and 1/32" below specified thickness for boards 1/4" or more thick.

§ 178.185–2 Lumber or plywood.

(a) Lumber shall be well seasoned and commercially dry; free from decay, objectionable knots, slanting shakes, sharp cross grain, and other defects that materially lessen the strength. Grain of wood in cleats and battens must not cross piece within its length.

(b) Plywood shall be made from veneer which has been rotary cut, sliced, or sawed. Plywood shall be good commercial box or sheathing grade and shall be moisture-resistant; free from decay, objectionable knots that interfere with nailing, splits, gaps, and other defects that materially lessen the strength.

(1) Moisture-resistant plywood shall be fabricated with either synthetic or protein type glue. Specimens for testing shall be not less than 5 in number, measuring 6" x 6", and shall withstand 10 cycles of 4 hours immersion in water at room temperature and drying for 20 hours at a temperature not over 100° F. After 10 cycles, 4 of the 5 samples are to show not more than a sum total of 2-inch delamination on the edges, with depth delamination no greater than 1/2 inch.

§ 178.185–3 Wires.

(a) Of annealed steel, or other metal of equal strength, Washburn and Moen sizes.

§ 178.185–4 Staples.

(a) Wire size, Washburn and Moen.

§ 178.185–5 **Grouping of principal woods.**

(a) Grouping as follows:

GROUP 1

White pine.
Norway pine.
Aspen (popple).
Spruce.
Western yellow pine.
Cottonwood.
Willow.
Magnolia.
Buckeye.
White fir.
Cedar.
Redwood.
Yellow poplar.
Balsam fir.
Chestnut.
Sugar pine.
Cypress.
Basswood.
Noble fir.
Butternut.
Alpine fir.
Cucumber.
Lodgepole pine.
Jack pine.

GROUP 2

Southern yellow pine.
Hemlock.
North Carolina pine.
Douglas fir.
Larch (tamarack).

GROUP 3

White elm.
Red gum.
Sycamore.
Pumpkin ash.
Black ash.
Black gum.
Tupelo.
Maple—soft or silver.

GROUP 4

Hard maple.
Beech.
Oak.
Hackberry.
Birch.
Rock elm.
White ash.
Hickory.

§ 178.185–6 **Closed box.**

(a) Parts and pieces with edges in close contact to give completely closed box.

§ 178.185–7 **Top, sides, and bottom.**

(a) Each cleated at both ends; intermediate rows of cleats authorized.

§ 178.185–8 **Cleats.**

(a) Ends mitered or with mortise and tenon joints.
(b) Cleats for plywood boxes shall be Group 4 woods.

§ 178.185–9 **Ends.**

(a) Battened when prescribed. Wired ends authorized provided wires run cross grain and terminate in loops with ends of wire driven through end board and clinched. Grain of wood and outside ply of plywood shall be perpendicular to sides except for wired ends.

(b) As provided by § 173.65(a)(1), Note 1, of this chapter, wooden boxes having inside metal containers which are tightly and securely closed may be equipped with hand holes in each end which must be not more than one inch by four inches and centered laterally not nearer than 1⅝ inches from top edge of end of box.

§ 178.185–10 **Wires.**

(a) One wire over each row of cleats; intermediate wires as prescribed.

§ 178.185–11 **Stapling.**

(a) Staples for wires over cleats driven through boards into cleats and anchored; others through boards and clinched.

§ 178.185–12 Thickness of boards or plywood (sides, tops, bottoms, and ends).

(a) Thickness as follows except that, for thicknesses prescribed as 3/16" or less, resawn boards must be 1/64" thicker for each resawn surface:

Group of wood	Minimum thickness of boards (inch)						
	1/8 (0.125)	1/7 (0.143)	1/6 (0.167)	3/16 (0.185)	7/32 (0.219)	1/4 (0.250)	5/16 (0.313)
	Authorized gross weight, box and contents, not over (pounds)						
	25	35	50	75	100	150	200
	35	50	75	100	150	200	315
	50	75	100	150	200	315	400
	75	100	150	200	315	400	

(1) For boxes with 3 or more rows of cleats, boards of the next lower thickness prescribed in the table are acceptable.

(b)

Group of wood	Minimum thickness of plywood (inch) [1]		
	1/8 (0.125)	3/20 (0.150)	3/16 (0.188)
	Authorized gross weight, box and contents, not over (pounds)		
4	150	300	400

[1] Minimum tolerance of 5% permitted for specified thicknesses.

§ 178.185–13 Size of cleats.

(a) At least 13/16" by 13/16" when thickness required for boards exceeds 1/4"; otherwise at least 9/16" by 13/16".

§ 178.185–14 Binding wires (sides, top, and bottom).

(a) Spacing not over 8".

Exception: When each binding wire is stapled to a row of cleats, 11" spacing is authorized.

(b) Number and size of binding wires as follows:

Number of wires	Minimum gauge of wires, Washburn and Moen				
	16	15	14	13	12
	Authorized gross weight, box and contents (pounds)				
2	35	50	75	100	150
3	50	75	100	150	200
4	75	100	150	200	315
5	100	150	200	315	400
6		200	315	400	
7			400		

§ 178.185–15 Wires for wired ends.

(a) At least 2 wires on each end, size not less than as specified for binding wires in § 178.185–14, and spaced as follows:

Thickness of end (inch)	Maximum spacing	
	Between wires (inch)	Wires to cleats (inch)
0.125	6	4
0.143	6	4
0.167	6½	4
0.187	6½	4
0.219	7	4
0.250	7	4
0.313	7	4

(b) Ends less than 10 inches deep are authorized with 1 wire provided they are reinforced by 2 strips (liners), and least 1¼" wide and as thick as ends, securely stapled along edges of the end parallel to the wires.

§ 178.185–16 Staple spacing (approximate) and minimum size.

(a) Staples into cleats 16 gauge, Washburn and Moen, and:

(1) One and one-fourth inches long with 1½-inch spacing, or 1⅛ inches long with 1-inch spacing, when boards are over ¼-inch thick.

(2) One and one-eighth inches long with 1½" spacing, for boards ¼" thick or less; except that staples ⅞" long with 1½" spacing are authorized when boards are 1/7" thick or less.

(b) Other staples 18 gauge, Washburn and Moen.

§ 178.185–17 End supporting battens.[1]

(e) End supporting battens at least 1⅛" wide and same thickness as cleats; fastened securely across ends parallel to side cleats; required so that unsupported distance between cleats, battens, and between cleats and battens will be not greater than as follows.

Thickness of ends (inch):	*Maximum spacing (inches)*	Thickness of ends (inch):	*Maximum spacing (inches)*
0.125	10	0.219	14
0.143	11	0.250	15
0.167	12	0.313	16
0.187	13		

§ 178.185–18 Side cleat battens and wired end supports.

(a) *Side cleats battens.* At least 13/16" by 13/16": fastened securely to ends so as to be adjacent to side cleats when box is set up; required, in addition to any other battens, when authorized gross weight exceeds the following:

Group of wood in cleats:	*Authorized gross weight, box and contents, over (pounds)*	Group of wood in cleats:	*Authorized gross weight, box and contents, over (pounds)*
1	100	3	200
2	150	4	200

(b) *Wired end supports.* Wired ends, for boxes for authorized gross weight exceeding the foregoing, must be reinforced by 2 strip (liners), at least 1¼" wide and as thick as ends, securely stapled along edges of the end parallel to the wires: side cleat battens not required.

§ 178.185–19 Marking.

(a) Marking on each box with letters and figures at least ½" high in rectangle as follows:

DOT–16A * * *

(1) Stars must be replaced by maximum authorized gross weight (for example, DOT–16A150, etc.). This mark shall be understood to certify that box complies with all specification requirements.

(b) Name of maker located just above, below, or following the mark specified in paragraph (a) of this section; symbol (letters) authorized if registered with the Bureau of Explosives.

§ 178.185–20 Setting up and closing.

(a) Nail or staple unwired ends to side cleats at intervals not over 2½"; fasten wired ends securely by means of loop fasteners.

(b) Twist ends of binding wires or bend loops to give tight closure.

(c) Nail at least 2 nails through side cleats into each side-cleat batten at not over 4" intervals; nail through top and bottom cleats with one 7-penny nail into each end of end-supporting battens.

[1] Not required for wired ends less than 20 inches long.

§ 178.185–22 Special box authorized only when used in conjunction with inside spec. 2U (§ 178.24 of this chapter) polyethylene 5- and 15-gallon cubical containers.

(a) The boxes shall comply with spec. 16A requirements using the table for a gross weight of 200 pounds for construction purposes only, except as follows:

(1) The top section of boxes may have a hole not over 4⅛ inches in diameter midway between the cleats, and centered not less than 3$\frac{3}{16}$ inches from either the back or front edge of boxes.

(2) Five-gallon capacity—ends. Ends may be made from ⅛ inch or thicker veneer and have only one 14-gauge wire across face. One-eighth inch veneer liners, at least 1¼ inches wide, must be stapled across the top and bottom of the ends.

(i) Fifteen-gallon capacity—ends. Ends must be made with same thickness faceboard material as the sides, top, and bottom and must have two liners of the same thickness, at least 3 inches wide, fastened by two rows of staples. Ends may have one 13-gauge wire across face.

(3) Paper overlaid veneer having veneer core of group 3 or 4 wood and completely covered on each side with 42 pound basis weight kraft paper securely adhered thereto by moisture resistant adhesive, is authorized. Total combined thickness of finished board shall be not less than 0.160 inch.

(4) Wire spacing for 5-gallon capacity containers. Binding wires stapled to a row of cleats may be spaced not more than 13 inches apart.

(b) Wirebound wooden or paper overlaid veneer board boxes must be provided with full size double-faced corrugated liners of at least 125-pound test (Mullen or Cady) for bottom and sides. Full area top pad is required for 5-gallon capacity containers and must be a minimum of 200-pound test (Mullen or Cady). Full area top pad is required for the 15-gallon capacity container and must be a minimum of 275-pound test (Mullen or Cady).

(c) Marking required:

(1) Marking on each box with letters and figures at least ½ inch high in rectangle as follows:

DOT–16A–C

(2) This mark shall be understood to certify that outer container complies with all construction requirements of the specification.

(3) Name of maker shall be located just above, below, or following the mark specified in subparagraph (1) of this paragraph; symbol (letters) authorized if registered with the Bureau of Explosives.

§ 178.209 Specification 12H; fiberboard boxes.

§ 178.209–1 Compliance.

(a) Required in all details.

§ 178.209–2 Definitions.

(a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.209–3 Classification of board.

(a) Fiberboard is hereby classified by strength of completed board as in first column of the following table; weights specified in the table are the minimum authorized.

Classified strength [1] of completed board	Facings for corrugated fiberboard	
	Double-faced-minimum weight of facings (pounds per 1,000 sq. ft.)	Double-wall-minimum combined weight of facings including center liner (pounds per 1,000 sq. ft.)
275	138	110
325	138	110
350	180	126
375	180	180
400	180	180
450	180	180

[1] Mullen or Cady test (minimum).

§ 178.209–4 Corrugated fiberboard.

(a) Both outer facings water resistant; corrugated sheets must be at least 0.009 inch thick and weigh not less than 26 pounds per 1000 square feet; all parts must be securely glued together throughout all contact areas.

§ 178.209–5 Stitching staples.

Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steep staples $\frac{3}{32}$ x 0.019 inch in cross section and not less than $\frac{7}{16}$-inch wide. Materials used must be at least equivalent to copper coated steel in nonsparking quality.

(Secs. 9, 902(h); 18 U.S.C. 831–835, 49 U.S.C. 1657, 1421–1430, 1472(h)) [Amdt. 178–12, 35 F.R. 11687, July 22, 1970]

§ 178.209–6 Tape.

(a) Used for manufacturer's joints must be coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the woof, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream) 500 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.209–7 Test.

(a) Acceptable board must have prescribed strength, Mullen or Cady test, after exposure for at least 3 hours to normal atmospheric conditions (50 to 70 percent relative humidity), under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength, the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.209–8 Type authorized.

(a) Shall be corrugated fiberboard, telescoping type- 1-piece, 2-piece or 3-piece construction without recessed heads, as follows:

(1) Box to consist of top and bottom sections divided equally or unequally and inner lining tube. The lining tube must be staple stitched to the lower section of the box to give in effect a 2-piece box. (See § 178.209–11.)

(2) Box to consist of full depth top and bottom sections completely telescoping. No inner lining tube required. Three variations are authorized: one with bottom slotted on ends and cover on sides; second, with both cover and bottom slotted on sides; and third, with sides and ends (both covers and bottom) not slotted, manufacturer's joint a side lap glued or stapled to end, closing flaps to form top and bottom of box with side closing flaps out and overlapping.

NOTE 1: Hand-holes oval in shape, not more than 1 inch in width by 3 inches in length, and horizontal with top score line, are authorized in ends of top section of boxes.

(3) Box to consist of 1-piece, 2-piece, or 3-piece, without recessed heads, fitted with lining tube as prescribed in § 178.209–11, except that lining tube is not required for boxes used for shipment of electric blasting caps picked in accordance with § 173.66(g)(1) of this chapter. When outer flaps butt, inner flaps must also butt, except 1-piece with tube or 2-piece fully telescoping ½ slotted style may have outer flaps that overlap a minimum of 2 inches to and including full overlap, and inner flaps may be of same length as outer flaps.

(4) Three-piece box without recessed ends. Outer flap may be full lap style with a 3-inch or longer tuck. With the full lap style, the inner end flaps must have a minimum length or 4 inches with or without hand holes.

[29 F.R. 18951, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5757, Apr. 23, 1965]

§ 178.209–9 Forming.

(a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.209–10 Joints.

(a) Lapped 1½" and stitched at 2½" intervals and within 1" of each end of joint; except for full depth telescope style boxes, body joints must be double-stitched (two parallel rows of stitches).

(b) For glued lap joint, the sides of box forming joint must lap not less than 1¼" and be firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

(c) For lining tubes only, one butt joint taped (see § 178.209–6) tape not less than 3" wide is authorized.

§ 178.209–11 Authorized gross weight and parts required.

(a) Box shall be corrugated fiberboard at least 275 pound test. Tubes, when required, shall be of solid fiberboard at least 200-pound test, or of corrugated fiberboard of at least 275-pound test, with adjoining edges stitched, taped, or glued.

(b) Authorized gross weight: 65 pounds; boxes may have gross weight of 103 pounds when authorized by § 173.66(g)(1) of this chapter.

[29 F.R. 18951, Dec. 29, 1964, as amended by Order 71, 31 F.R. 9081, July 1, 1966]

§ 178.209–12 Closing for shipment.

(a) By any method capable of withstanding tests prescribed by § 178.209–16 without failure.

§ 178.209–13 Marking.

(a) On each container. Symbol in rectangle as follows:

DOT—12H **

(1) Stars to be replaced by authorized gross weight (for example DOT–12H65). This mark shall be understood to certify that the container complies with all specification requirements.

(2) Name and address of plant making the container; symbol (letters) authorized if recorded with the Bureau of Explosives. This mark to be located just above or below the mark specified in paragraph (a) of this section.

(3) Size of markings: Specification markings prescribed in subparagraph (1) of this paragraph must be at least ½ inch high; other markings must be legible.

§ 178.209–14 **Special tests.**

(a) *By whom and when.* By or for each plant making the boxes; at beginning of manufacture and at six-month intervals thereafter; on largest size, by weight. Smaller sizes need not be tested if they have the same or equivalent construction. Report of results, with all pertinent data, to be maintained on file for one year; copy to be filed with the Bureau of Explosives.

§ 178.209–15 **Material.**

(a) Box material must comply with requirements of §§ 178.209–3, 178.209–4, 178.209–7, 178.209–11, and the following:

(b) Box material must have test strength and moisture content not over 30 percent as follows:

(1) Box material must test at least 200 pounds per square inch immediately after exposure for 3 days to 90 percent relative humidity of not less than 70° nor more than 75° F.

(2) Box material must test at least 100 pounds per square inch immediately after it has been in contact with water for 3 hours under 3'' head at not less than 70° nor more than 75° F.

NOTE: The test shall be conducted on a sample no greater than 6 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3-inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6-inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable.)

[29 F.R. 18951, Dec. 29, 1964, as amended by Order 66, 30 F.R. 5757, Apr. 23, 1965]

§ 178.209–16 **Completed container.**

(a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent relative humidity at not less than 70° nor more than 75° F.; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in the same manner as for shipment:

(1) Three loaded samples to be tested. Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½''.

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of the two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.

(7) A flatwise drop on one of the medium faces (usually side 2 or 4).

(8) A flatwise drop on the opposite medium face.

(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).

(10) A flatwise drop on the opposite large face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner on which the first drop was made on corner 3–4–6. Commence the third cycle of ten drops with corner 1–4–5. Each loaded container must withstand 3 cycles without spilling or shifting of contents.

§ 178.214 Specification 23F; fiberboard boxes.

§ 178.214–1 Compliance.

(a) Required in all details.

§ 178.214–2 Definitions.

(a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.

(b) "Joints" are where edges of parts of box are connected together in setting up the box. Generally done by box maker.

(c) "Seams" are where edges of parts of box are visible, except joints, when box is closed.

§ 178.214–3 Solid fiberboard.

(a) To be 3-ply or more; both outer plies waterproofed.

§ 178.214–4 Corrugated fiberboard.

(a) Both outer facings water resistant; corrugated sheets at least 0.009" thick; all parts securely glued together throughout all contact areas; minimum combined weight of facings not less than 84 pounds per 1,000 square feet, except when only one lining tube is used as provided by § 178.214–15 (b), minimum combined weight of facings must be not less than 138 pounds per 1,000 square feet.

§ 178.214–5 Stitching staples.

Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples 3/32 x 0.019 inch in cross section and not less than 7/16-inch wide. Material used must be at least equivalent to copper coated steel in nonsparking quality.

(Secs. 9, 902(h); 18 U.S.C. 831–835, 49 U.S.C. 1657, 1421–1430, 1472(n)) [Amdt. 178–12, 35 F.R. 11687, July 22, 1970]

§ 178.214–6 Tape.

(a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the woof, at least 70 units. Elmendorf test. Sisal tape of 2 sheets of No. 1 Kraft paper, total weight 80 pounds per ream (500 sheets, 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.214–7 Test.

(a) Acceptable board must have prescribed strength, Mullen or Cady test, under test as follows:

(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.

(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.

(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

(4) For corrugated fiberboard, double-pop tests may be disregarded.

§ 178.214–8 Type authorized.

(a) Of solid fiberboard; 1-piece, or 3-piece without recessed heads, fitted with lining tube or lining tubes as prescribed in § 178.214–15, except that lining tubes are not required for boxes used for shipments of high explosives packed in accordance with § 173.63(a)(3) of this chapter or electric blasting caps packed in accordance with § 173.66(g)(1) of this chapter, or when box is constructed of 1-piece of not less than 600-pound test board weighing not less than 300 pounds per 1,000 square feet. Boxes having handholes are authorized when approved by the Bureau of Explosives.

§ 178.214–9 Inside packing and size limits.

(a) As prescribed in § 178.214–15.

§ 178.214–10 Forming.

(a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.214–11 Joints.

(a) Lapped 1½ inches from center of scoreline except as in § 178.214–12; stitched at 2½-inch intervals and within 1 inch of each end of joint; double-stitched (2 parallel stitches) at each end of joint over 18 inches long; or lapped not less than 1¼ inches and firmly glued throughout entire area of contact with a glue or adhesive which cannot be dissolved in water after the film application has dried.

§ 178.214–12 Flanged heads.

(a) Must have 4 flanges, at least 1" long above fillet, on each head. Recessed flanged heads not authorized.

§ 178.214–13 Seams which are to be stitched.

(a) Overlap, if any, required to be at least 1½ inches from center of scoreline except as in § 178.214–12.

§ 178.214–14 Flap closure.

(a) Flaps must butt or have full overlap excepting that inner flaps may overlap ½ inch.

§ 178.214–15 Authorized gross weight (when packed) and parts required.

(a) Box to be of solid fiberboard, special waterproofed, at least 300-pound test, and weighing at least 250 pounds per thousand square feet. Tubes to be of solid or corrugated fiberboard at least 200-pound test and of 1-piece, or as provided in subparagraph (1) of this paragraph, with adjoining edges stitched, taped, or glued. Glued or stitched lap not less than 1¼". Lap must be firmly glued throughout entire area of contact with glue or adhesive which cannot be dissolved in water after the film application has dried.

(1) Or, box shall have one tube liner of solid fiberboard weighing at least 283 pounds per 1,000 square feet with joint or joints either stitched or glued as prescribed in paragraph (a) of this section. One end of the tube may have a handhole approximately ¾" deep located at the center of the top and a perforation with a minimum of ⅛" cuts and ⅛" webs extending from the handhole to the bottom.

(b) Authorized gross weight; 65 pounds when 2 or more lining tubes are used to divide the box into 2 or more compartments; 65 pounds when 1 or more lining tubes are used and contents will consist of 1 cartridge only or of black powder in bags; 65 pounds when boxes without lining tubes are used for shipments of high explosives packed in accordance with § 173.63(a)(3) of this chapter or electric blasting caps packed in accordance with § 173.66(g)(1) of this chapter; 35 pounds in all other cases except that boxes having a single solid fiberboard lining tube, the fiberboard weighing at least 283 pounds per 1,000 square feet, or corrugated fiberboard lining tube as prescribed in § 178.214–4(a), are authorized for 65 pounds gross weight.

§ 178.214–16 Closing for shipment.

(a) By any method capable of withstanding tests prescribed by § 178.214–20 without failure.

§ 178.214–17 Marking.

(a) On each container. Symbol in rectangle as follows:

DOT–23F***

(1) Stars to be replaced by authorized gross weight (for example, DOT-23F35 or DOT-23F65). This mark shall be understood to certify that the container complies with all specification requirements.

(2) Name and address of plant making the container; symbol (letters) authorized if recorded with the Bureau of Explosives. This mark to be located just above or below the mark specified in this paragraph.

(3) Size of markings: Specification markings prescribed in subparagraph (1) of this paragraph must be at least ½ inch high; other markings must be legible.

§ 178.214–18 Special tests.

(a) *By whom and when.* By or for each plant making the boxes; at beginning of manufacture and at six-month intervals thereafter; on largest size, by weight. Smaller sizes need not be tested if they have the same or equivalent construction. Report of results, with all pertinent data, to be maintained on file for one year; copy to be filed with the Bureau of Explosives.

§ 178.214–19 Material.

(a) Box material (special waterproofed board) must be 300-pound test board and weigh at least 250 pounds per thousand square feet when commercially dry.

(b) Box material must also have 200-pound test strength and moisture content not over 30 percent as follows:

(1) Immediately after exposure for 3 days to 90 percent humidity at 75° F.

(2) Immediately after it has been in contact with water for 3 hours under 3″ head at 75° F.

NOTE: The test shall be conducted on a sample no greater than 6 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3-inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6-inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable.)

§ 178.214–20 Completed containers.

(a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent humidity at 75° F.; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in same manner as for shipment:

(1) Three loaded samples to be tested. Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) Three loaded samples to be tested. Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½″.

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of the two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.
(7) A flatwise drop on one of the medium faces (usually side 2 or 4).
(8) A flatwise drop on the opposite medium face.
(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).
(10) A flatwise drop on the opposite large face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner on which the first drop was made, on corner 3–4–6. Commence the third cycle of ten drops with corner 1–4–5. Each loaded container must withstand 3 cycles without spilling or sifting of contents.

§ 178.219 Specification 23H; fiberboard boxes.

§ 178.219–1 Compliance.

(a) Required in all details.

§ 178.219–2 Definitions.

(a) Terms such as "200-pound test" mean minimum strength, Mullen or Cady test.
(b) "Joints" are where edges of parts of box are connected together in setting up box.
(c) "Seams" are where edges of parts of box are visible except joints, when box is closed.

§ 178.219–3 Solid fiberboard.

(a) To be 3-ply or more; both outer plies waterproofed.

§ 178.219–4 Stitching staples.

Stitching staples must be made in such a configuration that their holding capability as installed will not be less than that of flat steel staples $\frac{3}{32}$ x 0.019 inch in cross section and not less than $\frac{7}{16}$ inch wide. Material used must be at least equivalent to copper coated steel in nonsparking quality.

(Secs. 9, 902(h); 18 U.S.C. 831–835, 49 U.S.C. 1657, 1421–1430, 1472(h)) [Amdt. 178–12, 35 F.R. 11687, July 22, 1970; Amdt. 178–25, 36 F.R. 18469, Sept. 15, 1971]

§ 178.219–5 Tape.

(a) Coated with glue at least equal to No. 1¾ Peter Cooper standard. Cloth tape of strength, across the woof, at least 70 units, Elmendorf test. Sisal tape of 2 sheets of No. 1 kraft paper, total weight 80 pounds per ream (500 sheets 24" x 36"); sheets to be combined with asphalt and reinforced by unspun sisal fibers completely embedded in the asphalt and extending across the tape.

§ 178.219–6 Test.

(a) Acceptable board must have prescribed strength, Mullen or Cady test, under test, as follows:
(1) Clamp board firmly in machine and turn wheel thereof at constant speed of approximately 2 revolutions per second.
(2) Six punctures required, 3 from each side; all results but one must show prescribed strength.
(3) Board failing may be retested by making 24 punctures, 12 from each side; when all results but 4 show prescribed strength the board is acceptable.

§ 178.219–7 Type authorized.

(a) Of solid fiberboard, telescoping type construction without recessed heads. Box to consist of top and bottom sections, divided equally or unequally, and inner lining tube or full depth cover 2-piece telescope type in which case the lining tube may be omitted. The lining tube, when required, must be staple stitched to the lower section of the box to give in effect a 2-piece box.
(b) Hand-holes oval in shape, not more than 1 inch in width by 3 inches in length and horizontal with top score line, are authorized in ends of top section of full depth cover telescope type boxes.

§ 178.219–8 Inside packing and size limits.

(a) As prescribed in § 178.219–11.

§ 178.219–9 Forming.

(a) Parts must be cut true to size and so creased and slotted as to fit closely into position without cracking, surface breaks, separation of parts outside of crease, or undue binding.

§ 178.219–10 Joints.

(a) Lapped at least 1½ inches from center of scoreline; staple stitched at 2½-inch intervals and within 1 inch of each end of joint; 2 banks of staple stitches in each joint.

§ 178.219–11 Authorized gross weight (when packed) and parts required.

(a) Box to be of solid fiberboard, special waterproofed at least 300-pound test, and weighing at least 250 pounds per thousand square feet. Tubes to be of solid fiberboard at least 200-pound test and of 1 piece with adjoining edges staple stitched or taped.

(b) Authorized gross weight: 65 pounds when 2 or more lining tubes are used to divide the box into 2 or more compartments; 65 pounds when 1 or more lining tubes are used and contents will consist of 1 cartridge only or of black powder in bags; 35 pounds in all other cases except that boxes having a single solid fiberboard lining tube, the fiberboard weighing at least 283 pounds per 1,000 square feet, are authorized for 65 pounds gross weight. Boxes of 2-piece telescope type having full depth cover are authorized for 65 pounds gross weight.

§ 178.219–12 Closing for shipment.

(a) By any method capable of withstanding tests prescribed by § 178.219–16 without failure.

§ 178.219–13 Marking.

(a) On each container. Symbol in rectangle as follows:

DOT–23H***

(1) Stars to be replaced by authorized gross weight (for example DOT–23H35 or DOT–23H65). This mark shall be understood to certify that the container complies with all specification requirements.

(2) Name and address of plant making the container; symbol (letters) authorized if recorded with the Bureau of Explosives. This mark to be located just above or below the mark specified in paragraph (a) of this section.

(3) Size of markings: Specification markings prescribed in subparagraph (1) of this paragraph must be at least ½ inch high; other markings must be legible.

§ 178.219–14 Special tests.

(a) *By whom and when.* By or for each plant making the boxes; at beginning of manufacture and at six-month intervals thereafter; on largest size, by weight. Smaller sizes need not be tested if they have the same or equivalent construction. Report of results, with all pertinent data, to be maintained on file for one year; copy to be filed with the Bureau of Explosives.

§ 178.219–15 Material.

(a) Box material (special water-proofed board) must be 300-pound test board and weigh at least 250-pounds per thousand square feet when commercially dry.

(b) Box material must also have 200-pound test strength and moisture content not over 30 percent as follows:

(1) Immediately after exposure for 3 days to 90 percent humidity at 75° F.

(2) Immediately after it has been in contact with water for 3 hours under 3″ head at 75° F.

NOTE: The test shall be conducted on a sample no greater than 6 inches in diameter when exposed to water. The sample shall be rigidly fastened to a water column device so constructed as to provide at least a 3-inch head of water on the outer surface of the fiberboard sample. The water column device must be suspended in such manner that free circulation of air on the inner surface of fiberboard sample which is not exposed to water is permitted. After contact with water for 3 hours under conditions specified, the water column device shall be emptied, the sample blotted, and immediately subjected to Mullen or Cady test. (A 6-inch diameter pipe having a welded flange to which the sample is secured by a bolted ring flange is acceptable.)

§ 178.219–16 Completed containers.

(a) Samples must pass the following immediately after exposure for 2 weeks to 90 percent humidity at 75° F.; loaded containers shall contain dummy contents of shape and weight of the expected contents, and shall be closed in same manner as for shipment:

(1) *Three loaded samples to be tested.* Each must withstand 200 drops in standard 7-foot revolving test drum with pointed hazard in place, without spilling any contents.

(2) *Three loaded samples to be tested.* Each must withstand end to end pressure of at least 500 pounds without deflection of over 1½".

(3) Three empty samples to be tested. Each must withstand top to bottom pressure of at least 500 pounds without deflection of over ½ inch.

(b) As an alternate to the drum test specified in paragraph (a), 3 loaded samples must pass the drop test specified below:

(1) Box shall be dropped from height of 2 feet.

(2) Identification of face, edge, and corners. Facing one end (with the manufacturer's joint on the observer's right), the top of the box is designated as 1, the right side as 2, the bottom as 3, and the left side as 4. The near end is designated as 5 and the far end as 6. The edges are identified by the number of two faces which make that edge, as for example, 1–2 identifies the edge where the top and right side meet and 2–5 the edge having the manufacturer's joint. The corners are identified by the number of the three faces which meet to form that corner, as for example, 1–2–5 identifies the corner where the top, the right side, and the near end meet.

(c) Drop sequence as follows:

(1) A corner drop on 1–2–5.

(2) An edge drop on the shortest edge radiating from that corner (usually 2–5).

(3) An edge drop on the next shortest edge radiating from that corner (usually 1–5).

(4) An edge drop on the longest edge radiating from that corner (usually 1–2).

(5) A flatwise drop on one of the smallest faces (usually end 5 or 6).

(6) A flatwise drop on the opposite smallest face.

(7) A flatwise drop on one of the medium faces (usually side 2 or 4).

(8) A flatwise drop on the opposite medium face.

(9) A flatwise drop on one of the largest faces (usually top 1 or bottom 3).

(10) A flatwise drop on the opposite largest face.

This completes one cycle of ten drops. Commence the next cycle with a drop on the corner diagonally opposite through the box to the corner on which the first drop was made, on corner 3–4–6. Commence the third cycle of ten drops with corner 1–4–5. Each loaded container must withstand 3 cycles without spilling or sifting of contents.

APPENDIX D—PUBLICATIONS

Following are excerpts from seven technical publications that describe the history, uses, properties, manufacture and recommended methods of treatment of black powder:

1. Assn. of American Railroads, Bureau of Explosives, *Explosives and Other Dangerous Articles* (New York: 1968), pp. 4–5.

Black powder is the oldest and most widely known explosive material. Black powder is a mixture of sulfur, charcoal, sodium or potassium nitrate and is made in several grain or particle sizes, also, some black powder grains are glazed while others are not. The manufactured powder is packed for shipment usually in 25 pound capacity metal kegs.

Black powder may be readily ignited by a spark. The finer the grains the easier the powder may be ignited. It is the peculiar susceptibility to sparks which renders the transportation of black powder hazardous. The generic term deflagrating explosives is used for black powder or other explosives of similar composition or similar characteristics. Although black powder has some of the characteristics of a low explosive it is rated as a class A explosive under the D.O.T. Regulations.

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2. Federal Bureau of Investigation, National Bomb Date Center, Introduction to Explosives (1973), pp. 24–25.

LOW EXPLOSIVES

Black Powder

The typical composition of black powder is saltpeter (potassium nitrate) or sodium nitrate, 75 parts by weight; sulphur, 10 parts by weight; and charcoal, 15 parts by weight. There has been, however, a wide variation in the black powder formulas that have been used over the years. The black powder mixture ranges in color from coal black to gray black to cocoa brown, and in form from a very fine powder to granules over ½ inch in diameter. The burning speed of black powder, and therefore to a certain extent its strength, is controlled by the size of the granulation. Large grains, of powder burn more slowly than fine grains and are consequently less sudden in their action.

Black powder does not deteriorate with age, even if its container, e.g. cannon ball, has been submerged in water. Once black powder dries out it is just as effective and dangerous an explosive as it was the day it was manufactured. Widely used during the Civil War as a bursting charge in artillery ammunition, black powder is often encountered in dealing with Civil War "souvenir" items and has been found to be dangerous and fully capable of explosion in spite of the passage of time.

Sensitivity to friction, heat, impact, and sparks makes black powder one of the most dangerous explosives to handle. It is particularly sensitive to both electric and nonelectric generated sparks and should, therefore, be handled with wooden or plastic tools. As a further precaution, the body should be grounded by touching a water pipe or other grounded object before black powder is handled. Outdoors, the body can be grounded by rubbing the hands on the ground prior to any physical contact with the powder. In any environment where black powder will be handled, clothing of static electricity producing nylon, wool, or silk should be avoided in favor of cotton fabrics.

One use for black powder is as a propellant for ammunition. It is sold in tin flasks and bulk tin containers for use in hand loading ammunition or firing muzzle loading weapons. Black powder used for this purpose is irregular in grain configuration and has a shiny, metallic appearance.

Because of its slow action and consequent heaving or pushing effect, black powder was for years the sole commercial blasting agent. Though it has been replaced by dynamite in most blasting applications, black powder is still used

for certain special operations. For this purpose it is manufactured in varying granulations, to enable the customer to match the powder to the specific application, and packaged in 25 pound metal kegs. For commercial blasting, black powder is also pressed into cylinders, 2 inches in length and from 1¼ to 2 inches in diameter. Each cylinder has a ⅜ inch hole through its center so that an electric squib may be inserted or so that the cylinders may be laced together on a length of fuse. In cylinder form, black powder is usually wrapped in paper to form a stick about 8 inches in length and is packed in 25 and 50 pound cases.

As a blasting charge, black powder has about half the strength of TNT and, because the basic ingredients can be readily acquired, it has become one of the favorite homemade explosives of bombers in the United States. Black or smokeless powder, whether homemade or commercial, will probably be the explosives most often encountered in pipe bombs. When confined inside a pipe and provided with a safety fuse, no blasting cap is needed to initiate the powder, because the flame that spits from the end of the fuse is sufficient to cause the explosion of the bomb. It should be noted that any sparks resulting from an attempt to dismantle a pipe bomb may produce the same results.

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3. Fedoroff, *Encyclopedia of Explosives* (Dover, N.J.; Picatinny Arsenal 1960), Vol. 2, pp. B165–79.

BLACK POWDER OR GUNPOWDER

Black powder, the oldest explosive and propellant known, consists of a mechanical mixt of saltpeter, charcoal and sulfur in proportions varying with the purpose. Here, saltpeter is the oxygen producer, while charcoal is the combustible material. The object of sulfur is to make the powder readily inflammable and to form, on burning, K or Na sulfide (by reaction with K or Na nitrate) so as to prevent part of the CO_2 from forming K or Na carbonate, which would, of course, mean a reduction in the amt of gas evolved. Sulfur also imparts the necessary tenacity and density to the powder mass (Ref 34, p 191).

Historical (Refs 1,2,3,5,7,8,16,22 & 27). The exact date of the discovery of BkPdr is unknown. Some historians, such as Diego Ufano, attribute its discovery to the Chinese (in the 1st century before Christ), others to the Hindus and still others consider it of Arabian origin. It is very probable, however, that mixts similar to BkPdr were used very early by the Chinese (and perhaps by the Arabs) in the manuf of fireworks, rocket-type arrows or incendiary compns, but it was not used as a propellant in firearms, as there is no proof that these were invented before the 13th century. According to Claudius, the Romans were familiar with fireworks in the 4th century, AD and it was proved historically . . . that as early as the 7th century, the Greeks had a secret mixt which possessed props similar to those of present BkPdr. The famous Greek Fire of Kalinikos contained combustible material mixed with a substance closely resembling saltpeter in its props and through its use many naval victories were won by the Greeks against the Arabs, Turks and Russians.

The secret of the compn was well guarded for about 5 centuries after its invention, but the Turks finally obtained the formula and used the Greek Fire against the Christians at the time of the 5th Crusade (1217). During the 6th Crusade (1249), the army of Saint Louis was assailed in Egypt with incendiaries thrown from ballistae, with fire tubes and with hand grenades of glass and metal, which scattered upon bursting (Ref 16, p 33). Marcus Graecus, in about 800 AD, described in detail the compn of the Greek Fire used in his time. It contained sulfur and saltpeter mixed with pitch and other combustibles. He also gives a compn of a BkPdr consisting of saltpeter, charcoal (willow or grapevine) and sulfur. Marcus Graecus' work was quoted by an Arabian physician, Mesue, living in the 9th century. Western Europe was in complete ignorance of such compns. It was sometime before 1249 that Roger Bacon, a monk living in England (1214–1292), described a mixt resembling the present BkPdr and, as far as is known, this was the first publication on BkPdr to appear in Western Europe. However, there was nothing in his writings to suggest that he contemplated the use of BkPdr for propelling missiles or as an explosive.

The invention of BkPdr did not revolutionize the technique of warfare in Western Europe because there were no firearms. This situation lasted until about

the beginning of the 14th century when Berthold Schwarz, a German monk living in Freiburg, described a device (an iron tube) for throwing stones a considerable distance, using BkPdr as a propelling medium. It is not certain whether this "firearm" was the invention of Schwarz, or if he only improved the already existing crude device. Although some historians, especially German, attribute to Schwarz, not only the invention of firearms, but also the invention of BkPdr, there is no proof for such a statement.

Accdg to Col Hime, the cannon was invented in 1313 by an "unknown" German monk and was introduced in 1314. It was used in the same year at the battle of Bannockburn.

It may be mentioned that the manuf of firearms and of BkPdr in Russia began about 1389.

Notwithstanding the advantages of firearms (compared with the bow and arrow), it was not until the end of the 15th century that they became prevalent in open warfare. By the beginning of the 16th century the compn of BkPdr was well stabilized, becoming very close to the formula used in modern times, namely, saltpeter ca. 75, charcoal 12.5–15 and sulfur 10–12%. Although practically no changes have been made in the compn since that time, many improvements have been introduced which resulted in the prepn of more homogeneous mixts and in powders with better ballistic props. The ballistics of firearms were also improved through mechanical design of the weapons.

Until about the 17th century cannon balls were solid pieces of either stone or iron (first introduced ca. 1391) and BkPdr was used only for propelling these balls. When hollow cast iron balls, provided with an opening and filled with BkPdr, were introduced, the powder began to function also as an explosive (bursting charge). After loading a hollow ball with BkPdr, a time fuse (resembling the present Bickford fuse) was inserted through the opening in the ball. Then the gun was loaded through the mouth with a propelling charge of BkPdr and after inserting the ball, the propelling charge was ignited through a hole near the breech of the gun. The burning gases from the decompn of the BkPdr ejected the ball and ignited the time fuse. After reaching the target, the fuse ignited the charge in the ball which resulted in expln and bursting of the ball into small pieces.

Another great improvement in firearms was the introduction in the middle of the 19th century of rifled barrels and then later of breech-loading. The first large-scale use of rifled firearms was during the Crimean War (1855–6) by the French, British and Italians against the Russians, who still used smooth-bore firearms at that time.

As the power, brisance and velocity of detonation of BkPdr are low, firearms using it were neither powerful nor of long range.

The ancient compns were in powder form (from which the name "powder" is derived) and they burned with extreme rapidity. To make them slower burning, the Germans (according to some historians), as far back as the middle of the 15th century, introduced grained BkPdr. According to other sources it was in the Spanish Kingdom of Aragon that the first grained BkPdr was produced. At first the grains were irregular in shape and size, which lead to very non-uniform rate of burning. Gradually, it was learned that to obtain the best ballistics, the size and shape of the grain should be uniform. Napoleon was known to have used roughly cubical grains 8mm thick in the smaller field guns and grains about twice as thick in the larger guns. Later solid prismatic hexagonal grains of various sizes were introduced and in 1860 an American, Gen Rodman, developed (in an attempt to make BkPdr progressive-burning) perforated *cake powders* which consisted of large, solid, cylindrical grains (blocks) of nearly the same diam as the bore of the cannon, contg a hole about ¼" in diam along the axis of the cylinder. One grain was required for each firing. This powder was sometimes called "Mammoth". For larger cannon (such as 10 & 12-inch guns), the blocks (prisms) were made in sections (discs) which were joined by means of bands of paper glued around the joint. When these single-perforated prisms were lighted, the area of the outer surfaces decreased as the burning advanced but the area of the inner surfaces increased and a high rate of gas production was maintained. The Russians, Prussians and the British soon adopted Rodman's idea for their artillery. The perforated prisms were manufd not only in large sizes, as advocated by Rodman, but also in small sizes, and such powders, especially when used in rifled guns, gave higher velocities and greater ranges than had been possible previously.

In 1862–1864, Doremus, in France, introduced powders prpd by compressing the grains. The conglomerate thus formed retained the granular structure but was slower burning than grains in the loose form. This powder was used in small and medium caliber guns and proved to be satisfactory.

The last two improvements in BkPdr were made in the 70's and 80's of the 19th century just before BkPdr ceased to be a war lord, the position it had occupied for nearly six centuries (from the 1st quarter of the 14th to the last quarter of the 19th century). These improvements include: a) the use of multiple perforations in the prismatic grain by means of which the burning surface was made to increase as the burning progressed, resulting in acceleration of the rate of gas production, and b) the use of a slower burning formulation called *Brown Powder or Cocoa Powder* (also called *Chocolate Powder*), introduced by the Germans in 1882.

It is interesting to note that the first BkPdr factory established on the Amer continent was in Mexico at the time of Hernán Cortez (16th century) (Ref 19). In the US, the first powders were manufd at Milton, Mass. as early as 1675 and one year later were reported as being equal in quality to that of the best British powders.

In 1857, the only major change which has been made in the compn of BkPdr was introduced in the US by Lammot duPont, who substituted the more abundant and cheaper sodium nitrate for the more costly potassium nitrate.

The following table gives the approximate compns of BkPdr from ancient times to the end of the 19th century:

	K Nitrate	Charcoal	Sulfur
China (before Christ)	72.6	19.0	8.4
Marcus Graecus (8th century)	67	22	11
Roger Bacon (ca 1252)	37.5	31.25	31.25
Arderne formula (ca 1350)	66.6	22.2	11.2
Arabia (16th century)	74	15	11
Brussels formula (Belgium) (1560)	75.0	15.62	9.38
British Government formula (1635)	75.0	12.5	12.5
Swedish (1697)	73.0	17.0	10.0
American Colonies (1775)	75.2	13.5	11.3
British Watson formula (England) (1781)	75.0	15.0	10.0
Military powders in European States (19th century)	71–77	12.5–15	9–12.5
Blasting powders in Europe (19th century)	62–73.5	12–19.4	14–20
Sporting powders in Europe (19th century)	75–80	12–17	8–10
Powder in United States (19th century)	75	15	10

All of these improvements could not remove two props of BkPdr which render it not very desirable for use as a military propellant—low ballistic potential and production on firing of enormous amts of smoke, which quickly make the location of artillery obvious to the enemy. Its low power, brisance and velocity of detonation make it too weak for use as a bursting chge for any but cast-iron shell.

With the invention, about the middle of the 19th century, of NG and NC, it became possible to produce propellants practically smokeless and of high ballistic potential. The first "smokeless" proplts (such as Austrian and British, developed betw 1864 & 1883), were not colloided. Being porous they burned very fast and often caused gun barrels to burst. When the way was found to prep proplns as non-porous grains—by gelatinizing NC, either with alcohol [see B Poudre (invented in 1884 by P. Vieille) in this volume] or with a liq expl, such as NG see Ballistite (invented in 1888 by A. Nobel), in this volume, the use of BkPdr and of Cocoa Powder as a military proplnt was discontinued.

With the discovery in the 1880's that PA (previously known for many years as an external medicine) is a very powerful and brisant expl, combined with the introduction by Turpin of new HE shells (which were/essentially the same as shells currently in use), the need of BkPdr as a bursting chge was completely eliminated. In later years, other HE's were invented, such as Explosive D (Ammonium Picrate), TNT, Tetryl, PETN, RDX, etc.

Although BkPdrs are no longer used as military proplnts or as bursting charges in shells or bombs, they are still used as proplnts in some sporting weapons. They are also used as blasting expls and for some other purposes (see below under Properties of Black Powders).

The use in Europe of BkPdr as a mining expl probably began in Saxony as early as 1613 and then in Hungary ca 1627. It was used in England since ca 1670, slightly later in Sweden, and in the American Colonies since ca 1712 (Simsbury, Conn).

With the growth of the steel and coal industries in the first half of the 19th century, the use of BkPdr as a blasting expl increased tremendously until the production in the US in 1860 was ca 25 million lbs per year. Production reached an all time high of 277 million lbs in 1917 but has gradually declined since that time; production in 1947 was ca 36 million lbs and in 1958 it dropped to ca 6 million lbs, of which 1% was used for blasting (Ref 33). In contrast to the figures on BkPdr, the production of dynamite in the US (mostly NG compns), used mainly in blasting operations, is currently ca 1 billion lbs annually.

BLACK POWDERS CONTAINING POTASSIUM NITRATE

The compn of most current military BkPdrs is betw the following limits: K nitrate 74–78, charcoal 12–16 & sulfur 10–12.5%. Compns of many sporting and blasting powders are betw the same limits. There are, however, some exceptions, such as some Belgian blasting powders, which formerly consisted of KNO_3 70–73.5, charcoal 12.5–14 & sulfur 14–16% and a Russian blasting powder: KNO_3 66.6, charcoal 16.7 & sulfur 16.7%. One of the Russian sporting powders contained KNO_3 80, charcoal 12 & sulfur 8%.

Preparation. In earlier days, BkPdrs were prepd by grinding the ingredients by hand in mortars. This was superseded by the socalled *Stamp Mill.*

Modern methods of prepn consist essentially of the following operations:

(a) *Grinding, Mixing and Incorporating.* Charcoal (such as obtd by charring alder, willow or poplar trees) is broken up by *Wheel Mills* and then pulverized after adding the required amt of sulfur (high grade, commercial product), in a *Ball Mill.* In this operation sulfur is worked into the cellular openings of the charcoal. The dampened material is mixed with K nitrate (previously finely ground) and the moisture content adjus'ed to ca 4%. About 300 lbs of this mixt are placed in a *Wheel Mill* (such as described in Ref 11, p 46; Ref 18, p 69 or Ref 28, p 87) where the mass is processed during 3–6 hrs. This operation is called *Incorporation or Milling.* The resulting material is called "mill cake", "clinker" or "wheel cake". It is broken into small pieces and sent to the press.

(b) *Pressing* is done in hydraulic presses where the material is subjected to a pressure of ca 6,000 psi. As the operation is dangerous, it is usually conducted by remote control. The cakes are broken up with wooden tools and transported to the *Corning Mill.*

(c) *Corning or Granulation* consists of cracking up the cake into grains of desired sizes by means of a series of adjustable rolls having corrugated surfaces. The granulated material is then passed through a series of mechanically-shaken screens where the particles of different sizes separate and the dust is removed. The particles are classified according to the size of the screen and transferred to the *Finishing House.* The coarse material is passed through the rolls a second time and rescreened. The Corning Mill Dust is collected for use in fuses or in pyrotechnics. The Corning operation is the most dangerous of all the manufg operations and must be conducted by remote control.

(d) *Finishing or Polishing* is accomplished by tumbling, for as long as 8 hrs, the granulated material in a wooden drum, rotating on its axis. This operation may be combined with drying which can be accomplished by a stream of hot air. If a glazed powder is desired, a small amt of fine graphite is added to the contents of the drum after the moisture has been reduced to a certain point but before the powder is too dry. The moisture content of the finished powder is ca 1%.

Note: Final drying may be conducted by placing the powder on trays covered with canvas in the dry house.

(e) *Grading* of power consists of rescreening and separating into different grain sizes. The word "grade" applied to BkPdr refers to grain size, not the quality.

(f) *Blending* consists of mixing various grades of powder to obtain a desired rate of burning or other props.

Two processes for manufg BkPdr with modern production equipment have been developed and tested on a laboratory scale by Propellex Chemical Division

of Chromalloy Corp. Their final rept on the project describes the two processes (one with and the other without the use of CS_2), and also briefly discusses a number of other methods suggested by M. Baer and K. Kite of PicArsn.

Properties: BkPdr is one of the weakest expls and belongs to the class of "low expls" or "propellants". It contains sufficient oxygen for combustion to CO and nearly sufficient for combn to CO_2. The outstanding characteristic of BkPdr is that it can be exploded (or rather deflagrated) by ignition, yet it is very insensitive to impact, properties which are rarely encountered together.

Note: The opinion is held by some that the powder does not explode but merely deflagrates with the evoln of gases and it is these gases which finally explode.

The main disadvantages of BkPdr are: weakness, production of large amt of smoke and the corrosive action on metals of some of the products of its combustion. Alone, it is corrosive in the presence of moisture but not when dry.

BkPdr is the slowest acting of all the common expls. When used for blasting operations it has a shearing and heaving action which tends to break the material into large, firm fragments or masses. This action derives from a relatively slow development of gas pressure, which is sustained. In order to obtain the best results, it must be closely confined. BkPdr is unsuitable, however, for gassy and dusty coal mines because it produces a hot durable flame. Because of its high sensitivity to friction, heat, spark and flame, danger of manuf and inability to perform in many types of hard-rock shooting, it has been replaced by other blasting expls.

BkPdrs contg approx: KNO_3 74–75, charcoal 12.5–16 & sulfur 10–12.5% (including the compn KNO_3 74.0, charcoal 15.6 & sulfur 10.4%, may be considered to possess (approximately) the following props:

(a) *Brisance*-by Kast formula $B=1.4 \times 10^6$ vs 86×10^6 for TNT (Ref 11, p 95) by Sand Test-8g sand crushed by 0.40g BkPdr, vs 48g for TNT (Ref 31); 6.3 to 9.0g sand crushed (Ref 36).

(b) *Calorimetric Value*—ca 720cal/g (Ref 34).

(c) *Compatibility*—in the dry state it does not attack any of the common metals; attacks all of them, except stainless steel, when moisture is present (as low as 0.2%) (Ref 31).

(d) *Density*—1.7 to 1.89 depending on compn and compression (Ref 28, p 87; Ref 31 and Ref 34, p. 191).

(e) *Equation of Combustion:*

Sukharevskii & Pershakov (Ref 9) give the following equation:

$74\ KNO_3 + 16C_6H_2O$ (Charcoal) $+ 32S = 56CO_2 + 3CH_4 + 2H_2S + 4H_2 + 35N_2 + 19K_2CO_3 + 7K_2SO_4 + 2K_2S + 8K_2S_2O_3 + 2KCNS + (NH_4)_2CO_3 + 14CO + C + 3S$.

Stettbacher (Ref 11, p 108) gives for powder contg KNO_3 74.9, C 13.3 & S 11.8: $2KNO_3 + 3C + S = K_2S + 3CO_2 + N_2$.

Bofors Manual (Ref 34, p 190) gives the following equation:

$20KNO_3+32C+8S=5K_2CO_3+K_2SO_4+K_2S_2O_3+3K_2S+2S+11CO_2+16CO+10N_2$

of which about 43% are gases and ca 57% solid residues.

In TM 9–1910 Ref 28, p 86) the following equation for autocombustion of BkPdr is given:

$74KNO_3+96C+30S+16H_2=35N_2+14CO+3CH_4+2H_2S+4H_2+19K_2CO_3+7K_2SO_4+8K_2S_2O_3+2K_2S+2KSCN+(NH_4)_2CO_3+C+S+56CO_2$.

See also Ref 28a (discussion on ignition and combustion reactions of BkPdr) and Ref 28d (description of experimental investigation of the laws of combustion of BkPdr at atmospheric pressure and below).

(f) *Explosion or Ignition Temperature:* 510° (0.1 sec; no cap used); 490° (1 sec in cap); 427° (ignites in 5 sec); 356° (10 sec) (Ref 31): 359° (12 sec) (Ref 26a, p 1393); 457° (ignites in 5 sec) (Ref 36).

(g) *Flame Sensitivity*—ignites very readily (Ref 20, p 37 & Ref 28, p 86); Escales (Ref 1, p 394) gives for prismatic pdr 5.4 to 9.0 sec and for small grain pdr 3.6 to 4.5 sec.

(h) *Friction Sensitivity* by Pendulum Test—affected with Steel shoe and unaffected with fiber shoe (Ref 31); no explanation with steel shoe (Ref 36).

(i) *Heat of Combustion*, Q^v_c ca 1425 cal/g (Ref 9).

(j) *Heat of Explosion*, Q^v_e 665 to 690 cal/g (Ref 9); 693 cal/g (Ref 36).

(k) *Hygroscopicity* gains 1.91% at 25° and 90% RH (Ref 31).

(l) *Ignitability*, flame of a match or of a miner's squib as well as electric spark ignites it (Ref 36).

(m) *Impact Sensitivity:* PicArsnApp, 2kg wt 16" (vs 14" for TNT) (Ref 31); Bofors Detn, 2kg wt ca 70 cm (Ref 34,p 191); B of M, 2 kg wt 49cm for KNO_3 BkPdr and 66 cm for $NaNO_3$ BkPdr (Ref 36).

Deck (Ref 6) gives 32" for BkPdr dust when detd by PicArsnApp with 2kg wt.

(n) *Initiation* and thermal decomposition of BkPdr is discussed by Blackwood & Bowden (Ref 28a).

(o) *International Heat Test* at 75°–0.31% loss in 48 hrs (Ref 31).

(p) *Maximum Temperature of Explosion*–2380° vs. 2800° for TNT (Ref 11, p 95); ca 2400° (Ref 34, p 19).

(q) *Power*, by Trauzl Test-30cc expansion produced by 10g sample vs 300cc for TNT (Ref 34,p 191); 10% of TNT (Ref 31); by Ballistic Mortar 50% TNT (Ref 31); by Ballistic Pendulum 42.5% of TNT for pdr contg KNO_3 75.06, charcoal 13.68, S 10.76 & moisture 0.50% (Ref 36).

(r) *Rate of Burning* depends on compn, density and grain size. The rate increases on increasing the percentage of oxidizer (such as K or Na nitrate), within certain limits. The rate decreases when the percentage of fuel (charcoal, coal, brown coal, etc) is increased. With increase in the amt of sulfur, the rate increases to a certain extent, although sulfur acts mainly as a fuel and only to a small extent as an oxidizer (because it forms K_2S). The rate decreases with an increase in grain size and sl decreases with increase in density. When confined, increase in gas pressure causes increase in burning rate (Ref 20,pp 37–8 & Ref 28b,pp 86–7). W.O.Snelling & W.C.Cope, USBurMines Tech Paper 6,Washington, DC (1912), give the rate of burning of fuse pdr as influenced by temp, pressure, moisture and granulation. For instance, an 80-mesh pdr burns at atm press and ord temp at the rate of 82.3sec/m (25.1 sec/ft) vs 76.3sec/m (23.2sec/ft) for 40-60-mesh pdr. A cotton covered safety fuse burns at atm press and 18° at the rate of 82.3sec/m (25.6sec/ft) vs 49.8 (15.2) at 15 psi and 34.4 (10.5) at 30 psi (p 15). Moisture & high temps cause a decrease in burning rate. Safety fuses mfd by the DuPont Co burn either 90 or 120 sec/yd (Ref 28, p 89).

Some fast-burning fuse pdrs. burn ca 30sec/yd, whereas some modified slow-burning pdrs, such as those contg aldol-α-naphthylamine and aldol-β-naphthylamine, burn at the rate of 250-300sec/yd [H.H.Holmes & W.E. Lawson, USP 2414465 (1947) & CA 41,2578 (1947)]. Escales (Ref 1,p 396) gave for a rifle BkPdr at latm press 0.80cm/sec & at 500atm 6 cm/sec; the corresponding values for a brown prismatic pdr were 0.90 & 4cm/sec. US Army Purchase Description X–PA–PD–623 gives "static burning time" requirements for fuze pdrs. when tested directly in fuzes. For instances, for fuzes M54, M55A3, M77 or M84 the *average burning time* shall be 18.0 to 23.0sec and the "*minimum average burning time*" 36.0sec. The corresponding values for M65A1 fuzes are 9.0 to 13.0sec & 18.0sec. Tests for "rates of burning" of black blasting pdr and for pellet pdr are described by C.E.Munroe & J.E.Tiffany, Bur-Mines Bull 346, "Physical Testing of Explosives", Govt PrtgOff,Washington,DC (1923). Combustion of BkPdr at atm and lower pressures was studied by A.Douillet,MP 37, 167–96 (1955).

(s) *Sensitivity to Electrostatic Discharge* (Joules) >12.5 for unconfined and 0.8 for confined sample (Ref 31),

(t) *Sensitivity to Flame.* See Flame. See Flame Sensitivity.

(u) *Sensitivity to Sparks and Incandescent Particles*- very sensitive (Ref 28, p 88).

(v) *Specific Energy* (*f*) 2310 vs 8080 for TNT (Ref 11).

(w) *Specific Heat* ca 0.2cal/g at RT (Ref 36).

(x) *Vacuum Stability*- 0.5ml/40 hrs/100° and 0.9ml/40 hrs/120° (Ref 31); 0.86ml/40 hrs/120° for black meal powder and 0.75 for meal pdr contg 2% stearic acid (Ref 36).

(y) *Velocity of Detonation*- ca 400m/sec at d 1.6–1.7 vs 6825 for pressed and 6640 for cast TNT at d 1.56 (Ref 31); 400m/sec at 1.7 (Ref 34,p 191).

(*z*) *Volume of Combustion Gases* at 0° 760mm 271–280 l/kg vs 690–730 for TNT; ca 280 l/kg (Ref 11, p 95 & Ref 34, p 191).

(*zA*) *Uses:* Sporting proplnts, blasting and demolition expls, time fuzes, primers, igniters (of smokeless proplnts), time rings (in fuzes), delay & relay elements, petards, pyrotechnics, base chge for shrapnel shells (now seldom used), bursting chge for blank, saluting & practice cartridges & shells, flash reducer (in some smokeless proplnts), squib charges, Navy donuts for catapult charges, smoke-puff chges, chemical ammo as well as in Rocket, JATO and missile boosters and sustainers (Ref 28b, p 86; Fef 31 & Ref 34).

BLACK POWDERS, CONTAINING POTASSIUM NITRATE, USED IN THE UNITED STATES OF AMERICA

Requirements for the US Armed Forces are covered by the Specification JAN–P–223A for the powder alone; JAN–P–156 for potassium nitrate; JAN–C–178A (1) for charcoal (usually obtd by burning peeled willow, alder or certain hardwoods); JAN–S–487 for sulfur and JAN–G–155(1) for graphite. The compn is the same for all grades: K nitrate 74.0, charcoal 15.6 & sulfur 10.4%, but tolerances vary slightly (up to ±1.0%). The ash content for all grades is 0.80% (max), moisture 0.70% for all grades except A–1, for which the max is 0.50%, and the density is 1.72 to 1.77. No foreign matter such as gritty or fibrous particles shall be present.

For a description of various grades of US military BkPdrs and their uses, see JAN–P–223A.

The compns listed above may be considered as *fast-burning*, while the following compn is *slow-burning:* K nitrate 59.0, charcoal 15.6, sulfur 10.4 & nitrate 15.0%. By blending fast- with slow-burning mixts in different propns, it is possible to obtain powders suitable for various types of fuzes.

Another *slow-burning* mixt is the so-called *Coal Powder*. Its compn is: K nitrate 70.0±1.0, coal 14.0±1.0 & sulfur 16.0±1.0%. The US Armed Forces requirements for this powder are given in Spec X–PA–PD–623 (listed as Type II Powder, Black, Slow Burning) which superseded Spec JAN–P–540. The coal used for this powder must be semibituminous and of such fineness that 100% passes through No 140 US Std sieve and not less 45% through No 200 sieve. Other requirements for coal are: moist 0.75% (max), ash 11.0±1.5, volatile matter 18.0±1, fixed carbon 70.5±3.5 & sulfur 3.0±0.5%; no foreign matter, such as gritty or fibrous particles, shall be present. This BkPdr shall be of such fineness that 3% (max) is retained on a No 140 US Std sieve and 2% (max) retained on a No 200 sieve. Static burning time, when loaded in US Std Fuzes M54, M55A3, M77, M84 and M65A1, must be as indicated above under *Rate of Burning* (item r). No gritty or fibrous matter shall be present.

A BkPdr used in US *time fuzes* for military ammo consists of K nitrate 74.0±1.0, charcoal 15.6±1.0 & sulfur 10.4±1.0% and the requirements of the US Armed Forces are covered by Spec X–PA–PD–623 (listed as Type 8, Powder, Fuze), which superseded Spec JAN–P–TRP. The ash content 0.60% (max) and granulation must be of such fineness that 3% (max) is retained on a No 140 US Std sieve and 2% (max) passes through a No 200 sieve. When loaded in US Std Fuze M54, M55A3, M77, B84 aand M65A1 the static burning time of the powder must be as indicated above under *Rate of Burning* (item r); no gritty or fibrous matter shall be present.

BkPdrs for blasting operns by the DuPont Co are described in Ref 27, pp 45–8. Their *Pellet Powder* may be considered as an improved form of Bkpdr.

BLACK POWDERS, CONTAINING POTASSIUM NITRATE, USED IN EUROPEAN COUNTRIES

BkPdrs used in Europe have practically the same formulations as those used in the US. As an example, the following compns of powders were used in France before WW II (Ref 12, p 280).

	K nitrate	Charcoal	Sulfur
Poudre de Guerre (military powder)	75	12.5	12.5
Poudre de mine forte (strong mining exploration)	75	15.0	10.0
Poudre de mine ordinaire (ordinary mining exploration)	62	18.0	20.0
Poudre de mine lente (slow mining exploration)	40	30.0	30.0
Poudre de chasse (sporting powder) [1]	78	12.0	10.0
Poudre de guerre brun (brown military powder)	78	19.0	3.0

[1] P. Tavernier, MP 36,232 (1954) gives for black sporting powder: KNO_3 75–78, charcoal 12 to 15 and S 9 to 12 percent.

As there is no info at our disposal on current British BkPdrs, we are using here the description given in Thorpe (Ref 13a,p 584). The powders used in England were classified according to the size of grain. Some of them described below are definitely obsolete.

(a) *Grain Powders* were prepd by passing irregularly broken pieces of pressed cake through a series of rolls, each set of rolls causing a progressive reduction in the size of the grains. In the case of small arms powder, the grains were first

reduced to pass through No 10 BritStd sieve and were then screened on a No 20 sieve to remove fines and dust. The sized grains were then polished and coated with graphite and Al powder.

(b) *Pebble Powders* were manufd first ca 1865. The press-cake was cut into uniformly sized cubes ranging from 5/8" to 1.5" on a side. These powders were larger than ordinary grain powders and were used in order to prevent the development of excessive pressures. They are now obsolete.

(c) *Perforated Cake Powder*, devised in the US by Rodman ca 1860, was made in the form of cylindrical cakes which were pierced axially with ca 1/4" holes. The cakes were of the same diam as the bore of the gun in which they were used and were packed in cartridges with the holes in one cake aligned with those in the adjacent cake. These cakes were easily broken, however, in the course of transportation and were soon replaced by prismatic powder (see below).

(d) *Prismatic Powder* was made in the form of hexagonal prisms, ca 1.25" wide and 1" deep, with a hole through the center 0.4" in diam. The prisms were packed to form rigid cartridges for use in guns of large caliber (See also Refs 14, 15, 17, 22, 23, 30 & 31a).

BLACK POWDERS CONTAINING SODIUM NITRATE

These powders, introduced in 1857 in the US by Lammot duPont, are less expensive than the KNO_3 compns but are more hygroscopic, much slower and slightly weaker (Ref 27).

Requirements for the US Armed Forces are covered by Specification JAN–P–362(1) for the powder itself; JAN–S–322 for sodium nitrate; JAN–C–178A(1) for charcoal; JAN–S–487 for sulfur and JAN–G–155(1) for graphite.

Composition of the powder: Na nitrate 72.0±2.0, charcoal 16.0±2, sulfur 12.0±2.0, ash (including deterrent if used) 1.5 & moisture (max) 0.70%, density 1.72–1.84. It is glazed with graphite. There are three classes, according to granulation: (a) *Class A*—100% through No 12 sieve, 45% through No 16 and 99% retained on No 40; intended to be used for saluting chges, usually in the form of pellets. (b) *Class B*—99% retained on No 16 sieve; intended for use in practice bombs. (c) *Class C*—100% through a sieve opening of 9/16" and 100% retained on a sieve opening of 3/8; intended for use in torpedo impulse charges.

Sodium nitrate BkPdrs used in mining and to some extent in demolition work are usually in the form of cylindrical *pellets* ca 2" long and ranging from 1 1/8" to 2 1/2 in diam. The pellets have a 3/8" hole in the center which facilitates rapid and uniform ignition and permits a fuse to be inserted into or through the pellet. This opening will also seat an electric squib. The pellets are wrapped in paper to form cartridges of any desired length (usually 8") and the cartridges are dipped in paraffin, or similar material, to protect the powder from moisture. Pellets are more convenient and less dangerous to handle than other forms of BkPdr (Ref 27).

Pepin Lehalleur (Ref 12,p 287) and Sancho (Ref 15,pp 285–6) give compns of some European powders contg Na nitrate, such as:

Composition	De Tret's Pyronome	Freiberg and Wetzlar's	Soulage powder
Na nitrate	71.3	61.7–66.7	50–60
Charcoal	15	17.4	12–16
Sulfur	13.5	11.8–17.2	13–6
Soot			9–18
Oak bark		18.7	
Iron sulfate			4–5
Moisture		2.8	

BLACK POWDER MODIFICATIONS

A modification of BkPdr, known as *Brown-, Cocoa-, or Chocolate Powder* (so named because of its brownish color) was invented in Germany ca 1882. It contained K nitrate 79, brown charcoal (contg ca 2% H_2O) 18 & sulfur 2% and was made in the form of prisms. The brown charcoal was prepd by incompletely charring a light wood or straw and hence contained more volatiles than black charcoal. The compn of Brown Pdr was kept secret until the Russians published in 1886 the formulation of their own powder manufd at the Ochta plant, near

St. Petersburg. The Russian powder consisted of K nitrate 78.4, brown charcoal 19.6 (prepd from incompletely charred rye straw) and sulfur 2.0%. As the partially charred wood or straw possesses some colloidal props, it enabled the compn to flow under pressure, thus cementing the grains together, as in the case of sulfur. This made possible a reduction in the amt of sulfur or even its complete elimination, thus making the powders slow-burning. The use of Brown Pdr greatly improved the ballistics of big guns and made possible the use of larger caliber guns than could be used with BkPdr. Also, for equal muzzle velocities, BkPdr produced less pressures than BkPdr (Ref 13a). Brown Pdr was also used by the US Armed Forces, as late as 1898, during Spanish-American War.

A modification of BkPdr which does not contain sulfur is called *sulfurless black powder*. A sample of such pdr manufd by the King Powder Co was examined at PicArsn in 1941. The pdr contained KNO_3ca 70 & charcoal 30%. Its d was 1.63 (Ref 36).

A BkPdr used in *safety fuses* must consist of fine, uniformly grained particles free from dust. This type of powder must be of special quality and constant compn, contg, in some cases, various additives for controlling the rate of burning.

Lowering of the burning rate may be achieved by one of the following methods:

(a) Addn of inert bodies, such as brick dust, graphite, Ba or Pb sulfate of various metals. Fuses contg these substances do not burn very uniformly and they leave large residues.

(b) Addn of rosin. This method increases the time of burning from 45 sec per yard to 900 sec.

(c) Treatment of the grains of powder with a soln of NC (or other cellulose product). This treatment not only modifies the rate of burning but also renders the powder less hygroscopic.

(d) Substitution of pitch for charcoal may increase the time of burning from 45 to 180 sec/yd and even to 500 sec (method of Foster & White).

(e) Introduction of triphenyl phosphate, camphor, substituted ureas, etc, suggested by F. Olsen.

(f) Substitution of cuprene, wholly or in part for charcoal.

One of the most recent modifications of BkPdr is the so-called *Benite* developed at PicArsn by Hassmann (Ref 33a) for use in igniter compns of artillery primers or in base igniter bags for separate-loading ammo. This powder is, accdg to Huselton & Kaplowitz (Ref 35), in the form of extruded strands consisting of the ingredients of BkPdr (KNO_3, Charcoal & S) in a matrix of NC. The ratio of BkPdr ingredients to NC is 60/40.

Benite can be manufd by a solv extrusion process, using essentially the same mixing, extrusion & drying facilities employed in the manuf of double and triple base cannon propints. Based on production engrg studies to improve the manufg process, Huselton & Kaplowitz (Ref 35) developed an acceptable spec which was practical for production use. Some requirements in the R & D Spec PA-PD-1741, such as moisture content, total volatiles, & the use of reagent gd KNO_3 were changed. The resulting changes are contd in the current spec, MIL-B-45451, 27 Jan 1960.

Both the friction pendulum and deton hazard (solv wet) tests show that Benite reacts similarly to single base, M-18 propint and therefore may be considered a Class 2 expl hazard when wet. The functioning characteristics of benite are relatively unaffected by minor changes in dimensions of the strands and formulation (Ref 35).

Details of the manufg procedure for std and modified Benite formulations are given by Huselton & Kaplowitz (Ref 35). Hassmann (Ref 33a) reported physical, chemical and sensitivity characteristics of std Benite in comparison with those of Grade A–1 BkPdr. The stud Benite formulation, as given in the specs, is as follows: NC (13.15%N) 40, K nitrate 44.3, sulfur 6.3 & charcoal 9.4% with EtCentr 0.5% added.

Other modifications of BkPdrs are listed after Refs.

Refs: (1) R. Escales, "Schwarzpulver und Sprengsalpeter", Veil & Co, Leipzig (1910). (2) H. W. L. Hime, "The Origin of Artillery", Longmans-Green, London (1915), 28, 60, 95 & 149–69. (3) Marshall 1 (1917), 53–91. (4) J. A. Marshall, "The Manufacture and Testing of Military Explosives", McGraw-Hill, NY (1920), 114–17. (5) Van Gelder & Schlatter (1927), 3ff (History of BkPdr in the U.S.). (6) H.S. Deck, Army Ord 7, 34 (1926) (Impact test value for BkPdr dust). (7) H. Desvergnes, Army Ord 10, 191–4 (1929) (History of development of military powders). (8) Marshall 3 (1932), 1–5. (9) Sukharevskii & Pershakov

(1932), 169. (10) Vennin, Burlot & Lécorché (1932), 505–24. (11) Stettbacher (1933), 3, 95 & 97–113. (11a) I. V. Lapchenkov, "Kurs Dymnykh Porokhov". Goskhim Tekh Izdat, Moscow (1933) (in Rus.). (12) Pepin Lehalleur (1935), 279–89. (13) Beyling-Drekopf (1936), 1 & 67–71 (13a) Thorpe 4 (1940), 458. (14) N. A. Shilling. "Kurs Dymnykh Porokhov", Oboronguiz, Moscow (1940) (in Rus.). (15) Sancho (1941), 253–86. (16) Davis (1943), 28–51. (17) M. M. Kostevitch, "Espoletas de Tiempo y Pólvoro Negra para los Reguladores Inferior y Superior", Buenos Aires (1943). (17a) W. Hassenstein, SS 39, 1–9, 22–6 & 37–42 (1944) (The Chinese and the Discovery of Powder). (18) Anon, "Ammunition Inspection Guide", TM 9–1904 (1944), 68–79. (19) Pérez Ara (1945), 133–48. (20) All & En Expl (1946), 36–9.

(21) Stettbacher (1948), 1,20 & 58–9. (22) Vivas, Feigenspan & Ladreda 3 (1948), 3–74. (23) Giua, Dizionario 2 (149), 162–4. (24) J.Fauveau, MP 33, 452 (1951) (Evolution of propellants). (25) Kirk & Othmer 6 (1951), 3–7 & 77 (under Explosives). (26) H.Henkin & R.McGill, IEC 44, 1393 (1952) & CA 46, 8857 (1952). (27) Stettbacher (1952), 78–80. (28) Blasters' Hdb (1952), 45–8 & 89. (28a) J.D.Blackwood & F.P.Bowden, PrRoySoc 213A, 285–306 (1952) & CA 46, 10623 (1952). (28b) Anon, "Military Explosives", TM 9–1910 (1955), 86–91. (28c) S.Bentur et al, PrRoySoc 230A, 33–46 (1955) CA 49, 1520–1 (1955) (Inhibition of burning of BkPdr by foreign substances). (28d) A.Douillet MP 37, 167–96 (1955). (28e) W.Y.Carman, "A History of Firearms", St. Martin's Press, NY (1955), 1–11 & 157–62. (29) Gorst (1957), 156–9. (30) Yaremenko & Svetlov (1957), 110–12. (31) Tomlinson & Sheffield, PATR 1740, Rev 1 (1958), 32–6. (31a) Fedoroff et al, PATR 2510 (1958), p Ger 173–R. (32) Taylor & Gay (1958), 18–21 (Use of BkPdr in blasting). (33) Cook (1958), 8. (33a) H.Hassmann, PicArsn FREL, Propulsion Development Section Report No 1 (1958) (Conf) (Not used as a source of info). (33b) C.Campbell & G.Weingarten, TrFaradSoc 55 2221–8 (1959). (33c) Ibid, PicArsnMonograph M43 (1959) (Thermoanalytical study of ignition & combustion). (34) A.B. Bofors Nobelkrut, "Manual on Powder and Explosives", Bofors, Sweden (1960), 190–1. (34a) J.R.Partington, "A History of Greek Fire and Gunpower," Heffer, Cambridge, England (1960). (35) E.Huselton & S. Kaplowitz, PicArsnAmmo-Group, TR DB–TR 5–60 (1961) [Evaluation Tests and Process Studies Relating to Establishment of Substitute for Black Powder (Improvement in Manufacturer of Benite Strands)]. (35a) Chromalloy Corp, DAI–23–072–501–ORD (P)–43, Final Rept, July 1, 1961. (36) Wm.H.Rinkenbach, Allentown, Pa.; private communication (1961).

LIST OF MODIFICATIONS OF BLACK POWDER

The following compns, which appear to represent the most interesting developments, are listed in chronological order:

(A) J. P. Gray, USP 1438759 (1922) & CA 17,882 (1923) (Rosin 2–12% is added to BkPdr as retarder). (B) Lignosa S. Akcyjna, FrP 641442 (1927) & CA 23,1272 (1929) (Charcoal in BkPdr is replaced by hydrocarbons such as $C_{10}H_8$ sulfo acids of $C_{10}H_8$ or phenols, nitrosulfo acids of phenols, nitrisulfo acids of phenols. Carbohydrates, such as cellulose, starch or sawdust also may be used). (C) Dynamit A–G, Ph.-Naoûm & A. Hölz, GerP 499402 (1929) & CA 24,4160 (1930) (Powdered petroleum coke is used to replace charcoal). (D) R. L. Hill, USP 1833573 (1931) & CA 26,1125 (1932) (Mixt of BkPdr with an O-carrying salt, such as AN or NH_4ClO_4 coated with graphite, rosin or paraffin). (E) J. A. Hammond, CanP 311894 (1931) & USP 1872941 (1932); CA 25,3838 (1931) & 26,6141 (1932) (A slow-burning & free-pouring expl is obtained by treating BkPdr with asphaltum dissolved in CS_2 & drying). (F) R. L. Hill, USP 1845663 (1932) & CA 26,2320 (1932) (Mixt of BkPdr with AN coated with a combustible material deficient in O, such as TNT, NC or a carbohydrate). (G) R. L. Hill, USP 1845664 (1932) & CA 26, 2320 (1932) (Mixt of BkPdr with a O-carrying salt, such as AN or NH_4ClO_4 coated with S & charcoal). (H) W. A. McIntre, CanP 326148 (1932) & USP 1882853 (1932); CA 26,6140 (1932) & 27,846 (1933) (Rate of burning of BkPdr consisting of $NaNO_3$, S & charcoal is decreased by incorporating ca 0.5% of a water-emulsifiable oil, such as sulfonated oil). (I) B. A. Gillie, CanP 324731 (1932) & USP 1927870 (1933); CA 26,5422 (1932) & 27,5981 (1933) (A slow-burning BkPdr suitable for fuses is obtained by incorporating ca 05% of high-viscosity oil, such as castor oil). (J) C. W. Brooks, CanP 348641 (1935) & CA 29,3518 (1935) (Addn of 0.1–0.5% of stearic acid retards the rate of burning; eg, $NaNO_3$ 72.0, S 10.0, charcoal 17.7 & stearic acid of 0.3%). (K) C. W. Brooks, Jr, USP 2030096 (1936) & CA 30,2388 (1936) (Stability of BkPdrs contg AN is improved by incorporating 0.2% or more of a solid org basic compd such as urea of dicyandiamide).

(L) C.W.Brooks & C.R.Johnson,CanP 377516(1938) CA 32,2339(1939) (Addn of 0.2–2% of a non-fibrous binding agent, such as starch, in prepn of BkPdr pellets. (M) H.H.Holmes, CanP 384570(1939) & CA 34, 1488(1940) (Pellets of a deflagrating expl consisting of BkPdr,AN (15–45%) and at least one finely divided combustible metal, such as Al). (N) J.Simon & D.Hewitt,USP 2179434(1939) & CA 34,1488(1940) (Mixt of BkPdr with a product obtained by nitration with HNO_3+ H_2SO_4 of an incompletely charred cellulose). (O) R.Healy,Astronautics No 53, 3–10(1942) & CA 39,5077(1945) (Various BkPdr compns used in rockets are discussed).

(P) D.Hart "Investigation of Use of Nitroindene Polymer in Powder for M54 Time Fuze", PATR 1296(1943). [Substitution of nitroindene polymer for charcoal, yielded longer burning fuze powders and lowered the ignition temp, while it considerably increased the sensitivity to impact. Compns of two pdrs examined at Pic-Arsn were: (a) KNO_3 74.0, nitroindene polymer 15.6 & sulfur 10.4% and (b) KNO_3 67.8 nitroindine polymer 20.4 & sulfur 9.8%. The impact sensitivity of both pdrs was 20cm with 2kg wt, vs 75cm for BkPdr contg KNO_3 74.0, charcoal 15.6 & sulfur 10.4%. Because of their high sensitivity to impact, the nitroindene polymer pdrs were not recommended for use in fuzes].

(Q) A.J.Clear,PicArsnChemLabRept 99983(1943) (BkPdr substitute contg KNO_3 40, Tetranitrocarbazole 30 & aluminum pdr 30% was prepd and examined at PicArsn). (R) R.C.Payn et al, BritP 576107(1946) & CA 42(1949) (A compn suitable for delay combustion trains by addn to BkPdrs of an aldehyde-amine condensation product). (S) O.Matter,SwissP 244352(1946) & CA 43,4468(1949) (A BkPdr substitute contg carbonaceous material prepd by extg coal with high-boiling org solvents, such as a coaltar oil, followed by filtration and removal of the solvent from the filtrate by distn).

(T) W. H. Rinkenbach & V. C. Allison, USP 2415848(1947) & CA 41, 2900 (1947) (Slow-burning BkPdr suitable for fuses is prepd by replacing charcoal with non-cellular C obtd by decompn of sugar. For instance, the fuse contg: KNO_3 74, S 10.4 & sugar C 15.6% burns about 3.3 times slower than the pdr contg charcoal). (U) H. H. Holmes & W. E. Lawson, USP 2414465(1947) & CA 41, 2578(1947) (A faster-burning BkPdr suitable for fuses may be obtd by replacing charcoal by a special type of C black produced by incomplete combn of natural gas or other gaseous fuel. For inst, the compn KNO_3 74, S 9.5 & C black 16.5% burns 46 sec/yd vs 75 secs for pdr contg charcoal) (V) R. C. Payn et al, USP 2423427(1947) & CA 41,6050(1947) (Slow-burning fuse pdr, such as 250-300 sec/yd, is prepd by incorporating 2 parts of a mixt of aldol-a-naphthylamine & aldol-B-naphthylamine into BkPdr contg KNO_3 75, alder charcoal 17 & S 8%. (V_1) S. Livingston, PATR 1647(1947) (Conf) (Development of non-hygroscopic igniter powder). (W) M. de Simo, USP 2566602(1951) & CA 46, 1767(1952) (A BkPdr-type expl obtd by combining KNO_3 with sulfo-hydrocarbons and/or sulfocarbons in lieu of carbon and S. Details of prepn are given). (W_1) S. Livingston, PATR 1802(1951) (Conf) (A BkPdr substitute for use in artillery ammo). (X) F. P. Bowden & J. D. Blackwood, Brit P715827(1954) & CA 49, 2736 (1955) (Sulfur-free BkPdr is obtd by addg to KNO_3 + charcoal about 10-15% of an alkali metal salt of formic acid) (X_1) Ibid, BritP 715828(1954 & CA 49, 2736 (1955) (The reaction rate of BkPdr may be increased as much as ten-fold by addg low-melting mixts of alkali metal nitrates, such as $LiNO_3$ + $NaNo_3$). (Y) Ibid, BritP 715829(1954) & CA 49,2736(1955) (The reaction rate of BkPdr may be increased by addg small amts (eg 5%) of a metallic salt such as PbOAc, which will react with H_2S as it is liberated in early stages of burning). (Z) H. Hassmann, PATR 2515(1957) (Conf) (Elimite, a substitute for BkPdr in artillery primers).

BLACK POWDER, ANALYTICAL PROCEDURES

(I) Qualitative Tests

A. *Appearance.* Visual inspection of the uniformity of pdr and color of the grains (Ref 10, p 191).

B. *Identification.* Place ca 0.2g of material in a 5-ml beaker, add 2–3 ml distd w and stir for 5 min. Decant the liq through a filter into a small beaker. Evap this to dryness and test part of the deposit (white, in the case of BkPdr) with 1 drop of 1% DPhA soln in concd H_2SO_4, using a white porcelain spot-test plate. A blue color indicates the presence of a nitrate. Place another portion of the deposit in an indenture of a white porcelain spot-test plate, add an equal amt of cryst thymol and 3 drops of concd H_2SO_4. Stir the mixt and note the color

in 5 mins or more. A green color indicates the presence of a nitrate. Heat the w-insol residue in the 5-ml beaker to dryness, cool and digest with two 5-ml portions of CS_2 decanting these into an evapg dish. Evap to dryness at RT and examine the deposit (yel, sulfur, if the sample is BkPdr) by means of a microscope. Examine also the residue after CS_2 treatment (black, carbon, if the sample is BkPdr) (Ref 9, pp 269–73).

(II) Quantitative Tests

A. *Bulk Density*, also called *gravimetric density* or *apparent specific gravity*, is the reation betw wt and vol of the pdr. This includes the air spaces betw grains. In the Bofors method, Ref 10, p 23, a cylindrical vessel of 100 ml capacity is filled through a special funnel and then weighed without shaking. In the BurMines method (Ref 2, p 67), the so-called gravimetric method is used. US Army Specs (Refs 11 & 12) do not describe the bulk test.

B. *Specific Gravity*, also called *absolute density*, is the relation betw wt and volume of grains disregarding the air spaces. The Bofors manual (Ref 10, p 22) describes two methods: Mohr-Westphal's balance and pycnometer methods. In the BurMines method (Ref 2, p 67), an apparatus called densimeter is used. In US Spec JAN–P–223A (Ref 11) two methods are described in which either a 25-ml bottle with a 10-g sample or a large two-stopcock bulb with 100-g sample is used. In both cases, mercury is used for displacing the air.

C. *Granulation* is detd by separating the product under std conditions using a series of sieves of different sizes. The app is described in Bofors manual (Ref 10, p 23). A similar method is used in the US (Ref 2, p 66 and Federal Spec RR–S–366).

D. *Moisture*. In the Bofors' method (Ref 10, pp 15 & 191) a 5g sample is dried in an oven at 75° for 3 hrs. In the BM method (Ref 2, p 69) a 2-g sample is spread on a 3" watch glass and dried over concd H_2SO_4 in a desiccator at RT for 3 days. This method is described in US Specs (Refs 11, 12 & 13) as an alternate to the method in which a 2-g sample is dried on a watch glass (or in a dish) for 4 hrs in an oven at 70°.

E. *Composition*. This usually includes sulfur, charcoal and K or Na nitrates. In the Bofors' Method (Ref 11, p 191), a previously dried 10-g sample of BkPdr is extracted with CS_2 for 16 hrs in a Soxhlet app. After removing the thimble, the solv in the flask is distilled off and the residue is dried at 70°. This gives *sulfur content*. After drying the thimble, its contents are transferred quantitatively to a previously dried and tared sintered glass crucible of medium porosity (such as Jena 1G3 or Pyrex M), in which it is treated with hot distd w until the nitrate reaction of the wash w had disappeared. After drying the crucible at 100° to const wt, it is cooled in a desiccator and weighed. This gives *charcoal content*. The *nitrate* content is obtained by difference 100%-(% sulfur + % charcoal).

In the US method (Ref 2, pp 70–72 & Refs 11, 12 & 13), the following procedure is used:

(A) *K or Na Nitrate*. Transfer a known wt of a sample (ca 10g) to a 400-ml beaker, add 200ml dist w, bring to a boil and hold for 15 min on a steam bath. Filter through a sintered glass crucible and wash with successive portions, 10–15ml, of hot w until the nitrate reaction (blue coloration when tested with DPhA in concd H_2SO_4) of the wash w has disappeared. Dry the crucible to const wt at 70° (ca 4 hrs), cool in a desiccator and weigh. Calculate the percentage of nitrate on a moist-free basis.

(B) *Sulfur*. Place the crucible and contents from the previous operation in an extractor on a water bath and extract for 4 hrs with CS_2. Wash the residue in crucible once with alc and once with ether using suction. Dry for 1 hr at 100°, cool in a desiccator and weigh. Calculate the percentage of S on a moisture-free basis. This operation removes only rhombic sulfur. If the presence of amorphous S is suspected, the residue must be washed, after CS_2 extraction, with several portions of hot aniline followed by alc & ether washes.

(C) *Charcoal*. If the pdr is not graphited, the residue in the crucible after detn of KNO_3 and S may be considered as charcoal. Det its weight by subtracting the original wt of the filtering crucible from the wt of crucible + residue. Then calc the wt of the residue as percentage of charcoal on a moisture-free basis.

Note: Slow-burning pdr (Type II, in Ref 13) contains coal in lieu of charcoal.

(D) *Foreign Matter*. Examine the residue in the crucible for foreign matter such as fibers, sticks, stones, sand etc. No such matter shall be present.

(E) *Ash*. Ignite the crucible with charcoal in a muffle furnace or over a Bunsen Burner until all the carbon is burned off. Calculate the wt of residue as percent ash.

The US Specs requirements (Refs 11, 12 & 13) for various types of BkPdrs are listed above under Black Powder.

Lapchenkov (Ref 2a, pp 59–60) describes the following method of BkPdr analysis:

Sulfur can be detd by two methods:

(a) Boil in a tall 1l beaker 1g of finely divided BkPdr with 100ml HNO_3(d 1.4), adding periodically small amts of dry $KClO_3$ and new portions of HNO_3. Continue boiling until complete dissolution of sample and the color of liq becomes light yel. Dilute the soln with ca 6 volumes of w, heat to boiling and add 25ml of boiling 10% $BaCl_2$ soln. After leaving the liq overnight, det the amt of $BaSO_4$ by the usual method and calc the % of sulfur.

(b) Place in a 200ml beaker 0.3g of finely divided BkPdr, add 25ml of 3% NaOH soln, cover with a watch glass and boil for 45 mins. The following reaction takes place:

$4S+6KOH \rightarrow 2K_2S+K_2S_2O_3+3H_2O$ Add 25ml of 3% $KMnO_4$ soln and few pieces of unglazed porcelain or pumice stone and boil for ca 40 mins. The following reactions take place:

$3K_2S+8KMnO_4+4H_2O \rightarrow 3K_2SO_4+8MnO_2+8KOH$.

$3K_2S_2O_3+8KMnO_4+H_2O \rightarrow 6K_2SO_4+8MnO_2+2KOH$.

Add 25ml HCl(d1.19) to dissolve MnO_2, filter and heat the filtrate to boiling. Add 25ml of boiling 10% $BaCl_2$ solution and leave the liquid overnight. Determine the amount of $BaSO_4$ by the usual method and calculate the percentage of sulfur.

Saltpeter is determined by boiling 2g BkPdr with water, filtering and weighing the dry residue. Here the weight of residue is C+S and the loss in weight the saltpeter.

Charcoal is calculated by subtracting the amount of determined S from weight of residue.

References: (1) R. Escales, "Schwarzpulver and Sprengsalpeter", Veit, Leipzig (1914); physical tests, 381–89; chemical tests, 389–91; ballistic tests, 391–405. (2) W. O. Snelling, C. G. Storm, "The Analysis of Black Powder and Dynamite", BurMinesBull 51, Washington, D.C. (1916); physical examination 66–8; chemical examination, 69–76. 2a) I. V. Lapchenkov, "Kurs DymnykhPorokhov," GosKhimTekhIzdat, Moscow (1933) (in Russian). (3) V. Ohman G. Laurent, ZAnalChem 107, 409–11 (1936) and CA 31, 2007 (1937) (Determination of saltpeter in BkPdr using a Zeiss interferometer). (4) A. A. Azzam, Mikrochim Akta 2, 283–6 (1937) and CA 32, 1933 (1938) (Feigl's spot tests used in analysis of BkPdr combustion products). 5) A. W. Baker, Explosives-Engr 17, 115–17 (1939) and CA 33, 5661 (1939) (A method for determining the burning rate of BkPdr by using an open steel pipe). 6) A. Wetterholn, SS 38, 189–92 (1943) and CA 38, 4131 (1944) (Determination of moisture in BkPdr). 7) Kast-Metz (1944), 5–19. 8) H. Henkin and R. McGill, IEC 44, 1391–5 (1952) and CA 46, 8857 (1952) (Exploded temperature of BkPdr determined in a special apparatus). (8a) A. Douillet & P. Miaud, MP 36, 277–84 (1954) and CA 50, 3764 (1956) (Studies of ignition and burning of BkPdr in a manometric bomb). 9) Anon, "Military Explosives", Department of the Army Technical Manual TM 9–1910 (1955), 90–1 and 273. 10) A. B. Bofors, Nobelkrut, "Analytical Methods for Powders and Explosives", Bofors, Sweden (1960), 191. 11) US Spec JAN–P–223A, "Powder, Black". 12) US Spec JAN–P–362, "Powder, Black, Sodium Nitrate". 13) US Purchase Description X–PA–PD–623, "Powder, Fuze" and "Powder, Black, Slow Burning."

BLACK POWDER DESTRUCTION

If the powder is in containers (25- or 50-lb drums), they must be opened with wooden or non-sparking metal tools and if a stream or large body of water is at hand, the pdr can be dumped into it. (For detailed instruction see SR 75–70–10/AFR 68–3.)

The w will dissolve saltpeter leaving sulfur and charcoal as deposits, both of which are harmless. The washings must be disposed of separately from the residue. This method cannot be used in places where anti-pollution laws exist. In this case, the pdr must be sent to the *burning ground* (qv) to be destroyed in the following manner:

(a) Open one of the containers, using a wooden or non-sparking metal tool, and spread the contents on the ground in a trail (strip) not wider than 2'' and not over 1–2'' deep, in such a manner that no part of the trail parallels another part within a distance of 10 ft. The ground over which the trail is laid should be free of cracks or other depressions in which the pdr might accumulate and be in some confinement.

(b) Lay a train of combustible material (such as paper or excelsior), preferably on the downwind side of the trail, of such a length (ca 25 ft) that the operator can reach a safe place after igniting the paper. Ignite the combustible material.

(c) After the pdr burns, wait until the ground cools before starting the destruction of the 2nd and subsequent containers. If space permits use a new area of ground for 2nd, etc, containers. Never burn more than one container (25 or 50 lb) at a time.

(d) Wash out the empty containers with w. *Refs:* (1) Anon, "Safety and Storage Manual for Explosives and Ammunition", 00 Form 5994, Secn XI, U.S. Army, Chief of Ordnance, Washington, D.C. (1928), p. 3, (2) Anon, "Ammunition Inspection Guide", TM 9.1904 (1944), pp 773-4. (3) R. D. Leitch & P. R. Moyer, U.S. BurMines, InfCirc 7335 (1945), pp 3–4. (4) Anon, "Ordnance Safety Manual", Ordnance Corps Manual ORDM 7.224 (1951). (5) Anon, "Military Explosives", Dept of the Army Tech Manual TM 9.1910 (1955) 315–17 (6) Anon, "Care, Handling, Preservation and Destruction of Ammunition", Dept of the Army Tech Manual TM 9.1903 (1956), 179.

BLACK POWDER FIRES

BkPdr can be ignited easily by sparks, heat or friction. When unconfined, it burns with expl violence but will expl if ignited under even slight confinement. Only safety tools (such as made of wood or of non-sparking metal) shall be used when opening or closing containers. This will be done only in a bldg free from other expls & ammo or, in suitable weather, in the open at least 100 ft. from the nearest magazine. The quantity at/or near such an operation shall be limited to 100 lb. If a fire should take place during these operations, one must immediately withdraw to a safe distance because of danger of expln. Every effort must be made to prevent the fire from spreading to a BkPdr magazine. If this, however, fails, firemen should be withdrawn to at least 800 ft. from the magazine and either stand behind a barricade or lie flat on the ground. If an expln of a BkPdr magazine should occur, all efforts of firemen must be concentrated in preventing spreading of fire to adjacent bldgs, especially magazines with expls & ammo.

Refs: 1) "Safety and Storage Manual for Explosives and Ammunition", 00 Form 5994, Secn XI (1928) 2) TM 9.1904 (1944), p 78–9.

BLACK POWDER PACKING, STORAGE, HANDLING, SAFETY PRECAUTIONS, MAINTENANCE, INSPECTION & SURVEILLANCE, SHIPPING AND TRANSPORTATION

A std container for *packaging and shipping* BkPdr is a commercial iron drum (25-lb capacity complying with ICC specifications. BkPdr may also be packed for *storage* in 50-lb metallic containers or in 110-lb metal lined smokeless propInt boxes, but the amt in each container must be limited to 50 lb. The containers must be *stored* in bullet-proof magazines used for storing expls and ammo, but never in barracks, general supply rooms, inhabited bldgs or any bldgs heated by stoves or open fires. Instruction for proper piling (stacking) the containers in a magazine are given in Ref 2, p 790. Max amt of BkPdr allowed in one magazine is 250,000 lb.

As BkPdr is very sensitive to sparks, friction and heat, strict *safety* precautions must be exercised in handling it. In a bldg contg BkPdr, only safety nonsparking) shoes must be worn and all tools and equipment must be of nonsparking materials. No work around BkPdr shall be done other than that involving the storage and handling of containers or powders. If a storage magazine has a concrete floor, it must be covered with a tarpaulin or other suitable material. If it is necessary to transfer the pdr from one container to another conductive

rubber mats must be used at locations where such operations are performed (Ref 4, p 80).

Note: According to Ref 3, p 79, "A container will not be opened in a magazine in which expls or ammo are stored. This will be done only in a room or bldg free from all other expls or ammo, or in suitable weather in the open at least 100 ft from the nearest magazine". To this may be added that if repacking is conducted outside, it is advisable to do it under a very light cover, such as canvas.

Loose BkPdr is especially sensitive and whenever it is necessary to handle it, not over 50 lb of such pdr in open containers and not over 50 lb in closed containers (total 100 lb) must be permitted at or near such operations.

If BkPdr is spilled on benches or floors, all work in the vicinity must be stopped until the pdr has been removed and the expl hazard of any remaining dust or fine particles has been removed by washing down the area with w.

Most of the above operations belong to *maintenance* activities. To these may be added repainting & marking of containers, replacement of metallic caps, etc.

Since BkPdr deteriorates with the absorption of moisture and the containers in which it is stored are subject to rust, a thorough *inspection* of these articles must be made at least once a year. For this, one or several containers from each lot will be opened at the time, of annual inspection and if there is any doubt about serviceability of the pdr, it must be removed to the lab for physical and chemical testing. At the same time, the containers must be inspected for holes, weak spots, etc. Damaged containers should not be repaired but removed and the contents transferred to new containers. All of these operations may be called *surveillance*.

Rooms or bldgs in which BkPdr is handled must be frequently examined for the presence of BkPdr dust and all such dust must be immediately removed with w.

All containers with powder intended for *Shipment* must be previously inspected and those going overseas must be crated *Transportation* of BkPdr within the USA is governed by "Regulations for the Transportation of Explosives and Other Dangerous Articles by Freight" established by ICC (Freight Tariff No. 8). BkPdr is shipped as "Class A" expls which include those materials representing an expln hazard in case of fire but not in case of an accident without fire (Ref 3, pp 311–14 & Ref 5).

Refs: 1) Anon, "Safety and Storage Manual for Explosives and Ammunition", 00 Form No 5994, US Army Chief of Ordnance, Washington, DC (1928), Secn XI 2) Anon, 'Ammunition Inspection Guide", War Dept Manual TM 9-1904 (1944), 77–8 & 790 2a) Anon, "Ordnance Safety Manual", ORD M7.224 (1951), 14–11 & 20–4 3) Anon, "Military Explosives", Dept of the Army Tech Manual TM 9-1910 (1955), 306 & 311–14 4) Anon, "Care, Handling, Preservation, and Destruction of Ammunition", Dept of the Army Tech Manual TM 9.1903 (1956), 80 & 146 5) Sax (1957), Section II 6) B. Kanouse & C. V. Ruskewicz, PicArsn; private communication (1961).

4. E. I. duPont deNemours Co., Inc., *Blaster's Handbook* (Wilmington, Del.: 1957), ch. IV, X.

Chapter IV—Black Powder

Black powders are deflagrating or "low explosives," which classification differentiates them from detonating or "high explosives" such as the dynamites. They burn progressively over a relatively sustained period of time in contrast to detonating explosives which decompose practically instantaneously.

Black powders are manufactured in two forms: granular and pelleted, these being known under the names, black blasting powder and pellet powder.

Although the principal use of both black blasting and pellet powder is in coal mines, the federal government and a number of states have in recent years enacted laws restricting the use of these products in underground mines. Persons contemplating the use of either form of black powder in underground coal mines are advised to familiarize themselves with all applicable federal and state regulations.

Black Blasting Powder

Black blasting powder is a definitely grained material normally packed in bulk in metal kegs containing 25 pounds of powder. The product is glazed, this glaze

being a high luster and polish applied to the surface of the grains by coating them with a small amount of graphite during the finishing process of manufacture. This prevents the powder from caking together in the kegs during storage. The glaze on blasting powder, however, does not increase its resistance to water or moisture and does not improve its efficiency as an explosive.

Grades.—There are two grades of black blasting powder: "A" Blasting Powder which contains saltpeter or potassium nitrate, and "B" Blasting Powder which contains sodium nitrate instead of the potassium salt. In both powders the other ingredients are sulphur and charcoal. Because of the kind of nitrate used, "A" Blasting Powder is considerably faster, slightly stronger, and somewhat less hygroscopic than "B" Blasting Powder.

Granulations.—The burning speed of black blasting powder is controlled by the grain size—the finer the granulation, the faster the powder. "A" Blasting Powder is available in several standard granulations but only 4FA, 5FA, and 7FA are used to any extent in commercial blasting. "B" Blasting Powder is manufactured in six standard granulations from 2C to 4F.

Uses.—The chief application of "A" Blasting Powder in blasting is in quarrying fine dimension stone, granite, and slate. It is also used commercially in the manufacture of fireworks and safety fuse.

"B" Blasting Powder is used principally to shoot coal in underground mines that are nongassy. Other uses include clay and shale mining.

PELLET POWDER

Pellet powder is black powder pressed into cylindrical pellets 2 inches in length and varying in diameter from 1¼ to 2 inches. Each pellet has a center hole ⅜ inch in diameter to allow fuse to be laced through the cartridge or an electric squib to be inserted. Four of these pellets are wrapped in paper to form a cartridge 8 inches in length. The cartridges are packed either 25 or 50 pounds to the case.

The composition of the pellet powders is basically the same as "B" Blasting Powder, modified slightly by the addition of various ingredients to control the physical and explosive properties of the respective grades.

Grades.—Du Pont Pellet Powder is manufactured in two standard grades designated as No. 4 and No. 5. The No. 4 is somewhat faster than the No. 5.

Uses.—Pellet powder is used primarily in underground mines for shooting coal and clay, although it is also used to some extent for shooting coal in strip pits.

Chapter X—Handling and Storage

Explosives and blasting supplies go through many handlings. They are transported by rail and trucks, transferred to consumers' storage magazines, distributing magazines, and finally to the point where they are to be used. The handling and storage of explosives and blasting supplies, at all stages of their existence, require proper procedures and methods entailing compliance with the law, regard for the protection and preservation of these somewhat perishable materials, and consideration of the hazardous nature of such products.

TRANSPORTATION

The transportation of explosives by common and contract carriers on land or water is thoroughly governed by regulations issued by the Interstate Commerce Commission or the United States Department of Commerce, and all persons having occasion to make shipments by common or contract carriers are required to comply with these regulations.

Special attention is called to the Federal Act of March 4, 1921, which provides in Sections 232, 233, 234, 235, and 236 that it is a criminal act:

To carry or cause to be carried any explosives (other than exceptions named) in a train, boat, trolley, or other vehicle carrying passengers for hire; —or

To deliver or cause to be delivered to a common carrier for transportation any explosives under false or deceptive marking or description on the package, invoice, or shipping order; —or

To violate or cause to be violated any regulations of the Interstate Commerce Commission or the United States Department of Commerce relating to the marking, shipping, or handling of explosives.

A violation of any of the provisions of this law is punishable by fine of not more than $2,000, or by imprisonment for not more than 18 months, or both; or if injury or death results from such violation, by fine of not more than $10,000, or by imprisonment for not more than 10 years, or both.

In transporting explosives, congested traffic should be avoided and no unnecessary stops made. Avoid stopping at garages or repair shops when carrying explosives. Signs or placards on each side and on each end with the word "EXPLOSIVES" should be attached; or a red flag 24 inches square, marked with the word "DANGER" in white letters, should be displayed. Trucks carrying explosives should be equipped with not less than two fire extinguishers filled and ready for use. The vehicle should not be loaded beyond the manufacturer's rating.

Trucks used for transporting explosives should be inspected daily to see that the steering mechanism and brakes are in good condition. The location of the batteries and the wiring of motor vehicles should be such that neither will come in contact with the explosives packages. All wiring should be completely insulated and securely fastened to prevent short-circuiting and fire. To minimize the fire hazard, engine, pan, chassis, and body should be kept clean and free from surplus oil and grease.

Smoking should not be permitted in a vehicle transporting explosives and no passengers or persons not necessary for the safe operation of the vehicle should ride in or on it.

Carbide, oil, matches, firearms, electric storage batteries, flammable substances, acids, corrosive compounds, metal, metal tools, and any items not necessary for the transportation of explosives should never be carried in a vehicle containing explosives.

Any person having occasion to transport, handle, store, or use explosives should familiarize himself with the federal, state, and local laws and regulations and comply with them.

The transportation of electric blasting caps near radio broadcasting stations or in vehicles equipped with radio transmitters is discussed in Chapter XIV under the general heading of "Extraneous Electricity," and in the Institute of Makers of Explosives Pamphlet No. 20, "Radio Frequency Energy—A Potential Hazard in the Use and Transportation of Electric Blasting Caps."

Unloading Explosives.—An inspection should be made on the arrival of the explosives to ascertain the condition of the shipment. Occasionally rough handling in transit may damage the containers of dynamite or black powder so that there may be loose explosives between containers and on the floor. Should inspection reveal such a condition, the workmen should be warned to avoid every chance of friction, sparks, or fire that might cause an explosion. As soon as any loose material is discovered it should be carefully swept up and destroyed. When unloading black powder the danger would be from sparks or fire. In the case of a rail shipment of black powder, or any other explosives, protection from sparks from passing engines should be provided.

Men should never smoke while handling explosives or when working in close proximity to them. This applies not only to unloading, but also to every stage of the handling of explosives in the course of transporting, distributing, and blasting. Cases or kegs of explosives should always be lifted and set down carefully, never slide over one another, nor dropped from one level to another. Bale hooks or any other metal tools should never be used in handling explosives; although there is one exception, the approved use of aluminum where portable aluminum conveyors are used for unloading explosives.

Vehicles.—Any vehicle used to transport explosives should be substantially built and in first class working condition. It should have a tight wooden or nonsparking metal floor and should either be provided with sides and ends sufficiently high to prevent the explosives from falling off, or it should be equipped with a closed body. There should be no exposed metal in contact with the containers, the approved use of aluminum for truck bodies excepted. Explosives which are being transported in an open bodied vehicle should always be covered with a fire resistant tarpaulin.

STORAGE

The basic considerations are, of course, that storage magazines should be located, protected, constructed, and managed so as to guard against accidental explosion of their contents, and to prevent injury to persons or property in case such an explosion does occur.

The conditions of storage of explosives have a much deeper relation to safety in their use than is commonly realized. Improper storage of explosives, detonators, fuse, and squibs may lead directly to misfires, to unexploded powder in the borehole or in the blasted material, or to the burning of charges in the borehole. The handling of misfires, and the existence of undiscovered misfires constitute two of the chief sources of accidents from explosives; therefore, measures to prevent misfires are fundamental to safety.

Inadequate ventilation of magazines may also lead indirectly to accidents. Unless air circulates freely through a magazine the atmosphere may become hot and humid. Long exposure to such conditions has a deteriorating effect upon explosives, blasting caps. and fuse.

If a steel magaine is used without protection of some kind from the direct rays of the sun, there is danger that the metal will transmit so much heat to the explosive inside that it may become hard and insensitive. This is especially likely to happen in a region of hot days and cold nights where the explosive is subjected to repeated alternations of high and low temperatures. The records contain numerous instances of misfires due only to this cause. A steel magazine exposed to hot sunshine should be ceiled or should be protected by a false wooden roof so as to permit free circulation of air. In addition, some protection is afforded by painting with aluminum paint.

Any deterioration of an explosive or a detonator which results in a burning charge underground may cause fatal accidents, since the gases given off in such instances are extremely poisonous.

For all the foregoing reasons, dry, well ventilated, and reasonably cool magazines are essential to safety in the use of explosives.

Magazine Locations.—In some states and cities the location oof magazines is governed by laws and regulations, and storage in such localities should conform to them. Where no such laws or regulations exist, it is recommended that magazines be located in compliance with the American Table of Distances (revised September 30, 1955), which specifies the quantity of explosives that may be stored safely at various distances from inhabited buildings, passenger railways and public highways.

The American Table of Distances was originally formulated by The Institute of Makers of Explosives in 1914 after painstaking research. It has been the subject of constant study and periodic revision since that time and it undoubtedly embodies the most reliable weight and distance data available.

Where two or more magazines are to be constructed on the same property, they should be separated by certain minimum distances in order to prevent propagation from one magazine to another in case of an explosion. Frequently the total area available on the property is limited, and inhabited buildings, railways, or highways may be close to the boundaries. If both high explosives and blasting supplies are to be stored in sizable quantities on such a property, the proper placement of magazines presents a complicated problem. When construction of group magazine is contemplated, it is strongly recommended that a Du Pont representative be consulted.

Magazine locations should be selected with two objects in mind: safety and economy in operation. The sites should be cleared so that there is no danger from forest or brush fires. In a hilly, rolling country, the best locations are where the hills afford protection. In a flat country, artificial barricades should be used, or the specified unbarricaded distance provided. If fire risk is not excessive natural features of the ground, such as dense woods, provide good locations for magazines. Side hill dugouts are not recommended as they are difficult to ventilate and are usually wet.

Storage of the daily requirements of explosives for any operation should be carefully considered, and the magazines should be located so that in the event of an explosion there would not be serious injury to persons or damage to property. The quantity so stored should be kept at a minimum consistent with the operation and the risk involved.

TABLE XII.—AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVES, AS REVISED AND APPROVED BY THE INSTITUTE OF MAKERS OF EXPLOSIVES SEPTEMBER 30, 1955

Explosives		Distances in feet when storage is barricaded			
Pounds over	Pounds not over	Inhabited buildings	Passenger railways	Public highways	Separation of magazines
2	5	70	30	30	6
5	10	90	35	35	8
10	20	110	45	45	10
20	30	125	50	50	11
30	40	140	55	55	12
40	50	150	60	60	14
50	75	170	70	70	15
75	100	190	75	75	16
100	125	200	80	80	18
125	150	215	85	85	19
150	200	235	95	95	21
200	250	255	105	105	23
250	300	270	110	110	24
300	400	295	120	120	27
400	500	320	130	130	29
500	600	340	135	135	31
600	700	355	145	145	32
700	800	375	150	150	33
800	900	390	155	155	35
900	1,000	400	160	160	36
1,000	1,200	425	170	165	39
1,200	1,400	450	180	170	41
1,400	1,600	470	190	175	43
1,600	1,800	490	195	180	44
1,800	2,000	505	205	185	45
2,000	2,500	545	220	190	49
2,500	3,000	580	235	195	52
3,000	4,000	635	255	210	58
4,000	5,000	685	275	225	61
5,000	6,000	730	295	235	65
6,000	7,000	770	310	245	68
7,000	8,000	800	320	250	72
8,000	9,000	835	335	255	75
9,000	10,000	865	345	260	78
10,000	12,000	875	370	270	82
12,000	14,000	885	390	275	87
14,000	16,000	900	405	280	90
16,000	18,000	940	420	285	94
18,000	20,000	975	435	290	98
20,000	25,000	1,055	470	315	105
25,000	30,000	1,130	500	340	112
30,000	35,000	1,205	525	360	119
35,000	40,000	1,275	550	380	124
40,000	45,000	1,340	570	400	129
45,000	50,000	1,400	590	420	135
50,000	55,000	1,460	610	440	140
55,000	60,000	1,515	630	455	145
60,000	65,000	1,565	645	470	150
65,000	70,000	1,610	660	485	155
70,000	75,000	1,655	675	500	160
75,000	80,000	1,695	690	510	165
80,000	85,000	1,730	705	520	170
85,000	90,000	1,760	720	530	175
90,000	95,000	1,790	730	540	180
95,000	100,000	1,815	745	545	185
100,000	110,000	1,835	770	550	195
110,000	120,000	1,855	790	555	205
120,000	130,000	1,875	810	560	215
130,000	140,000	1,890	835	565	225
140,000	150,000	1,900	850	570	235
150,000	160,000	1,935	870	580	245
160,000	170,000	1,965	890	590	255
170,000	180,000	1,990	905	600	265
180,000	190,000	2,010	920	605	275
190,000	200,000	2,030	935	610	285
200,000	210,000	2,055	955	620	295
210,000	230,000	2,100	980	635	315
230,000	250,000	2,155	1,010	650	335
250,000	275,000	2,215	1,040	670	360
275,000	300,000	2,275	1,075	690	385

NOTES

1—"Explosives" means any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified by the Interstate Commerce Commission.

2—"Magazine" means any building or structure, other than an explosives manufacturing building, used for the permanent storage of explosives.

3—"Natural Barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine when the trees are bare of leaves.

4—"Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of three feet.

5—"Barricaded" means that a building containing explosives is effectually screened from a magazine, building, railway, or highway, either by a natural barricade, or by an artificial barricade of such height that a straight line from the top of any sidewall of the building containing explosives to the eave line of any magazine, or building, or to a point 12 feet above the center of a railway or highway, will pass through such intervening natural or artificial barricade.

6—When a building containing explosives is not barricaded, the distances shown in the table should be doubled.

7—"Inhabited Building" means a building regularly occupied in whole or in part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage, or use of explosives.

8—"Railway" means any steam, electric, or other railroad or railway which carries passengers for hire.

9—"Highway" means any public street or public road.

10—When 2 or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways, and highways, and in addition they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosives contained in cap magazines shall govern in regard to the spacing of said cap magazines from magazines containing other explosives. If any 2 or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such 2 or more magazines, as a group, must be considered as one magazine, and the total quantity of explosives stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum distances specified from other magazines, inhabited buildings, railways, and highways.

11—The Institute of Makers of Explosives does not approve the permanent storage of more than 300,000 lbs of commercial explosives in 1 magazine or in a group of magazines which is considered as 1 magazine.

12—This Table applies only to the manufacture and permanent storage of commercial explosives. It is not applicabld to transportation of explosives, or any handling or temporary storage necessary or incident thereto. It is not intendee to apply to bombs, projectiles, or other heavily encased explosives.

13—All types of blasting caps in strengths through No. 8 cap should be rated at 1½ lbs of explosives per 1,000 cap. For strengths higher than No. 8 cap, consult the manufacturer.

Except when necessary, or when the American Table of Distances can be complied with, storage within city limits should be avoided.

Magazine Construction.—For the permanent storage of high explosives, the magazine should be bullet resisting and weatherproof. It should be protected from fire and well ventilated. The foundation for such a magazine may be brick, concrete, concrete block, or stone, and the magazine walls above the foundation or floor level should be of medium soft brick that will resist weather conditions. The brick should be laid in cement mortar containing not more than 25 percent lime.

The magazine above the foundation may be of frame construction, sheathed outside, and lined inside with not less than ⅞ inch tongue and groove boards, blind and face nailed with nailheads countersunk. The space between the inner and outer lining from the sill to the plate should be completely filled with dry, sharp sand or a dry mixture of one part cement and eight parts sand. The thickness of the sand for bullet resisting purposes should range from 6 to 12 inches depending on the caliber of rifle and kind of ammunition used in the locality. All wood on the outside of the building should be protected from fire with flat galvanized iron, not less than No. 26 gauge, and firmly secured to the building with galvanized nails and lead washers.

The roof should be of wood frame and sheathing, covered with corrugated galvanized iron. The galvanized iron should be lapped two full corrugations and secured with galvanized nails and lead washers. If explosives can be shot into through the roof, it should be made bullet resistant with sand. This can be done by putting in ceiling joists at the plate line, as if a second story were to be built. A ⅞ inch tongue and groove floor is laid in these joists, with 4 inch sides to form a shallow box. The floor and sides are covered with building paper and the tray is filled with 4 inches of dry sand.

The bullet resistant door should consist of not less than three thicknesses of ⅞ inch matched hardwood boards, covered on the outside with a ⅜ inch steel plate.

To provide sufficient ventilation the floor (except in front of the door) and the bullet resistant sand box or ceiling should be set back at least 2 inches from the walls. Vents in the foundation should be screened with No. 6 gauge ¾ inch mesh wire screen, and weatherproof ventilators in the roof should be provided.

For storage of black powder only, the magazine should be weatherproofed and fire-protected. The foundation may be of brick, concrete, or stone. Above the foundation the magazine may be frame construction, sheathed with wood on the outside, and covered with not less than No. 26 gauge flat galvanized iron firmly secured to the building with galvanized nails and lead washers.

The door for a black powder magazine may be built of two thicknesses of ⅞ inch boards laid diagonally and covered on the outside with No. 22 gauge black or galvanized flat iron, allowing the metal covering to extend one inch over the sides, top, and bottom of the wood backing.

The roof should be of wood frame and sheathing covered with corrugated galvanized iron secured with galvanized nails and lead washers. All outside woodwork should be protected from fire with not less than No. 26 gauge flat galvanized iron sheeting.

For temporary storage, a post foundation may be used. The outside sheathing and metal covering of the magazine should be extended about 6 inches into the ground for fire protection. Ventilation is provided by cutting holes 6 inches square through the sheathing, covering these with No. 6 gauge ¾ inch mesh wire screen secured to the sheathing, or by punching ¾ inch holes in the galvanized iron covering.

For storage of small quantities of high explosives a box of the required dimensions built of 2 inch hardwood will serve; or a box in box with 5 inches of sand filling between can be used. Either should be covered with No. 24 gauge iron and provided with suitable hinges and lock.

Complete plans for any of the magazines described above may be secured from E. I. du Pont de Nemours & Company (Inc.), Storage and Delivery Section, Explosives Department, Wilmington, Delaware.

Magazine Operations.—To prevent brush fires from reaching magazines, trees should be kept trimmed; grass, weeds, and underbrush should be cut, and the open ground around magazines should be kept free of dry leaves or other combustibles for a distance of 25 feet from the magazine.

43-300 O - 75 - 25

The floors of magazines should be clean. They should be swept frequently and the sweepings removed and destroyed. In case magazine floors become stained with nitroglycerin, they should be scrubbed with a stiff broom or hard brush using nitroglycerin remover. This is a solution composed of 1½ quarts of water, 3½ quarts of denatured alcohol, 1 quart of acetone, and 1 pound of sodium sulphide (60% commercial). The liquid should be used freely to decompose the nitroglycerin thoroughly.

The effectiveness of nitroglycerin remover decreases in storage through oxidation of the sodium sulphide. It should, therefore, be kept in closed containers and stored in a dark place. It is good practice to prepare nitroglycerin remover only as needed but, if storage is necessary, the period should not exceed 60 days. About two gallons of nitroglycerin remover are required to desensitize one pound of nitroglycerin in dynamite. There is no apparent thermal hazard in treating dynamite with nitroglycerin remover but the length of time required to desensitize dynamite varies widely depending upon the grade.

If the magazine floor is covered with rubberoid or any material impervious to nitroglycerin, it should be thoroughly swept with dry sawdust. The sweepings should be taken to a safe distance from the magazine and destroyed by burning.

Flammable materials, oil, paint, carbide, metal, metal tools, machinery, or any other articles with the exception of approved aluminum portable conveyors should not be stored in a magazine containing explosives.

Blasting caps or electric blasting caps should not be stored in the same magazine with other explosives. Dynamite and black powder may be stored in the same magazine providing the magazine is bullet resistant.

"Primacord" may be stored in either an explosives magazine or a cap magazine, although storage with high explosives is generally preferred.

Cases of dynamite should be stored top side up. While years ago it was thought advisable to invert the cases at frequent intervals to prevent leakage, this is not necessary.

Black powder kegs may be stored on their sides or ends. If stored on end it is better to put the bungs down to assist in keeping the powder dry, or if stored on sides the seams should be down. To prevent the powder from caking, kegs should be shaken with the hands or rolled every 30 to 60 days.

The oldest stocks should always be used first. On receiving a new shipment, stocks should be arranged so that the remaining old stock is accessible. Cases of explosives should not be opened or renailed in or within 50 feet of a magazine, nor should primed cartridges be made up or kept in a magazine with other explosives. Cartridges or detonators should not be kept loose in the magazine but should be kept in boxes that are covered.

If artificial light is necessary, only electric flashlights or electric lanterns should be used in a magazine.

Smoking or the carrying of matches or cigarette lighters should not be permitted in or around magazines, trucks, powder cars, or wagons containing explosives.

Cases that have contained explosives should be destroyed by burning out of doors; they should never be burned in a stove or fireplace. The special precautions which should be taken in the burning of fiberboard cases are discussed later in this chapter under the section dealing with destroying dynamite.

Empty black powder kegs should be disposed of by sinking them in a river or other large body of water.

DISTRIBUTION

While distribution of explosives from main storage magazines to the point of use involves different safety procedures dependent on the conditions peculiar to the work, certain general principles may be stated. Explosives and detonators

should be kept apart until the last possible moment. Whenever feasible, they should be transported in separate conveyances or be carried by different men. If both must be transported in the same conveyance, or be carried by the same man, they should be placed in separate insulated containers. High explosives and detonators should always be carefully handled and protected from shock and friction. All explosives and detonators should be protected from fire, flame, or sparks. They should be protected from moisture. Wires of electric detonators should be kept from contact with stray electric currents or electrically charged surfaces.

Operations Above Ground.—In transferring explosives from the consumer's magazine to the blast area, the same general recommendations apply as for transportation into the magazine. Under these circumstances, however, haulage will usually be in the operator's trucks and over his own property. Ample precautions should be taken to keep the handling equipment in safe operating condition as described under "Transportation—Vehicles." In the vicinity of steam shovels or locomotives, vehicles should be covered to afford protection from sparks and cinders. Access roads should be so located and maintained as to permit the movement of explosives without undue hazards. Where it is necessary for men to carry explosives, suitable walkways should be provided.

Explosives or blasting agents in the blast area should be distributed in piles so selected, from the standpoints of quantity and spacing, that the accidental explosion of one pile cannot cause sympathetic detonation (propagation) of all of the piles. Numerous fatalities have been caused in the past by failure to observe suitable precautions in this extremely important matter.

TABLE XIII

Column 1	Column 2	Column 3	Column 1	Column 2	Column 3
Pounds of dynamite (cap sensitive)	Distance determined—feet for 100 percent detonations	Distance determined—feet for 100 percent failures	Pounds of dynamite (cap sensitive)	Distance determined—feet for 100 percent detonations	Distance determined—feet for 100 percent failures
50	9	21	2,500	31	75
100	11	25	3,000	33	80
200	13	32	5,000	40	96
300	15	37	7,500	45	108
400	17	41	10,000	50	123
500	18	44	12,500	53	128
750	21	50	15,000	57	136
1,000	23	55	20,000	63	156
1,500	26	64	25,000	67	161
2,000	29	70	30,000	72	170

TABLE XIV

Pounds of "nitramon" or "nitramex"	Distance for 100 percent failures feet	Pounds of "nitramon" or "nitramex"	Distance for 100 percent failures feet
100	6	5,000	21
300	8	10,000	26
500	10	15,000	30
1,000	12	20,000	33
2,500	17	30,000	38

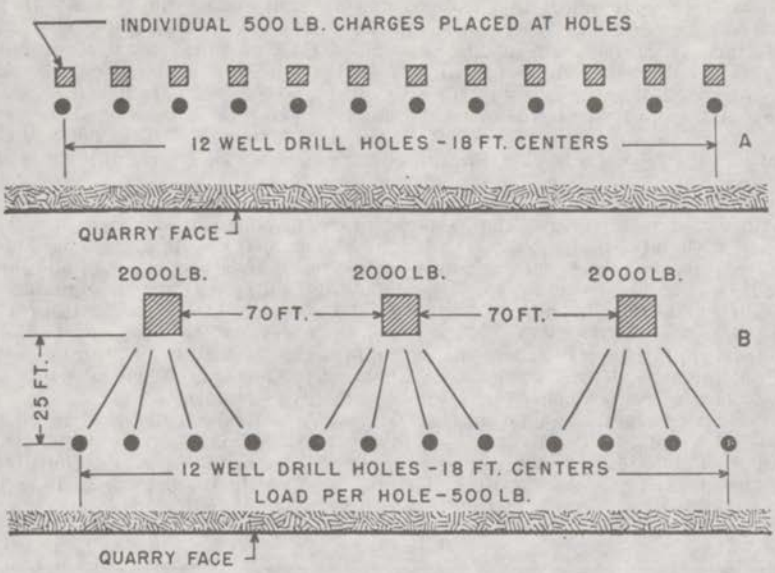


FIGURE 70.—Patterns for distribution of explosives in the blast area with vertical holes; (A) Satisfactory for "nitramon" or "nitramex" but not for dynamite. (B) Satisfactory for either dynamite, "nitramon", or "nitramex".

It is self-evident that, in each case, there must be some distance at or beyond which propagation cannot take place. Some years ago, therefore, the Du Pont Company set out to establish whether these distances could be determined on a scientific basis. Tests on quantities up to 50 pounds indicated that the equation $d=kw^{\frac{1}{3}}$ would apply; where d=distance, k=a constant proportional to the sensitiveness of the explosive, and w=weight of the explosive.

Further confirmation of the formula was then obtained with quantities up to 400 pounds, in a remote section of Canada. Then there arose a most fortunate opportunity to obtain final proof. A very large quantity of dynamite had to be destroyed at Point Barrow, Alaska. Test shots were made, therefore, with approximately 5,000, 10,000, 15,000, and 20,000 pounds. Results were exactly as predicted by the formula.

Table XIII is based upon the above data. Column 1 shows certain quantities of cap sensitive explosives of a type commonly used in quarries, strippings, and open pits. Column 2 shows the number of feet at which the quantities shown in Column 1 will always propagate, while Column 3 shows the distances in feet at which those quantities will constantly fail to propagate. The tests on which the propagation data are based were carried out on soft ground and on hard rock with both boxed and unboxed explosives. No significant difference in the propagating distances was noted, indicating that neither the type of ground nor the missile hazard is an important factor. It is possible, of course, that a missile from one detonating pile of explosives could detonate an adjacent pile at distances greater than those listed in Column 3. The possibility is extremely remote, however, and the chance that still a third pile would detonate is infinitesimal. From a practical standpoint, therefore, the missile hazard can be ignored.

Table XIV includes corresponding data for "Nitramon" and "Nitramex". These blasting agents are very much less sensitive to propagation than dynamite. "Nitramon" primers, however, are explosives and should be treated as such. They should be stacked away from the "Nitramon" and "Nitramex" and should be brought to the boreholes as required.

Figure 70 illustrates both good and bad practices. In "A" the individual charges of 500 pounds, if dynamite, each spaced 18 feet center to center would surely propagate in the event of a premature in any charge. On the other hand, if "Nitramon" or "Nitramex" is used, this spacing is ample. The pattern shown in "B" is the recommended distribution for the same blast when dynamite is used.

In this country at the present time the majority of large operations employing well drills have face heights of 40 to 80 feet, lay out holes with greater spacings than burdens, and use factors varying from three to four tons of material per pound of explosives. In almost all such operations it is satisfactory to pile the "Nitramon" or "Nitramex" opposite each hole to be loaded, while with cap sensitive explosives the charges for four holes should be placed in single piles. This generalization is easily remembered and serves as a very good guide for many blasting crews.

In loading well drill blasts the piles of cap sensitive explosives should be at least 25 feet back from the line of holes. The dynamite cases should be opened at the piles as required and then carried to the loading stations. Loading stations should be at least 6 feet, but preferably 10 feet, from the holes to be loaded and from any unstemmed loaded hole. The loading station should also be at least 25 feet from any primary pile. No more than 100 pounds of dynamite should be allowed at any loading station.

Figure 71 shows a satisfactory pattern for distributing cap sensitive explosives in operations using horizontal holes. The charges are grouped in piles in accordance with the satisfactory distances shown in Table XIII. These piles should be placed at least 25 feet back from the face in order to minimize the chance of detonation in the event of an explosion in the borehole, and also to guard against the hazard of rock falls from the face. It should be noted that the piles are placed midway between the center lines of two holes; this is to offset as much as possible the effect of the rifle barrel action in the case of an explosion in the borehole.

Normally the explosives charges per ton or per cubic yard of rock to be moved are smaller in the case of horizontal holes than vertical holes. Here again, a generalization can be stated; namely, that in most instances the charges for three boreholes can be stacked in one pile.

When loading a large number of holes with more than one loading crew, the crews should be separated by the greatest practical distance. This distance, of course, must be consistent with efficient loading and supervision of the work. A minimum of 25 feet is recommended and every effort should be made to maintain it throughout loading and to avoid the simultaneous loading of adjacent holes.

While the data in Table XIII and Table XIV were developed primarily for providing a measure of safe practice in loading large diameter drill holes at quarries and strippings, they apply as well to all blasting operations.

Underground Operations.—The safe transportation of explosives and explosives supplies from the surface magazine to underground distributing magazines, and their final handling to the point of use, should follow all the rules for transporting explosives and for magazine operations. The exact procedure at a particular mine is, of course, influenced by the conditions. General principles, however, may be stated.

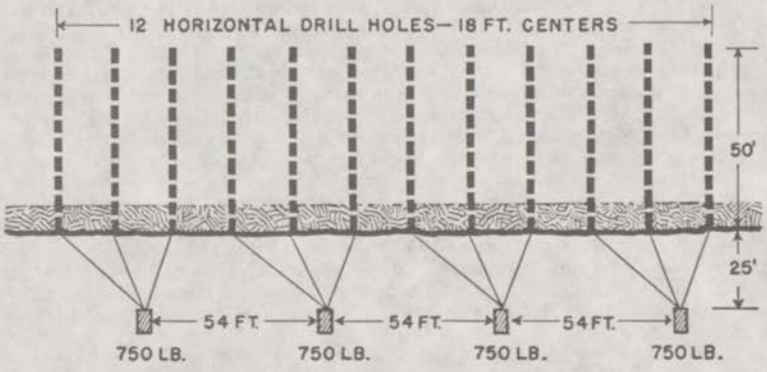


FIGURE 71.—Pattern for distribution of explosives in the blast area with horizontal holes.

Movement of explosives from the surface to the mine should be scheduled on a daily basis, or at short intervals. Explosives preferably should be sent underground off shift. Long storage in the mine is not advisable because of the quantities involved and the effect on the explosives of the usually humid atmosphere. However, in some mines such as salt mines, in which the air is normally dry and where a magazine can be safely located, there is certainly no objection to quantity storage below ground. It is advisable to refer this problem to the explosives manufacturer for recommendations.

Explosives should be transported into the mine in closed cars constructed for that purpose alone. The interior of the car should be lined with wood with no metal parts protruding. When using motor haulage the car should be equipped with insulating wooden draw bars with moisture shedding coverings, or its wood lining covered with rubber or other suitable insulating material. If state laws permit, detonators may be placed in compartments or boxes in the powder car provided that the explosives and detonators are in separate compartments divided by at least 4 inches of wood.

Underground magazines should be so situated that in the event of explosion or fire they shall not hinder escape from the mine, nor shall the fumes be circulated through the mine by the ventilating system. Explosives should be stacked on racks or on a substantial board floor. Empty cases, broken boxes, and packing paper should be returned to the surface for disposal and every effort should be made to keep the magazine clean. There should be no electric wiring in the magazine and open lights should not be permitted. Electric lights can be situated at a reasonable distance from the magazine, so arranged that they will illuminate it through the use of reflecting surfaces or spotlights. Explosives and detonators should not be stored in the same magazine.

In coal mines where shotfirers are employed, small box type magazines may be placed convenient to each loading group. These may be supplied daily from the explosives car, and they should hold just enough for one day's shooting for the group. Separate boxes should be used for the detonators.

Explosives and detonators or primed explosives received from the distributing magazines should be carried to the working face in separate insulated containers. Powder bags are efficient and convenient for carrying explosives or primed explosives, while small wooden boxes can be made to carry detonators.

All explosives and detonators left over at the end of the shift should be returned to the magazine by the miner or shotfirer. Leaving them unprotected in or near the working place may cause serious accidents.

All underground operations relating to the distribution of explosives and explosive supplies should be carried out with due regard to existing state and federal laws and regulations.

OPENING CONTAINERS

Wooden Boxes.—A sharp hardwood wedge and a mallet should be used for opening wooden boxes. The quickest and easiest way is to split the sides and ends, using the wedge on the corners. The box is simply split apart and the top of portion can be lifted off. An alternate method is to remove the cover, using the wedge, leaving the body intact. This latter method should always be used for opening wooden cases of detonators.

Fiberboard Boxes.—There are two types of fiberboard boxes. One employes glue-sealed top flaps and is most easily opened by sliding a wooden wedge under the flaps. A pick or ax handle sharpened at the flat end makes an excellent wedge. The other type of fiberboard box consists of a top and bottom half sealed with tape. Such boxes can be opened very quickly because the tape may be stripped off with the fingers.

Metallic Kegs.—There is only one way to open kegs of black blasting powder properly and safely; the four metal clips on the bung should be pried up with a sharpened wooden stick and pressed back with the same implement or the fingers. The metal cap and underlying paper washer should be lifted out with the fingers.

It is never safe to drive a hole in a powder keg even with a wooden pin. The use of any metal instrument, such as a pick or a rail spike, is definitely very dangerous.

DESTROYING EXPLOSIVES

Except for some amplification, and the coverage of certain Du Pont products, the following is based on pamphlet No. 21, "How to Destroy Explosives," published by The Institute of Makers of Explosives.

It is often necessary to destroy explosives. These explosives may be fresh material from containers which have been broken during transportation, or usable material for which there is no further need on a job, or they may consist of material which has deteriorated from one or more causes or which has become unfit for use through some sort of damage. Frequently, deteriorated explosives are much more hazardous than those in good condition and hence require special care in handling and disposal. The methods recommended for destroying various explosive products are given in the following paragraphs. If large quantities of explosives must be destroyed, if experienced or competent men are not available for the work, or if there is any question in one's mind about the safety of the undertaking, then the handling and destruction of the explosives should be deferred until a representative of an explosives manufacturer has been consulted.

Warning.—The preferred method of destroying dynamite and detonating fuse is by burning. It must be assumed that there is always a possibility of an explosion when either of these two materials is being burned, although it is a remote one in the case of detonating fuse. Consequently, it is important that a place be chosen for burning which is far enough away from any dwelling, railroad, highway, or other place where people may assemble, to eliminate the possibility of injury to persons, or damage to property, should an explosion occur.

Every precaution must be taken when destroying explosives or blasting supplies to make certain that only one type is destroyed at a time. Dynamite, black powder, detonating fuse and safety fuse must be examined carefully to be sure that no detonators of any kind are included. Any attempt to burn these materials when caps of any description are included will almost certainly result in an explosion.

The American Table of Distances, prepared by The Institute of Makers of Explosives, and included as Table XII, page 136 specifies the quantity of explosives that may be stored safely at various distances from inhabited buildings, passenger railways, and public highways. The 2 to 100 pound portion of the American Table of Distances (as revised and approved September 30, 1955) dealing with the separation of unbarricaded explosives storage buildings from inhabited buildings follows:

Explosives (pounds):	*Distances (feet)*
2 to 5	140
5 to 10	180
10 to 20	220
20 to 30	250
30 to 40	280
40 to 50	300
50 to 75	340
75 to 100	380

Explosives should be burned at distances *not less* than those specified in the Table for the quantity involved. These *minimum* distances will protect persons against everything but the missile hazard; to guard against it, they should stand near suitable cover that is available for immediate use in case missiles develop. The *minimum* distances will also protect buildings against major structural damage. Obviously, if it is practicable to do so, the burning should be carried out at distances so great that there is *no* chance of either missile injury or minor damage to buildings. If the burning is near magazines, their doors should be closed.

Dynamite.—When properly stored and cared for, dynamite will remain in good condition for long periods of time, but it will deteriorate rapidly if improperly treated. Dynamite which shows obvious signs of deterioration, such as hardness, discoloration, excessive softness, or leakiness, should be destroyed. If the leakiness has proceeded to the extent of saturating the sawdust in the bottoms of the cases, or of staining the cases, the dynamite should not be touched except under the supervision of a representative of an explosives manufacturer. In addition, dynamite may become unfit for use through some damage, such as wetting, and should be destroyed.

Small amounts of dynamite can be destroyed by exploding them in a safe place, but this is not usually practical where larger quantities are involved. The most satisfactory method of destroying dynamite is by burning, which can be done safely providing certain precautions are taken. It is advisable to limit the amount

of dynamite burned at any one time to 100 pounds. Permissible gelatins, for example, "Gelobel" AA, are particularly prone to detonate during burning, so not more than 10 pounds should be burned at a time.

When burning large quantities of explosives, it is often necessary to burn more than one pile at a time. This is safe provided that: (1) the distance from any dwelling, railroad, highway, etc., is *not less* than that specified in the Table, (2) any persons involved are also at the *minimum* safe distance as specified in the Table, and are near suitable cover in case of missiles, before the first pile starts to burn, and (3) the piles are separated far enough so that there is no chance of propagation. The latter, which means that the detonation of one pile causes the sympathetic detonation of other piles, can be avoided by spacing the piles *at least* 25 feet apart. This distance covers all quantities up to 100 pounds.

Situations occasionally arise in which the quantity of explosives to be destroyed is so large that it would be impractical to limit the amount to be burned at one time to 100 pounds. In such cases, consult an explosives manufacturer before proceeding.

Dynamite should never be burned in cases or deep piles. The cases should be opened with wooden mallets and wedges, using special care in this operation if there are any signs of leakiness. The cartridges should be removed, slit, and spread over the ground, preferably with a mat of loose paper or excelsior underneath them. In no case should the layer of dynamite exceed two or three inches in thickness. Some dynamites are difficult to ignite, hence it is necessary to have combustible fuel beneath the cartridges. If the dynamite is wet, it may be necessary to pour a little kerosene or diesel fuel oil over it. The pile should be ignited by a small pilot fire of paper, wood shavings, or other kindling material arranged so that the fire will have to burn several feet before it reaches any explosive material. This will allow the operator ample time to reach a place of safety before there is any possibility of an explosion. It is also recommended that the kindling be arranged so that it can be ignited on the down wind end. After lighting the pilot fire, all persons should retire immediately to a safe place until the dynamite has completely burned.

When more than 100 pounds of dynamite must be destroyed, a new space should be selected for each lot, as it is not safe to place dynamite on the hot ground of the preceding burning. As soon as all dynamite has been destroyed, the ground where the material was burned should be plowed. The residue from burning dynamite contains salts which may be eaten by cattle with serious results.

Since the widespread introduction of fiberboard boxes and heavy spiral wound shells for large sizes of dynamite, particularly the latter, there have been a number of instances in which one or more small explosions occurred during the burning of the waste boxes and shells. This has happened most frequently when both boxes and shells from which the dynamite had been shucked were involved, but it has occurred in some cases with only the boxes. The cause of the explosions undoubtedly lies in the fact that neither the boxes nor the shells burn very readily and the explosive is subjected to prolonged heating. These explosions have been small and have done little or no damage at reasonable distances. They can be dangerous, however, at close range, such as where men might be warming themselves at the fire.

In case magazine floors become stained with nitroglycerin, they should be scrubbed well with a stiff broom, hard brush, or mop, using a solution composed of 1½ quarts of water, 3½ quarts of denatured alcohol, 1 quart of acetone, and 1 pound of sodium sulphide (60% commercial). The liquid should be used freely to decompose the nitroglycerin thoroughly. If the magazine floor is covered with rubberoid or any material impervious to nitroglycerin, this portion of the floor should be thoroughly swept with dry sawdust and the sweepings taken to a safe distance from the magazine and destroyed *in the same manner as dynamite*. This subject is covered in more detail on page 139, under "Magazine Operations."

Dynamite Boxes and Packing Materials.—All empty dynamite boxes, box liners and sawdust, and empty bags or cartridges, should be carefully collected and destroyed. This is in part because they constitute a potential hazard, and in part because livestock may eat the paper products with possibly fatal results.

Burning is also the most satisfactory means for destroying dynamite boxes and packing materials. An explosion may take place during the burning, however, either because a little loose dynamite is still present or because the materials have absorbed some of the liquid explosive. Thus the burning must be carried out in the open, and in a location such that neither injury nor damage will

result in the event of an explosion. All persons involved should proceed to a safe place, at least 100 feet away, immediately after the fire is started.

Waste materials accumulated in loading a shot should preferably be burned after the shot has been made. If they are burned before the shot, the burning should never be carried out either (1) in the shot area, or (2) before the holes have been stemmed.

"Nitramon" and "Nitramite".—The simplest way to destroy "Nitramon" and "Nitramite" is to chop the containers open with a hatchet or ax, and empty the contents into a large body of water. If a lake or stream is not convenient, these products may be dissolved in water and emptied into a pit or spread over the surface of the ground and preferably covered by earth or plowed under.

"Nitramon" and "Nitramite" Primers and "Nitramex".—These contain an ingredient that cannot be destroyed by water. The best method of disposal is to shoot them in some suitable safe place, either under water, or covered by sand or earth, or in the open if there is no objection to the latter. If it is inconvenient or impossible to dispose of these by shooting them, refer the problem to a Du Pont representative.

Black Powder.—This is best destroyed by pouring the powder into a river or large body of water. Pellet powder should be removed from its wrappers to insure quick destruction.

"Primacord".—When necessary to destroy "Primacord" the preferred method is to burn it. It should be kept in mind that "Primacord" contains a core of high explosives and that the same precautions should be observed as in burning any other high explosive. It should not be burned on the spool, but should be strung out in parallel lines one-half inch or more apart on top of paper, dry straw, or hay.

Detonators.—Blasting caps, electric blasting caps, and delay electric blasting caps which have so deteriorated from age or improper storage that they are unfit for use should be destroyed. These devices should also be destroyed if they have ever been under water, as for example, during a flood, regardless of whether they have been subsequently dried out. In some cases the shells of caps which have been wet and then dried will show signs of corrosion. Such caps may be very dangerous to handle, and it is recommended that they not be disturbed until a representative of the manufacturer has had an opportunity to pass on them.

The method most generally used for destroying detonators is to explode them with dynamite under some confinement as described below. Detonators should not be thrown into small lakes or bodies of water, such as river, creeks, ponds, wells, or water-filled abandoned quarries.

If possible it is advisable to explode ordinary (fuse) blasting caps in the original containers. Otherwise they should be placed in a small box or bag. A hole should be dug in the ground, preferably in dry sand, at least a foot deep. The container is placed in the bottom of the hole and primed with about one-half pound of dynamite and a good electric blasting cap or ordinary cap and fuse. The caps and the primed cartridge should be carefully covered with paper and then dry sand or fine dirt and fired from a safe distance. It is recommended that never more than 100 caps be fired at one time and that the ground around the shots be thoroughly examined after the shot to make certain that no unexploded caps remain. The same hole should not be used for successive shots unless the entire inside surface of the hole feels cool to the touch.

To destroy electric blasting caps or delay electric blasting caps it is necessary first to cut the wires off about one inch from the top of the cap, preferably with a pair of tin snips. No attempt should be made to cut wires from more than one cap at a time. Not more than 100 caps should be placed in a box or paper bag, primed with about one-half pound of dynamite and a good electric blasting cap, buried under paper and sand or dirt, and exploded as described above. It is desirable, especially in the case of delay electric blasting caps, to bundle them together so that the business ends are close together. Of course, the same precautions mentioned in the preceding paragraph should be observed.

Electric Squibs and Delay Electric Squibs.—These devices should be destroyed by the same procedure as used for electric blasting caps.

Safety Fuse.—This material may be disposed of very satisfactorily by burning in a bonfire after checking carefully to see that no unexploded caps are crimped to the fuses.

All Other Materials.—The destruction of explosives and blasting supplies not included above should be referred to the manufacturer.

Alternate Methods.—Manufacturers are familiar with and frequently employ means of destroying explosives and blasting supplies other than by the methods just described, and such other methods may be employed, but only under the direction of the manufacturer.

CARELESS HANDLING

Every year children are injured or lose their lives from tampering with detonators or playing with explosives. There are two sides to this problem: (1) the users of explosives must see that they are not carelessly left where children can get their hands on them; and (2) children must be educated to recognize these detonators and explosives, to leave them alone, and to notify an adult if they should be encountered while playing.

In spite of all warnings that have been issued on this subject, some careless people still leave explosives and detonators where children can get them. If the precepts of this Chapter on Handling and Storage were followed carefully, if explosives and detonators not required for the day's work were always accounted for and removed to locked storage magazines, then these accidents would not occur. Those who cache a few caps under a boulder, or lay them away in a building, or put them in their pockets where they may be forgotten, all needlessly contribute to this toll of injury and loss of life.

Children should be taught what a cap and a stick of dynamite look like and told about their power to cripple or kill. They should be warned not to touch these materials, but rather to notify immediately a police officer or an adult so that the material can be collected and properly disposed of. This program of education can be carried out in several ways. Each person familiar with the handling and use of explosives should tell the story to his children and their friends in the neighborhood. Police officers, school teachers, Boy Scout leaders, camp counselors, neighborhood recreation directors, and the like, should also join the campaign.

The Institute of Makers of Explosives has produced a motion picture, "Blasting Cap," in color on this topic. It is regularly being shown in schools and children's camps. The Institute also distributes posters and leaflets. Information on these and the motion picture can be obtained by writing directly to The Institute of Makers of Explosives, 250 East 43rd Street, New York, New York.

5. ————, *Explosives Series, Solid Propellants, Part One*, U.S. Army Materiel Command Pamphlet AMCP 706-175 (1971), pp. 33-42.

19. General.—Black powder is our oldest propellant. It is older than any of the heat engines (guns, rockets) in which propellants are used, and has been used as a pyrotechnic and as a bursting charge for centuries. It is an intimate mixture of saltpeter, charcoal, and sulfur. There are two types of black powder, one made with potassium nitrate and the other with sodium nitrate.

The *potassium nitrate type* is the older, and for ordnance uses is still the more commonly used. In ordnance circles black powder is the potassium nitrate type unless otherwise designated. The name black powder is a translation of the German "Schwarzpulver," named after Berthold Schwarz who experimented with it in the fourteenth century.[1] In the English language the material was known as "gunpowder" until the use of smokeless powder in guns made it necessary to differentiate between the black and the smokeless varieties of gun propellant. Gunpowder included Musket Powder and Cannon Powder, later Rifle Powder and Sporting Gunpowder. When used for blasting, gunpowder was called Blasting Powder. The present United States terminology is "A" Blasting Powder.[2]

The *sodium nitrate type* of black powder was developed in the United States in the middle of the nineteenth century[3] and is known commercially as "B" Blasting Powder. When used for ordnance it is called sodium nitrate black powder.

20. Appearance.—The appearance of black powder is shown in Figure 22. The grains are irregularly shaped solids, resulting from the fracture of larger pieces on the rolls of the corning mill, of roughly uniform size as a result of screening. Black powder may alternatively be pelleted into grains of uniform size and shape.

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[1] A. P. VanGelder and H. Schlatter, *History of the Explosives Industry in America*, p. 10, Columbia University Press, New York, New York, 1927.
[2] C. W. Brooks (E. I. duPont deNemours & Co., Inc.), private communication.
[3] L. duPont (to E. I. duPont de Nemours & Co., Inc.) U.S. Patent 17,321 (1857).

21. Composition.—The nominal composition of black powder as available in the United States is shown in Table 3. The same compositions are used for both military and commercial grades. Selection of the charcoal has an important bearing on the quality and performance of black powder. The charcoal is not pure carbon, but contains 13 to 20 percent volatile matter and 2 to 5 percent moisture.

TABLE 3.—NOMINAL COMPOSITIONS OF BLACK POWDER AVAILABLE IN THE UNITED STATES

	KNO_3 type [1]	$NaNO_3$ type [2]
KNO_3, (percent)	74.0	
$NaNO_3$, (percent)		72.0±2
Sulfur, (percent)	10.4	12.0±2
Charcoal, (percent)	15.6	16.0±2
Ash, maximum, (percent)	.80	1.5
Moisture, maximum, (percent)	.50	.70
Specific gravity	1.72–1.77	1.74–1.82

[1] JAN–P–223A, National Military Establishment Specification Powder, Black (Jan. 12, 1949) with SCN No. 1 (Mar. 23, 1959).
[2] JAN–P–362, Joint Army-Navy Specification. Powder, Black, Sodium-Nitrate (June 28, 1946) with Amendment-I (Dec. 23, 1946).

22. Granulation.—The standard granulations of potassium nitrate and sodium nitrate powders are shown in Tables 4 and 5, respectively.

23. Thermochemistry.—Lacking knowledge of the nature of the volatile matter in the charcoal, and considering that manufacturing tolerances permit 1 percent variation in the fraction of each ingredient, it is practically impossible to calculate the gas composition or volume of black powder. A rough approximation may be got by assuming that the volatile matter is largely carbon, that the potassium appears in the product as K_2CO_3, the nitrogen as N_2, the carbon as $CO+CO_2$, and that the sulfur and such hydrogen as is in the volatile matter do not make an important contribution to the gas volume. Under these assumptions the gas volume would be given by $[C]+\frac{1}{2}[N]-\frac{1}{2}[K]$. Since the [N] and [K] are present in equal numbers, the gas volume of black powder is determined roughly by the fraction of charcoal in the formula. In the United States grade of potassium nitrate type of black powder, one gram contains 0.0130 gram atoms



FIGURE 22.—Black powder, grade FFFFG, 8× magnification.

of carbon which when burned should give 0.0130 moles or 290 cc (STP) of gas. An experimental value of the gas volume from three samples of British black powder recently examined in the Imperial Chemical Industries laboratories has been reported at 280 cc (STP).[6] The same author reports a heat of explosion, Q, of 720 cal/g and a calculated flame temperature, rework in the wheel mill, shown in Figure 24, along with a small quantity of water. The individual wheels of the wheel mill may weigh 10 tons and stand 7 feet high. The functions of the wheel mill include in addition to grinding and mixing the achievement of a state of "incorporation." Although incorporation is little understood, it is believed to be a state of very close contact among ingredients, perhaps without intervening films of air on particles, and accomplished by very considerable mechanical effort in the form of shearing pressure.[2] When the wheel mill cycle is complete, the wheel cake is shoveled out and transported to the press house where it is first broken down by passing through rolls, then pressed into cakes using a horizontal press shown in Figure 25.

TABLE 4.—GRANULATIONS OF POTASSIUM NITRATE BLACK POWDERS

	Sieve size	Retained (maximum percent)	Sieve size	Through (maximum percent)
Military grade:[1]				
A–1	4	3.0	8	5.0
A–2	4	3.0	12	5.0
Cannon	6	3.0	12	5.0
A–3	12	3.0	16	5.0
A–3a	12	3.0	20	5.0
Musket	14	3.0	25	5.0
FFG	16	3.0	30	5.0
A–4	16	3.0	40	5.0
Shell	16	3.0	50	5.0
FFFG	20	3.0	50	5.0
A–5, fuze	40	3.0	100	5.0
FFFFG	45	3.0	140	5.0
A–6	100	5.0	140	15.0
A–7	100	3.0	140	50.0
Meal	100	5.0	200	50.0
Sphero-hexagonal: 128±2 grains per pound, 0.6-inch grain diameter.				
Commercial grade:[2]				
Sporting:				
Whaling	[3] 32/64	3	4	12
Life saving service	6	3	12	12
Cannon	6	3	1	12
Saluting	10	3	20	12
Fg	12	3	16	12
FFg	16	3	30	12
FFFg	20	3	50	12
FFFFg	40	3	100	12
"A" blasting:				
FA	[3] 20/64	3	5	12
2FA	4	3	12	12
3FA	10	3	16	12
4FA	12	3	20	12
5FA	20	3	50	12
6FA	30	3	50	12
7FA	40	3	100	12
Meal D	40	3	----	----
Meal F	100	3	----	----
Meal XF	140	3	----	----

[1] JAN-P-223A, National Military Establishment Specification Powder, Black Jan. 12, 1949) with SCN No. 1 Mar. 23, 1959).
[2] C. W. Brooks (E. I. duPont de Nemours & Co., Inc.), private communication.
[3] Diameter of circular perforations in plate.

[6] J. Taylor, *Solid Propellant and Exothermic Compositions*, p. 19, Interscince Publishers, Inc., New York, New York, 1959.

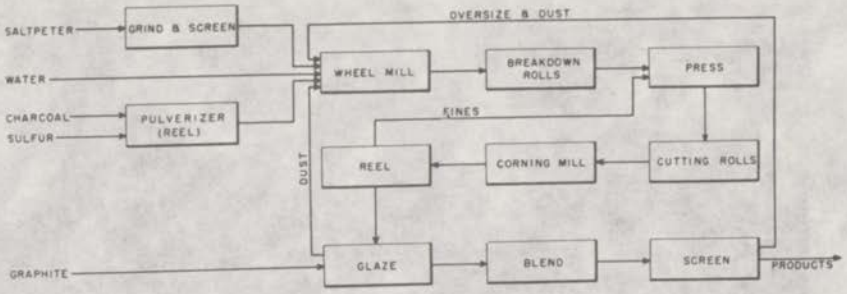


FIGURE 23.—Black powder manufacturing process.

The press cakes are broken into pieces of about ¾-inch size on the cutting rolls shown in the background of Figure 25. The size is reduced further on the corning rolls. The product from the corning mill is screened on a reel, the dust being sent back to the press. The product size and shape do not change essentially after the corning operation. The remaining operations are glazing and screening to separate the various grades produced. The glazing operation is carried out at elevated temperature in order, simultaneously, to evaporate water down to the specified level. If fuse powder is being made, two or more grades of different burning rate are produced by varying the ratio of sulfur to charcoal in the formula and these are blended to meet burning rate specifications.

27. *Uses.*—With a force, *F*, of 110,000 ft-lb/lb, black powder was an effective gun propellant. The presence of solid reaction products led to large volumes of smoke and to a corrosive barrel residue requiring thorough cleaning of the gun daily or after each use. When propellants known as smokeless powders with higher force and substantially without solid products became available, black powder became obsolete for gun use. The change was not made overnight because a gun designed for black powder was not ideal for use with smokeless powder and *vice versa*. There are still a few antique sporting pieces in the hands of hobbyists who fire them, but the use of black powder as the propelling charge for guns no longer is significant.

During World War II a need arose for a flash suppressant for use with certain guns, particularly the 155-mm gun. It was known that potassium salts are effective in suppression of flash. As black powder is roughly three-quarters potassium nitrate and a propellant in its own right, the use at night of an auxiliary charge of black powder was undertaken with considerable success. This use of black powder is not expected to outlive the present inventories of smokeless powder, however, since new propellants containing largely nitroguanidine have been developed which have at the same level of force lower burning temperature than those of the World War II smokeless powders. These nitroguanidine propellants exhibit much less tendency to flash, and the incorporation of small fractions of potassium salts in them generally inhibits flash completely.

Black powder was also the original rocket propellant. In the decades before World War II, except for Goddard's experiments, rocketry in the United States was confined to fireworks and small signal rockets of modest range and velocity and small payloads. For such rockets, black powder has been quite satisfactory. The smoke and sparks of the exhaust were desirable and there was no disadvantage connected with residue in the spent motor chamber. When military rockets

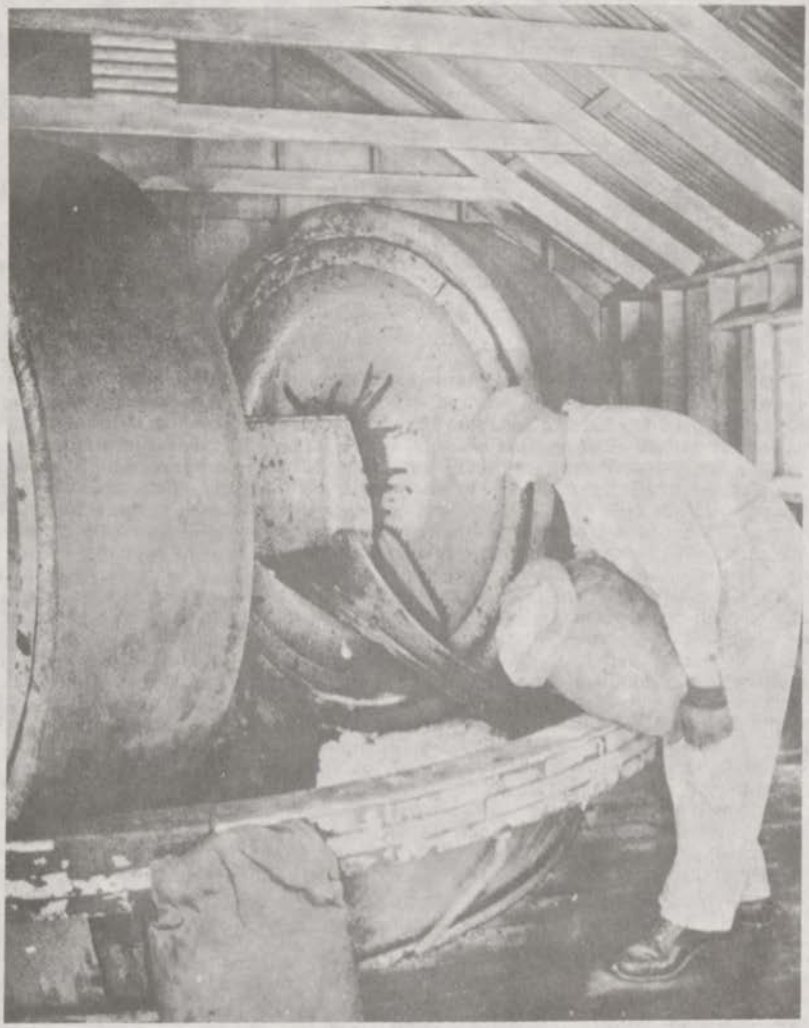


FIGURE 24.—Black powder wheel mill.

were developed during World War II, first abroad and later in the United States, it was recognized that the low calorific value of black powder took it out of competition with the more energetic propellants that were available. Manufacturing processes moreover were not available to form black powder into the grain geometries required for these higher performance rockets, and it is doubtful that the physical properties of black powder would be compatible with the thermal and acceleration forces of such rockets.



FIGURE 25.—Black Powder Press.

As a bursting charge, black powder has been supplanted largely by more potent high explosives except for some practice bombs and projectiles where the smoke puff helps locate the impact point.

In primers for gun charges and igniters for rocket charges the easy ignitibility of black powder has made it a preferred ingredient. The high content of potassium nitrate has also been recognized as favorable for such use, because potassium salts are good emitters of radiation and radiation may be an important means of transfer of heat from the primer or the igniter to the surface of the main propellant charge.

As the first civil as well as military explosive, and for a long time the only available explosive, black powder has been extensively used for blasting. For this use the sodium nitrate black powder has been preferred ever since its introduction, in spite of somewhat greater hygroscopicity and slower burning rate, because of its lower price. Black powder does not detonate, even when initiated with a blasting cap. The observed propagation rates of 100 to 600 m/sec. [2],[11] when confined in steel pipes and initiated with a detonator are accounted for by shattering of the black powder by the initiator and burning at the attained pressure. Black blasting powder was first supplanted by commercial high explosives for blasting in rock because the detonation of the high explosives was very much more effective than the burning of black powder. For blasting in earth, black powder withstood the competition of high explosives for a longer time because the shock of detonation of high explosives was rapidly dissipated in earth whereas the slower burning black powder maintained pressure longer and gave more "heaving" of the burden. Coal miners like black powder because it breaks the coal into higher priced lump coal and produces less fines than even the low rate permissible high explosives. Unfortunately the reaction time of black powder lasts longer than the initial fracture of the coal, resulting in occasional ignition of methane (fire damp) and dust in the atmosphere of gassy mines and even of the coal itself. Use of black powder for blasting in coal mines engaged in interstate commerce is now forbidden by federal law.

TABLE 6. *Consumption of black blasting powder (all types) in the United States*[1]

Year:	*Pounds (thousands)*
1915	197, 722
1920	254, 880
1925	156, 964
1930	99, 873
1935	68, 888
1940	59, 754
1945	36, 948
1950	20, 655
1955	6, 624
1956	5, 598
1957	3, 684
1958	2, 492

[1] U.S. Bureau of the Census, *Statistical Abstract of the United States: 1940*, 62nd edition, p. 860, Washington, D.C., 1940; *ibid.*, *Statistical Abstract of the United States: 1959*, 80th edition, p. 815, Washington, D.C., 1959; U.S. Bureau of Mines, *Mineral Market Report No. MMS 2973*, Washington, D.C., 1959.

The largest current use of black powder is for safety fuse. This is a column of black powder enclosed in a fabric tube. The rate of burning is carefully standardized so that the shooter can predict the length of time between lighting his fuse and the shot. Black powder has also been used as the timing element in some military fuzes. It has the disadvantage of producing a considerable volume of gas which either must be vented or it increases the pressure on the powder train and hence its burning rate. It has the further disadvantage that it is difficult to ignite at reduced pressures and impossible to ignite at pressures below 100 mm. For use at high altitudes it is necessary to assure that any device relying on the burning of black powder be pressurized.

The decline of the black powder industry in the United States is shown in Table 6.

Recognizing the obsolescence of black powder, the military forces have sponsored research on substitutes for black powder in all applications.

[11] Hercules Powder Company, unpublished data.

Black Powder

Composition:
%

Potassium nitrate	74.0
Sulfur	10.4
Charcoal	15.6
C/H Ratio	

Impact Sensitivity, 2 Kg Wt:

Bureau of Mines Apparatus, cm	32
Sample Wt 20 mg	
Picatinny Arsenal Apparatus, in.	16
Sample Wt, mg	16

Friction Pendulum Test:

Steel Shoe	Snaps
Fiber Shoe	Unaffected

Rifle Bullet Impact Test: Trials

	%
Explosions	
Partials	
Burned	
Unaffected	

Explosion Temperature: °C

Seconds, 0.1 (no cap used)		510
1		490
5	Ignites	427
10		356
15		
20		

75°C International Heat Test:
% Loss in 48 Hrs 0.31

100°C Heat Test:
% Loss, 1st 48 Hrs
% Loss, 2nd 48 Hrs
Explosion in 100 Hrs

Flammability Index:

Hygroscopicity: %

20°C, 75% RH	0.75
25°C, 90% RH	1.91
30°C, 90% RH	2.51

Volatility:

Molecular Weight: 84

Oxygen Balance:

CO_2 %	-22
CO %	- 2

Density: gm/cc Variable

Melting Point: °C

Freezing Point: °C

Boiling Point: °C

Refractive Index, n_{20}^{D}
n_{25}^{D}
n_{30}^{D}

Vacuum Stability Test:
cc/40 Hrs, at

90°C	
100°C	0.5
120°C	0.9
135°C	
150°C	

200 Gram Bomb Sand Test:
Sand, gm 8

Sensitivity to Initiation:
Minimum Detonating Charge, gm
Mercury Fulminate
Lead Azide
Tetryl
Sensitive to igniting fuse

Ballistic Mortar, % TNT: 50

Trauzl Test, % TNT: (a) 10

Plate Dent Test:
Method
Condition
Confined
Density, gm/cc
Brisance, % TNT

Detonation Rate:
Confinement
Condition
Charge Diameter, in.
Density, gm/cc 1.6
Rate, meters/second 400

43-300 O - 75 - 26

Fragmentation Test:

90 mm HE, M71 Projectile, Lot WC-91:
Density, gm/cc
Charge Wt, lb

Total No. of Fragments:
For TNT
For Subject HE

3 inch HE, M42A1 Projectile, Lot KC-5:
Density, gm/cc
Charge Wt, lb

Total No. of Fragments:
For TNT
For Subject HE

Fragment Velocity: ft/sec
At 9 ft
At 25½ ft
Density, gm/cc

Blast (Relative to TNT):

Air:
Peak Pressure
Impulse
Energy

Air, Confined:
Impulse

Under Water:
Peak Pressure
Impulse
Energy

Underground:
Peak Pressure
Impulse
Energy

Initiating Efficiency:

Grams Required to Initiate

Igniter Comp K-31	2.0
Igniter Comp K-29	2.3

Shaped Charge Effectiveness, TNT = 100:

	Glass Cones	Steel Cones
Hole Volume		
Hole Depth		

Color: Black

Principal Uses: 1. Igniter powder
2. Time rings (fuzes)

Method of Loading: 1. Loose (granulated)
2. Pressed

Loading Density: gm/cc

psi x 10^3					
25	50	60	65	70	75
1.74	1.84	1.86	1.87	1.88	1.89

Storage:

Method	Dry
Hazard Class (Quantity-Distance)	Class 9
Compatibility Group	Group O
Exudation	None

100°C Vacuum Stability Test, cc gas/40 hrs:

Initial Value	0.5
After 2 hours at 65°C	0.86
After 2 hours at 65°C, 75% RH	1.46

Sensitivity to Electrostatic Discharge, Joules: (b)

Unconfined	>12.5
Confined	0.8

Compatibility with Metals:

Dry - Compatible with all metals when moisture content is less than 0.20%.

Wet - Attacks all common metals except stainless steel.

Heat of:

Explosion, cal/gm	684
Gas Volume, cc/gm	271

6. Explosives Series, Properties of Explosives of Military Interest, U.S. Army Materiel Command Pamphlet AMCP 706-177 (1971), pp. 36-39.

Black Powder

Preparation.—Willow or alder charcoal, flour of sulphur and 2-3% of water are placed in a tumbling barrel and mixed for a short period (about ½ hour). The mixture is transferred to a "wheel mill" and crystalline potassium nitrate containing 3-4% moisture is added and the mixture is incorporated for several hours. During the incorporation period the mixture is kept damp (2-3% moisture) by adding water at intervals. The mill cake is then pressed at 6000 psi between aluminum plates. The pressed cakes are broken up between rubber or wood rolls. The material is screened and the various particle sizes are separated as desired. The screened material is then transferred to canvas trays and dried in hot air ovens at 60° C. If it desired to glaze the black powder, the material before drying is polished by rotation in a tumbling barrel to give it a smooth surface. It is next screened to remove the dust. The smooth particles are then placed in a wooden barrel and rotated with graphite. The material is again screened to remove the excess graphite, and dried. Material finer than #40 U.S. Sieve is not graphited.

WARNING

The batches of black powder must be of sufficient size to cover the bed of the "wheel mill." If the wheels run off on the bare bed, explosions usually result.

Origin.—The exact date of the discovery of black powder is unknown. Historians attribute its discovery to the Chinese, Hindus or Arabs. The Greeks used it during the 7th Century. Marcus Graecus in the 9th Century and Roger Bacon in the 13th Century described compositions similar to the present powder. Beginning with the 16th Century, the composition of black powder containing potassium nitrate, charcoal and sulfur has remained unchanged with respect to the proportionality (75/15/10) of the ingredients.

Destruction by Chemical Decomposition.—Black powder can be desensitized by leaching with water to dissolve the potassium nitrate. The washings must be disposed of separately because the residue of sulfur and charcoal is combustible but not explosive.

References.—(a) Ph. Naoum, *Nitroglycerine* and *Nitroglycerine Explosives*, Baltimore, 1928.

(b) F. W. Brown, D. H. Kusler and F. C. Gibson, *Sensitivity of Explosives to Initiation by Electrostatic Discharges*, U. S. Department of the Interior, Bureau of Mines RI 3852, 1946.

(c) Also see the following Picatinny Arsenal Technical Reports on Black Powder:

0	1	2	3	4	5	6	7	8	9
250	91	222	163	354	65	56	347	188	379
710	471	272	363	454	415	176	407	318	819
850	661	322	453	544	545	356	437	428	839
1,010	901	472	843	554	605	686	547	558	849
1,450	1,111	492	1,043	574	1,145	746	757	598	859
	1,241	582	1,153	594	1,275	1,256	847	608	899
	1,451	762	1,243	654	1,815	1,316	1,097	618	1,259
	1,541	872	1,333	664	1,885	1,536	1,737	698	1,309
	1,711	1,022	1,493	774	1,905	1,576	1,797	838	1,339
	1,911	1,622	1,583	844	1,915	1,586	1,807	898	1,349
	1,951	1,712	1,643	1,114		1,946	1,827	1,068	1,589
	2,051	1,802	1,813	1,154				1,388	1,739
		1,912	1,843	1,244				1,528	1,869
			1,973	1,504				1,778	1,889
								1,808	
								1,838	
								1,928	
								2,178	

F. ————, *Military Pyrotechnics Series, Part Three—Properties of Materials used in Pyrotechnic Compositions*, U.S. Army Material Command Pamphlet AMCP 706-187 (1963), pp. 58-59.

Black Powder

(GUNPOWDER)

Black powder is an intimate mechanical mixture of potassium or sodium nitrate, charcoal, and sulfur. Willow or alder charcoal and flour of sulfur and 2–3% of water are well mixed in a tumbling barrel. This mixture is transferred to a wheel mill and the desired amount of crystalline potassium nitrate and several percent of water are added. The mill is run for several hours to obtain a uniform mixture. During mixing the mixture is kept damp by the addition of water. The mixture is pressed at about 6000 psi and then broken up by passing between rolls. Broken pieces are screened into sizes and material of undesired size is reconsolidated and passed through rolls and screened. Material of acceptable size is then thoroughly dried in hot air ovens at about 60°C. The material may be polished before drying by rotating it in a tumbling barrel. After tumbling, the black powder is sieved and the fines removed.

Black powder is sensitive to friction, heat, and impact, and is very dangerous to handle. It absorbs moisture and deteriorates rapidly. If kept dry, it will retain its properties indefinitely. Combustible materials that have absorbed liquors leached from black powder are a severe fire hazard and may become explosive. Every safety precaution should be taken in black powder manufacture and operations.

Black powder has a composition close to the stoichiometric proportions needed to satisfy the equation:

$$2KNO_3 + S + 3C \rightarrow K_2S + 3CO_2 + N_2$$

In practice, the proportions may be varfied slightly.

Formula (specification)	KNO_3, 74.0%; S, 10.4%; charcoal, 15.6%.
Specification No.	JAN–P–223A.

(All seven grades listed in the specification are used in pyrotechnics.)

Crystalline form	Mechnical Mixture.
Color:	Black.
Density, g./ml	Approx. 1.6, variable depending mainly on conditions of preparations.

Decomposition Temperature: Exothermal preignition reaction starts at about 250°C and culminates at aproximately 300°C (DTA and TGA curves).

Decomposition Products:

Hygroscopicity: Black powder is appreciably hyroscopic and is prepared and kept under conditions of low humidity so that its properties will not be adversely affected.

Temp. °C	R.H.%	Gain %
26	75	0.75
25	90	1.91
30	90	2.51

Explosion Data:

Specific volume at S.T.P., l./kg.	285 (H_2O gas).
Explosion temperature, °C	2770.
Heat of explosion, Kcal./kg	685 (H_2O liquid).
Characteristic produce (V_0Q)	195,200.

The equation for the burning of black powder has been given as approximately:

$$74KNO_3 + 96C + 30S + 16H_2O \rightarrow 35N_2 + 56CO_2 + 14CO + 3CH_4 + 2H_2S + 4H_2 + 19K_2CO_3 + 7K_2SO_4 + 8K_2S_2O_3 + 2K_2S + 2KSCN + (NH_4)_2CO_3 + C + S$$

For other equations see Ref. 54V2.

Health Hazard	None mentioned.
Safety Classifications:	
OSM: Class 9 (in charges or containers).	
ICC: Class A explosive, not accepted for railway express. Black powder igniters with empty cartridge bags, classified class C explosives.	
Fire and Explosion Hazard: Black powder can be detonated by friction, heat, and impact.	
Electrostatic sensitivity	Unconfined > 12.5 joules.
Energy required to ignition	Confined 0.8 joules.
Impact Sensitivity, 2 kg. weight falling on 16 mg. sample:	
Bureau of Mines apparatus, cm. 32	(10% Point).
P.A. Apparatus, in. 16	(10% Point).
Initiating efficiency (min. wt. in grams required to initiate B.P.):	
Igniter composition K–31	2.0
Igniter composition K–29	2.3
Friction pendulum test:	
Steel shoe	Snaps.
Fibre shoe	Unaffected.
Explosion Temperature Test: (0.02 g. sample in No. 6 copper detonating cap)	
Seconds:	
0.1 (no cap used) *Temp., °C*	510.
1 Do	490.
5 Do	427 ignited.
10 Do	356.
75% International heat test:	
Loss in 48 hrs., weight %	0.31.
Vacuum Stability Tests, cc./hrs. on 5 g. sample	100°C, 0.5; 120°C, 0.9.
Sand Test, with 200 g. bomb and 0.4 g. sample of black powder:	
Grams sand crushed to pass 30-mesh screen	8.
Sensitivity	tetryl, 0.25 g.
Ballistic mortar, % of TNT	50.

APPENDIX E—DATA ON BOMBING INCIDENTS

Following is the most recently-compiled edition of the Federal Bureau of Investigation's *Bomb Data Summary:*

BOMB SUMMARY

A COMPREHENSIVE REPORT OF INCIDENTS INVOLVING EXPLOSIVE AND INCENDIARY DEVICES IN THE NATION - JANUARY-JUNE, 1974



FBI UNIFORM CRIME REPORTS

FOREWORD

The number of bombing attacks have shown a slight decrease since 1972, however, these crimes of violence are still a problem with which society is confronted. By their very nature, they instill fear in the public and present a challenge to the administration of criminal justice in combatting this menace.

Since 1972, available information on known explosive and incendiary devices indicates the majority of these vicious crimes are committed by individuals rather than by an organized group or groups.

This six-month summary of bombing information is compiled from data furnished to the FBI by public safety agencies and in turn is released to the criminal justice community to further delineate this crime problem.

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BOMB SUMMARY
UNIFORM CRIME REPORTS
FEDERAL BUREAU OF INVESTIGATION
NATIONAL BOMB DATA CENTER
January - June, 1974

SUMMARY

TOTAL NUMBER OF BOMBING INCIDENTS -- 908

ACTUAL BOMBINGS -	726	ATTEMPTED BOMBINGS -	182
Explosive	369	Explosive	106
Incendiary	357	Incendiary	76

* * *

A preliminary total of 908 bombing incidents were reported to the FBI for the period January-June, 1974. In the same period for 1973, a total of 945 incidents occurred.

* * *

One thousand one hundred fifty-eight devices were used in connection with the 908 bombing incidents. Forty-six percent or 531 were explosive in nature, while 54 percent or 627 were incendiary.

* * *

Twelve deaths and 75 injuries were reported to have occurred as a result of bombing incidents. Fifty-five injuries and ten deaths occurred in connection with explosive incidents, and 20 injuries and two deaths occurred as a result of incendiary attacks.

* * *

The total value of property damaged due to bombings was $3,323,439. Explosive bombs resulted in $1,759,655 damage while incendiary devices caused $1,563,784 damage.

* * *

Thirty-nine percent of all bombing matters occurred in cities over 250,000 population. California led the Nation in number of incidents with 240 or 26 percent of the total. The Western Region experienced 395 or 44 percent of the 908 bombing incidents.

* * *

Seventy-two percent of all bombings occurred between 6:01 p.m. and 6:00 a.m. Three hundred forty-four incidents occurred between 6:01 p.m. and midnight, and 306 occurred between 12:01 a.m. and 6:00 a.m.

* * *

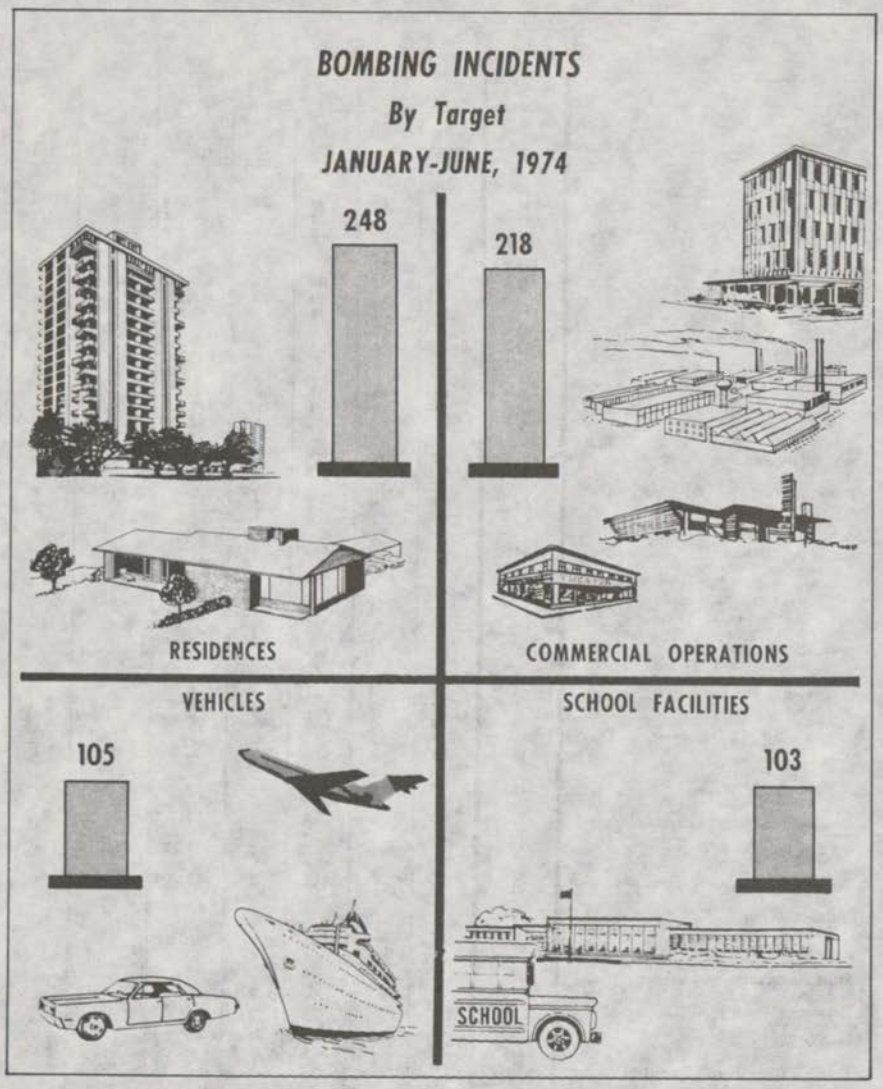
Monday had the highest frequency of bombing incidents with 153, while Saturday had the lowest with 114.

* * *

The most common targets were residences with 248 attacks and commercial operations with 218. The combined total for these targets accounted for 51 percent of the bombing attacks.

BOMBING INCIDENTS BY TARGET

Target	Total Actual and Attempted Bombings	Actual		Attempt		Property Damage (Dollar Value)	Personal Injury	Death
		Explo.	Incend.	Explo.	Incend.			
TOTAL	908	369	357	106	76	3,323,439	75	12
Residences	248							
Private Residence	180	51	93	16	20	264,304	7	...
Apartment House	31	4	21	1	5	26,265	4	1
Other Private Property	37	27	8	2	...	13,617	1	...
Commercial Operations	218							
Commercial Building	175	62	80	16	17	1,491,612	10	1
Office Building	17	4	7	3	3	218,000	...	...
Industrial Building	11	7	1	2	1	33,810	...	...
Motel and Hotel	4	2	2	...	...	100	1	...
Theater	11	3	6	1	1	900	6	...
Vehicles	105							
Auto	71	28	25	12	6	35,430	2	...
Other Vehicle	32	11	15	4	2	130,025	...	...
Aircraft	2	1	...	...	1	80,000	...	...
School Facilities	103	56	32	9	6	411,505	19	...
Public Safety	36							
Law Enforcement	35	9	19	3	4	97,405	1	...
Fire Department	1	...	...	...	1	.....	...	...
Public Buildings	21							
Church	5	...	5	...	...	51,600	...	...
Hospital and Health Facilities	3	1	1	1	...	100	...	...
Post Office Facilities	9	5	...	2	2	555	1	...
Court House	4	1	3	...	...	17,750	...	...
Recreation Facilities	20	13	2	5	...	14,970	...	...
Other Government Property	15							
Federal	5	2	2	1	...	3,650	...	...
State	5	2	2	...	1	30,650	...	...
Local	5	3	1	1	...	1,820	...	...
Persons	14	8	1	5	...	15,500	4	4
Transportation Facilities	14	3	8	3	...	14,503	2	...
Construction Sites and Equipment	11	7	2	2	...	23,150	...	...
Telephone Facilities	10	8	1	1	...	16,273	...	...
Other Communication Facilities	2	...	1	...	1	5,000	...	...
Utilities	8							
Power Facilities	2	1	...	1	...	15,000	...	...
Other Public Utilities	6	5	1	...	...	268,500	...	...
Military Facilities	5	2	...	2	1	1,000	...	...
Newspaper Facility	1	1	...	...	...	2,500	...	...
Open Area	57	25	18	11	3	95	5	...
Unknown (Premature Detonation)	10	10	...	...	...	3,200	10	6
Other	10	7	...	2	1	34,650	2	...

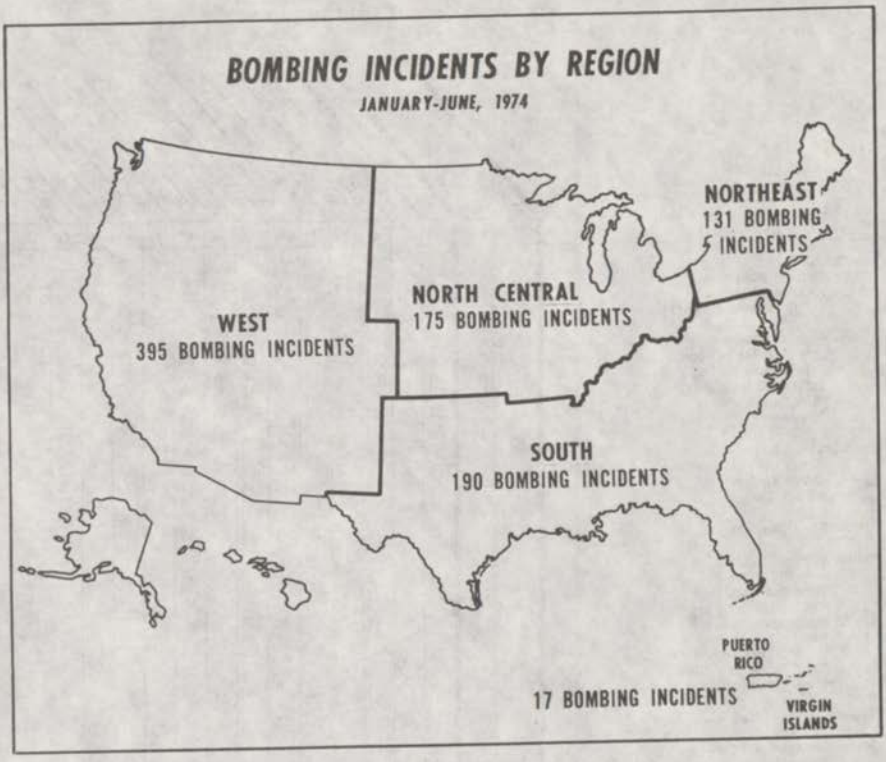

BOMBING INCIDENTS
By Target
JANUARY-JUNE, 1974
248
218
RESIDENCES
COMMERCIAL OPERATIONS
VEHICLES
105
SCHOOL FACILITIES
103
SCHOOL

BOMBING INCIDENTS BY REGION, GEOGRAPHIC DIVISION AND STATE

Area	Total Actual and Attempted Bombings	Actual		Attempt		Property Damage (Dollar Value)	Personal Injury	Death
		Explo.	Incend.	Explo.	Incend.			
TOTAL	908	369	357	106	76	3,323,439	75	12
Northeast	131	55	50	17	9	592,258	12	...
New England								
Connecticut	16	7	9	...	...	5,245	2	...
Maine	...	...	...	...	...	.....	...	...
Massachusetts	9	4	4	1	...	8,875	...	...
New Hampshire	3	2	1	...	...	750	...	...
Rhode Island	1	1	...	...	...	.....	1	...
Vermont	1	...	...	1	...	.....	...	...
Middle Atlantic								
New Jersey	21	7	9	4	1	11,333	1	...
New York	63	22	24	10	7	18,065	8	...
Pennsylvania	17	12	3	1	1	547,990	...	...
North Central	175	89	52	24	10	847,046	22	...
East North Central								
Illinois	44	17	20	4	3	354,330	9	...
Indiana	15	7	5	1	2	12,682	...	...
Michigan	23	15	3	4	1	86,115	8	...
Ohio	54	30	15	7	2	336,459	5	...
Wisconsin	5	4	...	1	...	1,000	...	...
West North Central								
Iowa	10	7	1	2	...	1,350	...	...
Kansas	6	2	1	3	...	85	...	...
Minnesota	6	3	1	1	1	350	...	...
Missouri	8	4	3	1	...	9,625	...	...
Nebraska	3	...	2	...	1	5,050	...	...
North Dakota	...	...	...	...	...	.....	...	...
South Dakota	1	...	1	...	...	40,000	...	...
South	190	74	63	32	21	934,175	15	3
South Atlantic								
Delaware	...	...	...	...	...	.....	...	...
Florida	20	9	8	...	3	84,550	2	...
Georgia	8	2	3	3	...	86,250	...	...
Maryland	31	9	11	4	7	4,130	1	...
North Carolina	11	2	6	2	1	188,900	...	...
South Carolina	5	4	1	...	...	30	...	...
Virginia	18	7	4	6	1	3,180	...	...
West Virginia	4	3	...	1	...	865	1	...
District of Columbia	5	...	1	1	3	.....	...	...

BOMBING INCIDENTS BY REGION, GEOGRAPHIC DIVISION AND STATE - Continued

Area	Total Actual and Attempted Bombings	Actual		Attempt		Property Damage (Dollar Value)	Personal Injury	Death
		Explo.	Incend.	Explo.	Incend.			
East South Central								
Alabama	2	1	...	...	1	5,000	...	...
Kentucky	10	8	1	1	...	96,460	...	...
Mississippi	12	1	9	1	1	95,350	...	...
Tennessee	15	5	5	5	...	12,690	3	1
West South Central								
Arkansas	2	1	...	1	...	.....	2	...
Louisiana	3	...	1	2	...	.....	...	...
Oklahoma	17	5	9	1	2	333,215	...	2
Texas	27	17	4	4	2	23,555	6	...
West	395	148	182	30	35	924,760	26	9
Mountain								
Arizona	37	19	15	2	1	70,397	2	...
Colorado	47	21	19	3	4	359,235	5	6
Idaho	1	...	1	...	...	3	...	...
Montana	6	4	...	...	2	5,000	1	...
Nevada	6	4	...	2	...	1,200	2	...
New Mexico	7	2	3	1	1	2,540	...	...
Utah	...	...	...	...	...	.....	...	...
Wyoming	1	1	...	...	...	60	...	...
Pacific								
Alaska	1	...	1	...	...	.....	6	...
California	240	65	129	20	26	451,855	6	...
Hawaii	3	2	1	...	...	2,700	...	...
Oregon	17	9	5	2	1	8,730	1	2
Washington	29	21	8	...	...	23,040	3	1
Puerto Rico	17	3	10	3	1	25,200	...	...
Virgin Islands	...	...	...	...	...	.....	...	...

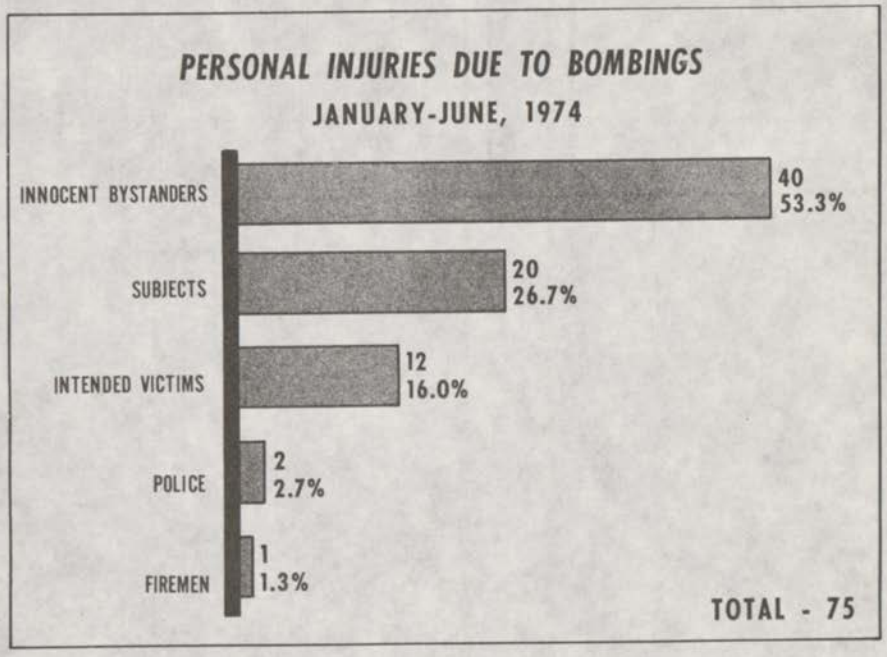

BOMBING INCIDENTS BY REGION
JANUARY-JUNE, 1974
NORTHEAST
131 BOMBING
5 INCIDENTS
NORTH CENTRAL
175 BOMBING INCIDENTS
WEST
395 BOMBING INCIDENTS
SOUTH
190 BOMBING INCIDENTS
PUERTO
RICO
17 BOMBING INCIDENTS
VIRGIN
ISLANDS

BOMBING INCIDENTS BY TARGET AND APPARENT MOTIVE

Target	Total	Anti-"Establishment"	Anti-Religious	Civil Rights	Extremist	Foreign Political	Labor Dispute	Malicious Destruction	Monetary Gain	Personal Animosity	Political	Racketeering	Suicide	Unknown	Other
TOTAL	908	23	4	4	20	2	44	373	12	347	13	4	1	40	21
Residences	248														
Private Residence	180	..	..	1	1	..	5	59	..	100	2	2	..	7	3
Apartment House	31	..	..	..	..	..	1	6	1	20	..	..	..	2	1
Other Private Property	37	..	..	1	..	..	2	26	2	6	..	..	..	..	..
Commercial Operations	218														
Commercial Building	175	2	..	1	10	..	9	52	6	83	2	1	..	6	3
Office Building	17	..	..	..	..	..	2	3	..	4	5	..	..	2	1
Industrial Building	11	1	..	..	..	..	4	1	..	3	..	..	..	2	..
Motel and Hotel	4	..	..	..	..	..	..	1	..	3	..	..	..	..	..
Theater	11	..	..	..	3	..	2	3	..	3	..	..	..	..	..
Vehicles	105														
Auto	71	1	..	..	..	..	..	18	..	49	..	..	..	2	1
Other Vehicle	32	..	..	1	..	..	11	3	..	14	1	..	..	1	1
Aircraft	2	1	..	..	..	..	..	..	1	..	..	..	..	..	..
School Facilities	103	1	..	..	..	..	1	83	..	17	..	..	..	..	1
Public Safety	36														
Law Enforcement	35	11	..	..	..	..	..	9	..	13	..	1	..	1	..
Fire Department	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Public Buildings	21														
Church	5	..	4	..	..	..	..	..	..	1	..	..	..	..	..
Hospital and Health Facilities	3	..	..	..	..	..	..	2	..	1	..	..	..	..	..
Post Office Facilities	9	1	..	..	..	..	..	5	..	2	..	..	..	1	..
Court House	4	..	..	..	1	..	..	..	..	2	..	..	..	1	..
Recreation Facilities	20	..	..	..	..	..	1	17	..	1	..	..	..	1	..
Other Government Property	15														
Federal	5	2	..	..	..	..	..	1	..	1	..	..	..	1	..
State	5	1	..	..	1	..	1	..	..	2	..	..	..	..	..
Local	5	1	..	..	..	..	..	2	..	2	..	..	..	..	..
Persons	14	..	..	..	..	..	..	3	..	8	..	..	1	..	2
Transportation Facilities	14	..	..	..	..	..	2	9	..	2	..	..	..	1	..
Construction Sites and Equipment	11	..	..	..	..	..	..	5	..	2	2	..	..	2	..
Telephone Facilities	10	..	..	..	..	..	..	7	1	2	..	..	..	..	..
Other Communication Facilities	2	..	..	..	..	..	..	..	..	2	..	..	..	..	..
Utilities	8														
Power Facilities	2	..	..	..	..	..	..	2	..	..	..	..	..	..	..
Other Public Utilities	6	1	..	..	..	..	..	3	1	..	..	..	..	..	1
Military Facilities	5	..	..	..	..	..	..	4	..	1	..	..	..	..	..
Newspaper Facility	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Open Area	57	..	..	..	..	..	3	45	..	..	..	..	..	5	4
Unknown (Premature Detonation)	10	..	..	..	2	..	..	1	..	..	..	..	..	4	3
Other	10	..	..	..	2	2	..	2	..	3	1	..	..	..	..

BOMBING CASUALTIES BY APPARENT MOTIVE

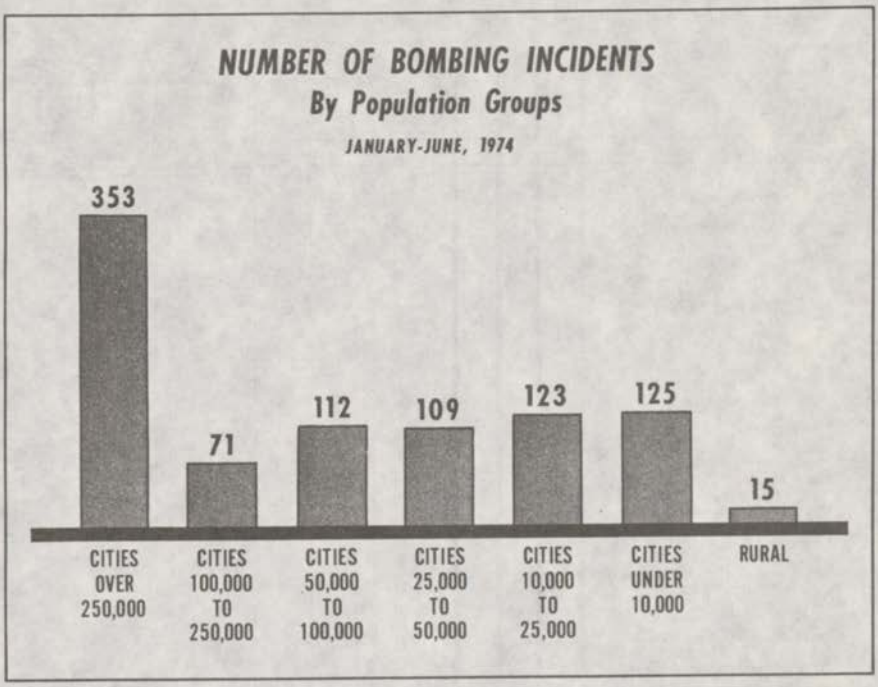
Motive	TOTAL		Police		Firemen		Intended Victims		Innocent Bystanders		Subjects	
	Injury	Death	Injury	Death	Injury	Death	Injury	Death	Injury	Death	Injury	Death
TOTAL	75	12	2	...	1	...	12	5	40	...	20	7
Anti-"Establishment"	1	...	...	...	...	...	...	...	1	...	...	...
Extremist	6	6	...	...	...	...	...	...	4	...	2	6
Foreign Political	2	...	...	...	...	...	...	...	...	...	2	...
Labor Dispute	1	...	...	...	...	...	...	...	1	...	...	...
Malicious Destruction	27	...	2	...	...	...	3	...	16	...	6	...
Personal Animosity	18	3	...	...	1	...	8	3	8	...	1	...
Suicide	...	1	...	...	...	...	...	...	...	...	...	1
Unknown	13	...	...	...	...	...	...	...	9	...	4	...
Other	7	2	...	...	...	...	1	2	1	...	5	...



43-300 O - 75 - 27

BOMBING INCIDENTS BY POPULATION GROUP

Population Group	Total Actual and Attempted Bombings	Actual		Attempt		Property Damage (Dollar Value)	Personal Injury	Death
		Explo.	Incend.	Explo.	Incend.			
TOTAL	908	369	357	106	76	3,323,439	75	12
Group I Cities over 250,000 population	353	131	155	36	31	1,354,814	38	1
Group II Cities 100,000 to 250,000 population	71	23	29	16	3	62,365	4	1
Group III Cities 50,000 to 100,000 population	112	45	50	8	9	387,265	8	6
Group IV Cities 25,000 to 50,000 population	109	46	40	9	14	536,775	9	1
Group V Cities 10,000 to 25,000 population	123	45	51	18	9	365,800	10	1
Group VI Cities under 10,000 population	125	70	31	16	8	343,020	6	2
Rural Area	15	9	1	3	2	273,400	...	...

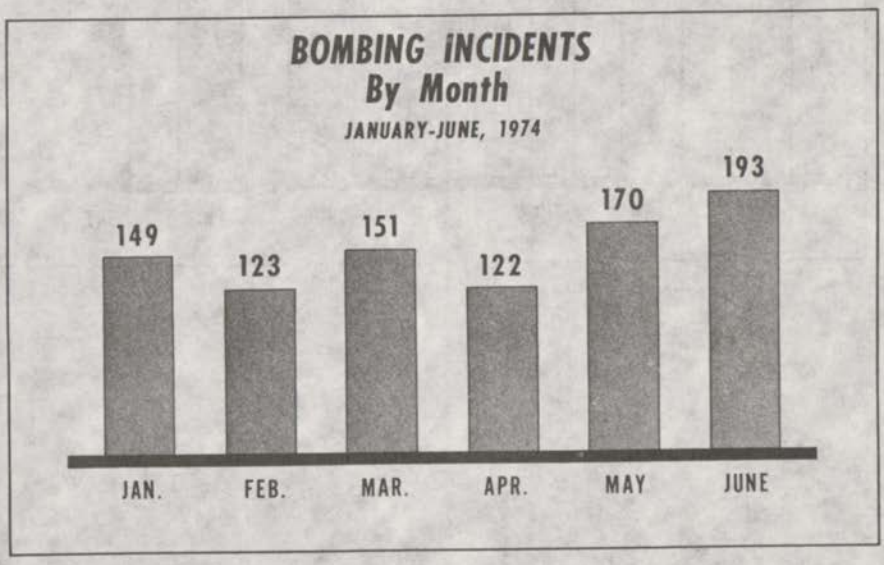

NUMBER OF BOMBING INCIDENTS
By Population Groups
JANUARY-JUNE, 1974
353
71
112
109
123
125
15
CITIES OVER 250,000
CITIES 100,000 TO 250,000
CITIES 50,000 TO 100,000
CITIES 25,000 TO 50,000
CITIES 10,000 TO 25,000
CITIES UNDER 10,000
RURAL

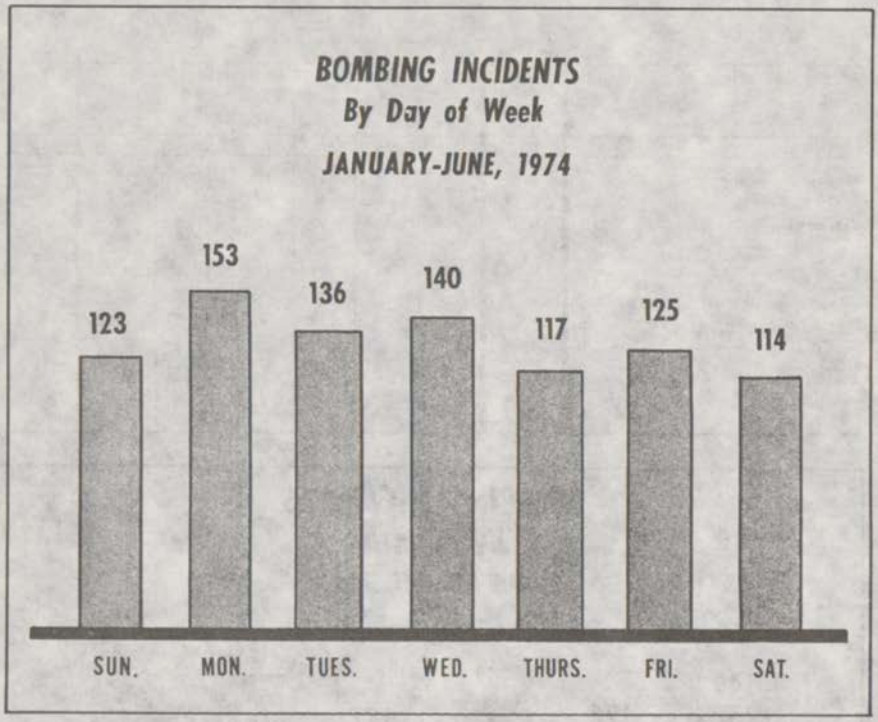
BOMBING INCIDENTS BY TARGET AND TIME

Target	Total	12:01 a.m. to 6:00 a.m.	6:01 a.m. to Noon	12:01 p.m. to 6:00 p.m.	6:01 p.m. to Midnight
TOTAL	908	306	114	144	344
Residences	248				
Private Residence	180	74	15	21	70
Apartment House	31	9	7	5	10
Other Private Property	37	10	2	5	20
Commercial Operations	218				
Commercial Building	175	76	18	25	56
Office Building	17	10	4	....	3
Industrial Building	11	2	2	2	5
Motel and Hotel	4	....	....	1	3
Theater	11	2	1	1	7
Vehicles	105				
Auto	71	31	6	8	26
Other Vehicle	32	11	4	2	15
Aircraft	2	1	1	....	....
School Facilities	103	18	24	27	34
Public Safety	36				
Law Enforcement	35	15	2	3	15
Fire Department	1	1	....	....	....
Public Buildings	21				
Church	5	4	1	....	....
Hospital and Health Facilities	3	....	....	1	2
Post Office Facilities	9	2	3	2	2
Court House	4	3	....	....	1
Recreation Facilities	20	1	3	7	9
Other Government Property	15				
Federal	5	2	1	....	2
State	5	2	1	1	1
Local	5	2	1	2	....
Persons	14	2	4	5	3
Transportation Facilities	14	2	1	3	8
Construction Sites and Equipment	11	6	....	1	4
Telephone Facilities	10	4	3	....	3
Other Communication Facilities	2	2	....	....	....
Utilities	8				
Power Facilities	2	1	....	1	....
Other Public Utilities	6	3	....	....	3
Military Facilities	5	....	2	1	2
Newspaper Facility	1	1	....	....	....
Open Area	57	7	5	14	31
Unknown (Premature Detonation)	10	....	....	5	5
Other	10	2	3	1	4

BOMBING INCIDENTS BY MONTH

Month	Total Actual and Attempted Bombings	Actual		Attempt		Property Damage (Dollar Value)	Personal Injury	Death
		Explo.	Incend.	Explo.	Incend.			
TOTAL	908	369	357	106	76	3,323,439	75	12
January	149	66	54	17	12	325,577	17	3
February	123	44	52	17	10	231,385	3	...
March	151	65	62	10	14	519,672	22	...
April	122	49	53	10	10	807,671	9	...
May	170	76	64	18	12	273,035	14	8
June	193	69	72	34	18	1,166,099	10	1




BOMBING INCIDENTS
By Day of Week
JANUARY-JUNE, 1974
123
153
136
140
117
125
114
SUN.
MON.
TUES.
WED.
THURS.
FRI.
SAT.

BOMBING INCIDENTS
January - June, 1974

The following are selected situations involving the criminal justice community:

February

Maryland

On February 3, four subjects were arrested following an unsuccessful attempt to bomb a police cruiser belonging to the Laurel Police Department. At 11:15 p.m., a police officer was approaching his cruiser which was parked at the rear of the police station when he observed a book of matches burning under the right front of the vehicle. The officer kicked the object causing the fuse to disengage from a bomb. The device consisted of a large chrome syringe approximately four inches long by one inch in diameter filled with black powder, four primers from shotgun shells, and kerosene as a binder. The fusing system consisted of a lighted cigarette attached to a book of matches and a paper fuse containing black powder. Information from a local citizen led to the arrest of four subjects. All were charged with assault with intent to murder and conspiracy to commit murder.

California

An unknown subject threw a Molotov cocktail over the security wall and into the exercise yard at the Solano County Jail at Fairfield on February 13. The incendiary device ignited causing a fire, but no injuries or property damage resulted.

Pennsylvania

During the early morning hours of February 14, a Molotov cocktail was thrown into the residence of a patrolman of the Ford City Police Department. The device, which ignited after being removed from the residence by the officer, caused approximately $200 damage.

March

Texas

During the early morning hours of March 5, a Young County Sheriff's Office patrol vehicle burned while parked in the driveway of a deputy's residence at Olney. Investigation disclosed that an unknown person had placed a ten-ounce bottle filled with gasoline and fused by a gauze-type cloth wick under the rear portion of the vehicle. The device ignited causing approximately $500 damage.

Oregon

An apparent clock-actuated dynamite bomb was detonated at the Oregon State Department of Parole and Probation at Portland during the late evening of March 7. The building was unoccupied at the time of the explosion. The explosive device caused an estimated $2,000 damage to the intended target and lesser damage to a nearby privately owned building. No suspects were developed at the time of the incident.

Virginia

Guards at the Lorton Reformatory at Lorton discovered a crudely constructed "pipe bomb" near the gymnasium at the reformatory on the evening of March 8. A guard observed the object at close range and it appeared to have burning paper in one end. The object exploded with a loud noise, but did no damage to property. A search of the area after the explosion disclosed a pipe-like piece of chrome about nine inches long by one and one-fourth inches in diameter with one end crimped and the other open. The pipe was found approximately 120 feet from the site of the explosion.

Mississippi

At approximately 1:15 a.m. on the morning of March 12, a fire was discovered in progress at the office of a Vicksburg constable. Investigation revealed that one of three subjects had thrown an incendiary device at the office. Damage to the constable's office and an adjoining warehouse has been estimated at $75,000. The three subjects have been identified.

California

On the evening of March 15, a policewoman at the complaint desk of the Pasadena Police Department received a call from an individual who stated, "This is the Phantom. I've put a bomb in the police station." Subsequently, a custodial employee cleaning a stairwell in the building noticed a small paper box behind an ashtray. The box was approximately four inches by two and one-half inches and was wrapped in green and black tape. As the custodian disturbed the package, it began to smoke from a small hole in the center of the lid and then exploded causing a flash fire. The explosion resulted in no structural damage, but paint in the area was scorched and blackened.

Colorado

An explosive device detonated at the corner of the building which houses the University of Colorado Police Department at Boulder on March 16. The device, apparently dynamite, destroyed the corner of a concrete patio attached to the building, and several blocks were dislodged from the building itself. Damage has been estimated at $500. The incident was believed to have been related to a similar blast at the Boulder Courthouse approximately eight minutes later.

Pennsylvania

On March 21, a witness, living near the Folcroft Police Department, heard the sound of shattering glass from the direction of the department building which was unoccupied at the time. The witness subsequently observed flames inside the building and saw two men fleeing the area. Police and firemen responded and contained the fire to the lobby area of the station. A broken wine bottle containing a flammable liquid was recovered. The device caused damage estimated at $5,000.

April

Washington

On the morning of April 18, an explosive device, believed to contain three sticks of dynamite, was placed between the tailpipe and frame of a Benton County Sheriff's vehicle. The vehicle, while parked in front of a deputy's residence, at Prosser, was completely destroyed as a result of the explosion and the deputy's residence received $200 damage. Witnesses observed a male wearing light colored clothing running from the scene. No one was injured as a result of the incident.

Maryland

During the early morning hours of April 25, a police car of the Rising Sun Police Department was the target of a bombing incident. The vehicle was unoccupied and parked at an officer's residence at the time of the incident. Detonation of the device shattered the windshield and damaged the hood of the car. Damage has been estimated at $300. No injuries were sustained. One subject has been arrested and charged with possession of explosives without a license and possession of smokeless powder.

On April 26, two Molotov cocktails were thrown through a closed window of an unoccupied Montgomery County police cruiser. The devices consisted of beer bottles filled with an unidentified petroleum product and fused with rag wicks. The vehicle, parked in front of an officer's residence at Wheaton, received approximately $100 damage. An obscene note was located on the windshield of the officer's personal auto which stated that a revolutionary group was taking credit for the attack.

Michigan

A black powder-type pipe bomb detonated beneath a vehicle belonging to the Allen Park Police Department on April 26. The vehicle received damage estimated at $175, and no one was injured. Three subjects, two juveniles and one adult, have been arrested and charged. The adult was charged with aiding and abetting in placing an explosive with intent to destroy and cause damage to property. The two juveniles were charged with juvenile delinquency for the placement of the explosive device.

May

Florida

Between 10:15 p.m. and 10:30 p.m., May 1, Molotov cocktails were thrown at the home of a Sanford police officer, the home of a Seminole County deputy sheriff, and at the personally owned automobile of another Sanford police officer. No damage was done to the homes, and the vehicle sustained minor damage. The incident may have been related to a narcotics investigation being conducted by the Seminole County Sheriff's Office.

California

A Beaumont police vehicle, unoccupied, locked, and parked in the department's parking area was the target of a firebombing on May 2. Fragments of two bottles with cloth wicks were found at the scene. The damage to the vehicle was estimated at $300.

During the late evening hours of May 20 and early morning hours of May 21, the Yuba City Police Department building, a Sutter County Sheriff's Office vehicle at Yuba City, and the California Department of Motor Vehicles building at Yuba City were targets of firebombings. All devices appeared to be Molotov cocktails consisting of quart bottles filled with a gasoline/oil mixture and containing tissue paper wicks. All devices ignited upon contact.

The resulting fire at the Yuba City Police Department caused approximately $100 damage. The device which was thrown at the Sheriff's office vehicle ignited underneath it. The ensuing fire completely destroyed the auto. Damage has been estimated at $5,000. The Department of Motor Vehicles building suffered $500 damage as a result of the attack.

On the morning of May 31, a powerful explosive device was placed on the sixth floor of the old State Building in Los Angeles. All offices on the floor are utilized by the California Attorney General's office. The device, which detonated, was placed in the elevator lobby outside the reception room of the Attorney General. The bomb caused damage estimated at $30,000. Shortly after the bombing, a Los Angeles newspaper received a telephone call from a female who stated that an underground organization was taking credit for the attack.

Oklahoma

A police car of the Kingfisher Police Department was found burning in the department parking lot on the morning of May 8. A policeman of that office noticed a fire over the gas tank of the vehicle, but before he could attempt to extinguish the blaze, the gas tank ruptured and the rear half of the vehicle burned. Investigation revealed that an incendiary device was used to start the fire. The vehicle sustained damage estimated at $1,250. Two subjects were apprehended and charged with third degree arson.

Connecticut

On May 17, in Hartford, about 50 youths, walking in a group, approached a police cruiser and threw three Molotov cocktails at the unoccupied vehicle. None of the devices which struck the vehicle ignited. One device fell short of its target, ignited, and burned in the street. Police arrived and chased the subjects, apprehending several.

New York

A male subject was arrested by the New York City Police Department on May 19, and charged with murder. At the time of the arrest the subject was in possession of a hand grenade which he attempted to activate and throw at the arresting officers. The subject was subdued by the officers, and the hand grenade was deactivated by the New York City Bomb Squad.

Illinois

During the afternoon of May 31, a pipebomb consisting of a three-quarter-inch coupling, two three-quarter-inch plugs, and low velocity black powder exploded in the second floor washroom of the 18th District Station of the Chicago Police Department. Damage was estimated at less than $100; however, a janitor was slightly injured. The department advised the restroom was open to the public. No suspects have been developed.

June

Michigan

During the early morning hours of June 2, a Wyandotte Police Department vehicle, while parked in the police lot, was the target of a firebombing. The device was a Molotov cocktail. After being thrown, the firebomb ignited upon impact with the vehicle causing approximately $2,000 damage to the unoccupied auto. No deaths or injuries were sustained.

Washington

At 3:11 p.m., June 3, a bomb exploded, killing a State Superior Court Judge in his chambers at Pasco. A package, addressed to the judge, had been received earlier at another office of the judge in Prosser. Upon request from the judge, a clerical employee drove approximately 35 miles and delivered the package to the judge in Pasco. The judge received the package in his chambers and attempted to open it. The pipe bomb contained within the package exploded and killed the judge. No other deaths or injuries were sustained. Damage to the surrounding area was estimated at $500. One subject has been arrested and charged federally with the mailing of an explosive with the intent to kill or injure. He also has been charged locally with first degree murder.

Missouri

The personally owned automobile of a St. Louis Police Department patrolman was bombed at 3:30 a.m. on June 11. The vehicle was parked outside a building owned by the policeman and had been there for approximately a week. One stick of dynamite was placed under the dash and another atop the engine. The two explosives were interconnected with safety fuse. The explosive on the engine detonated causing an estimated $1,000 damage to the engine and the hood while the other failed to detonate. The car was unoccupied and no injuries or deaths resulted. The apparent motive was believed to have been personal animosity toward the police officer.

California

At 3:15 a.m. on June 13, two Molotov cocktails were thrown at the rear brick wall of the Laguna Beach Police Department Annex. The firebombs ignited and fell to the loading dock of the building, scorching the area but causing no appreciable damage. The device consisted of gasoline filled beer bottles with strips of towel used as wicks. No injuries were sustained and no suspects or motives developed at the time of the occurrence.

During the late evening hours of June 18, an unknown subject threw a Molotov cocktail through an office window of the Waterford Police Department building. The device was a quart glass fruit jar containing a flammable liquid and a rag wick. The device failed to ignite and damage was limited to the broken windowpane. No injuries or deaths resulted. Waterford authorities believe that two subjects arrested and released earlier that evening were responsible for the incident.