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INTERNATIONAL TERRORISM

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON AVIATION

OF THE

COMMITTEE ON

PUBLIC WORKS AND TRANSPORTATION

HOUSE OF REPRESENTATIVES

NINETY-FIFTH CONGRESS

SECOND SESSION

ON

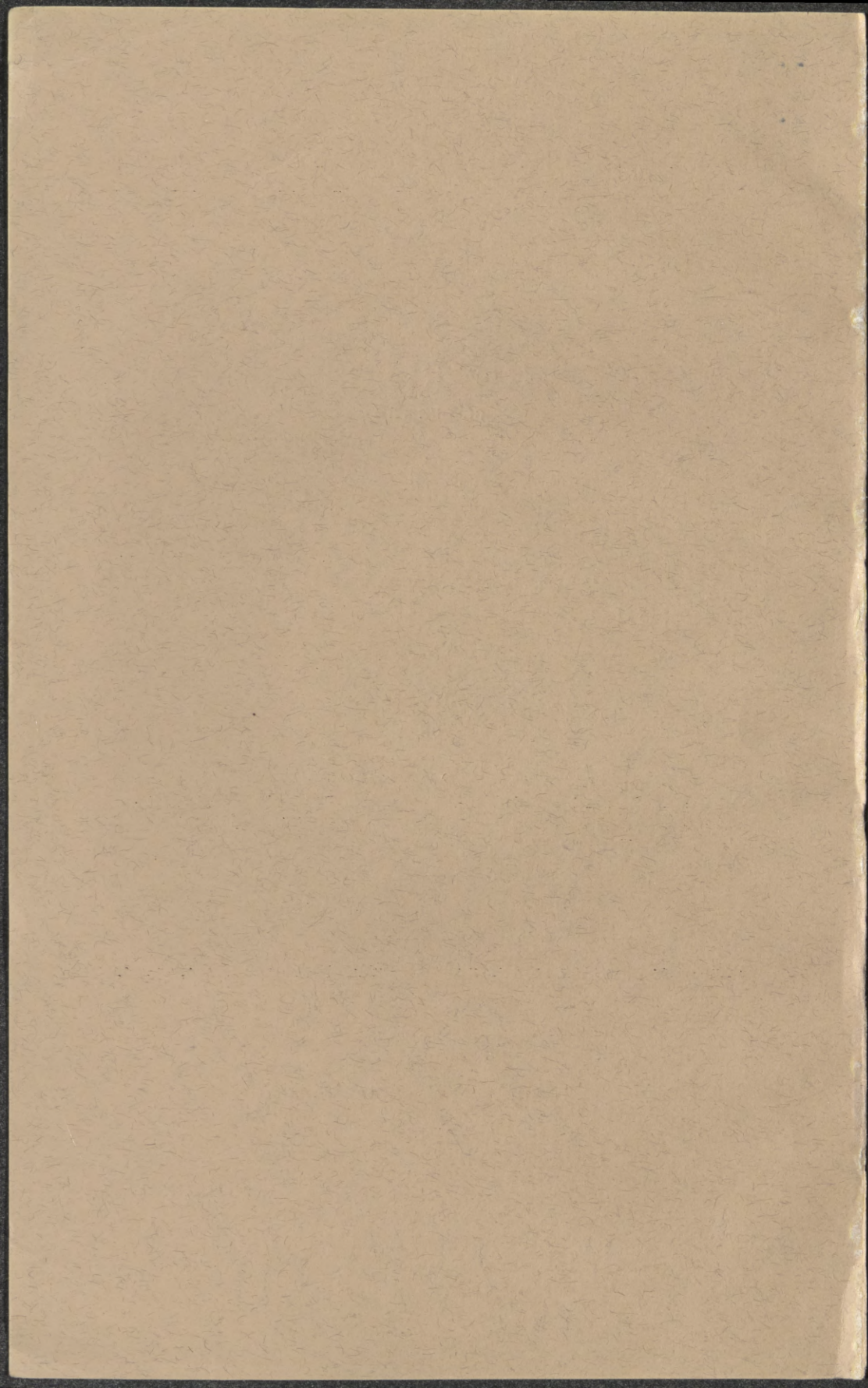
H.R. 13261

TO AMEND THE FEDERAL AVIATION ACT OF 1958, RELATING
TO AIRCRAFT PIRACY, TO PROVIDE A METHOD FOR COMBAT-
ING TERRORISM, AND FOR OTHER PURPOSES

JULY 18, 19, 20, AND 25, 1978

Printed for the use of the Committee on Public Works and Transportation





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WASHINGTON : 1978

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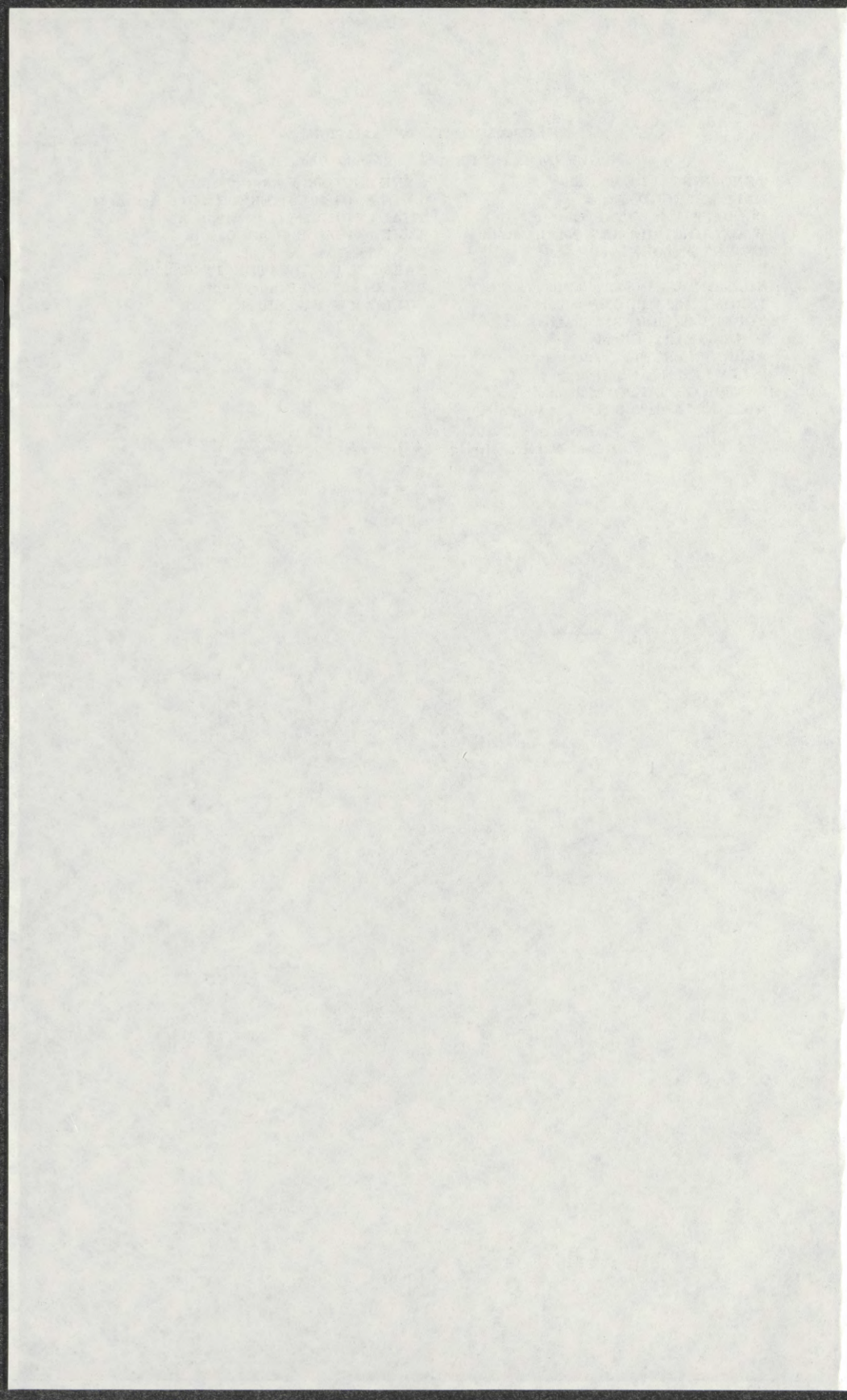
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1 (A) the Convention for the Suppression of Un-
 2 lawful Seizure of Aircraft (done at The Hague,
 3 December 16, 1970) ;

4 (B) the Convention for the Suppression of
 5 Unlawful Acts Against the Safety of Civil Aviation
 6 (done at Montreal, September 23, 1971) ;

7 (C) the Convention on the Prevention and
 8 Punishment of Crimes Against Internationally Pro-
 9 tected Persons, including Diplomatic Agents
 10 (adopted by the General Assembly of the United
 11 Nations at New York, December 14, 1973) ; or

12 (D) any other unlawful act which results in
 13 the death, bodily harm, or forcible deprivation of
 14 liberty to any person, or in the violent destruction
 15 of property, or an attempt or credible threat to com-
 16 mit any such act, if the act, threat, or attempt is
 17 committed or takes effect—

18 (i) outside the territory of a state of which
 19 the alleged offender is a national; or

20 (ii) outside the territory of the state
 21 against which the act is directed; or

22 (iii) within the territory of the state against
 23 which the act is directed and the alleged
 24 offender knows or has reason to know that a
 25 person against whom the act is directed is not a
 26 national of that state, or

1 (iv) within the territory of any state when
2 found to have been supported by a foreign state
3 as defined in section 2 (2), irrespective of the
4 nationality of the alleged offender;

5 if the act of international terrorism is—

6 (I) intended to damage or threaten the inter-
7 ests of or obtain concessions from a state or an
8 international organization;

9 (II) not committed in the course of military or
10 paramilitary operations directed essentially against
11 military forces or military targets of a state or an
12 organized armed group; and

13 (2) the term “state support of international ter-
14 rorism” means any of the following acts when com-
15 mitted deliberately by a state:

16 (A) furnishing arms, explosives, or lethal sub-
17 stances to individuals, groups, or organizations with
18 the likelihood that they will be used in the commis-
19 sion of any act of international terrorism;

20 (B) planning, directing, providing training for,
21 or assisting in the execution of any act of interna-
22 tional terrorism;

23 (C) providing direct financial support for the
24 commission of any act of international terrorism;

25 (D) providing diplomatic facilities intended to

1 aid or abet the commission of any act of interna-
2 tional terrorism; or

3 (E) allowing the use of its territory as a sanc-
4 tuary from extradition or prosecution for any act of
5 international terrorism.

6 REPORT ON ACTS OF INTERNATIONAL TERRORISM

7 SEC. 3. (a) Six months after the date of enactment of
8 this Act and every six months thereafter, the President shall
9 transmit to the Congress a report on those incidents he deter-
10 mines to be acts of international terrorism, except that with
11 respect to any such incident which affects or involves citi-
12 zens or significant interests or property of the United States,
13 the President shall transmit a report to the Congress on such
14 incident not later than thirty days after the occurrence of
15 such incident.

16 (b) Such report shall include, but not be limited to, the
17 following information:

18 (1) a description of the incident and of the involve-
19 ment and identity of each individual, entity, group, or
20 organization involved in such incident;

21 (2) the identity of any government providing state
22 support for such acts of international terrorism, and
23 a statement setting forth the exact nature and extent of
24 such government's involvement;

25 (3) a description of the actions of any government

1 which assisted in bringing about a positive termination
2 of the incident; and

3 (4) a description of the response of the United
4 States Government to such incident.

5 (c) Nothing in this section is intended to require the
6 public disclosure of information which is properly classified
7 under criteria established by Executive order, or is otherwise
8 protected by law. Such information shall be provided to the
9 Congress in a written classified report. In such case, an
10 unclassified summary of such information shall be prepared
11 and submitted to the Congress.

12 (d) Nothing in this section is intended to require dis-
13 closure of investigatory records compiled for law enforcement
14 purposes specifically protected by section 552 (b) (7) of
15 title 5, United States Code.

16 LIST OF STATES SUPPORTING INTERNATIONAL TERRORISM

17 SEC. 4. (a) Six months after the date of enactment of
18 this Act and every six months thereafter, the President shall
19 consider which, if any, states have demonstrated a pattern of
20 support for acts of international terrorism. If the President
21 determines that any states have so acted, he shall submit a
22 list of states supporting international terrorism to the Con-
23 gress and set forth his reasons for listing any such states.

24 (b) Such list shall also identify any states against which
25 sanctions have been applied pursuant to section 6 of this Act,

1 and any other initiatives of the United States with respect to
2 such states

3 (c) Nothing in this section is intended to require the
4 public disclosure of information which is properly classified
5 under criteria established by Executive order, or is otherwise
6 protected by law. Such information shall be provided to the
7 Congress in a written classified report. In such case, an un-
8 classified summary of such information shall be prepared and
9 submitted to the Congress.

10 (d) Nothing in this section is intended to require dis-
11 closure of investigatory records compiled for law enforce-
12 ment purposes specifically protected by section 552 (b) (7)
13 of title 5, United States Code.

14 (e) Any list submitted to the Congress pursuant to sub-
15 section (a) of this section may be reviewed by the President
16 and the President may delete any state which appears on
17 such list if the President determines that such state no longer
18 demonstrates a pattern of support for acts of international
19 terrorism.

20 PRESIDENTIAL AUTHORITY TO COMBAT INTERNATIONAL
21 TERRORIST ACTS

22 SEC. 5. (a) When a foreign government is listed pur-
23 suant to section 4 of this Act, the President shall—

24 (1) provide no assistance under the Foreign As-
25 sistance Act of 1961, or

1 (2) not authorize any sale, or extend any credit or
2 guaranty, with respect to any defense article or service
3 as defined by section 47 of the Arms Export Control
4 Act, or

5 (3) approve no export license for the export of
6 commodities or technical data which has a potential mili-
7 tary application or which would otherwise enable a
8 foreign government to support acts of international ter-
9 rorism, or

10 (4) extend no duty-free treatment under title V of
11 the Trade Act of 1974.

12 (b) If the President finds that the interests of national
13 security so require, he may suspend the applicability of any
14 part of the prohibitions listed in subsection (a) of this sec-
15 tion in such case. He shall report his reasons therefor in
16 writing to the Congress and those prohibitions shall not
17 apply.

18 (c) In devising initiatives to combat international ter-
19 rorist actions and to reduce state support for such actions, the
20 President shall take such other measures available to him as
21 he deems appropriate; he shall take into account the effective-
22 ness of specific sanctions in inducing change in a country's
23 policy or practice of supporting acts of international terror-
24 ism; the likely effect of sanctions on overall United States
25 relations with such country or with other countries; and the

1 effect such sanctions would have on other United States na-
2 tional interest.

3 (d) The President shall take all appropriate diplomatic
4 measures consistent with international obligations to support
5 the effectiveness of actions taken pursuant to this authority
6 in the accomplishment of the purposes of this Act.

7 (e) The President shall promptly and fully inform the
8 Congress of each exercise of authority granted under the Act.

9 INFORMATION ON FOREIGN AIRPORT SECURITY

10 SEC. 6. Section 1115 of the Federal Aviation Act of
11 1958 (49 U.S.C. 1515) relating to security standards in
12 foreign air transportation is amended to read as follows:

13 "SECURITY STANDARDS IN FOREIGN AIR
14 TRANSPORTATION

15 "SEC. 1115. (a) The Secretary of Transportation shall
16 conduct at such intervals as the Secretary shall deem nec-
17 essary an assessment of the effectiveness of the security meas-
18 ures maintained at those foreign airports serving United
19 States carriers, those foreign airports from which foreign
20 air carriers serve the United States, and at such other foreign
21 airports as the Secretary may deem appropriate. Such
22 assessments shall be made by the Secretary in consultation
23 with the appropriate aeronautic authorities of the concerned
24 foreign government. The assessment shall determine the ex-
25 tent to which an airport effectively maintains and administers

1 security measures. The criteria utilized by the Secretary
2 in making such assessment shall be those set forth in the
3 standards established by the International Civil Aviation
4 Organization, as such standards are in effect on the date of
5 the assessment.

6 “(b) Each report to the Congress required by section
7 315 of this Act shall contain:

8 “(1) A summary of those assessments conducted
9 pursuant to subsection (a) of this section.

10 “(2) A description of the extent to which secu-
11 rity deficiencies identified have been eliminated.

12 “(c) Whenever, after an assessment in accordance with
13 subsection (a) of this section, the Secretary finds that an
14 airport does not maintain and administer effective security
15 measures, he shall notify the appropriate authorities of such
16 foreign government of his finding, and recommend the steps
17 necessary to bring the security measures in use at that air-
18 port to the standards referred to in such subsection (a).

19 “(d) (1) Not later than one hundred and eighty days
20 after the notification required in subsection (c) of this sec-
21 tion and upon a determination by the Secretary that the
22 foreign government has failed to bring the security measures
23 at the identified airport to the standards referred to in sub-
24 section (a) of this section, he—

1 “(A) shall publish in the Federal Register and
2 cause to be posted and prominently displayed at all
3 United States airports regularly serving scheduled air
4 carrier operations the identification of such airport; and

5 “(B) after consultation with the appropriate aero-
6 nautical authorities of such government and, notwith-
7 standing section 1102 of this Act, may, with the approval
8 of the Secretary of State, withhold, revoke, or impose
9 conditions on the operating authority of any carrier or
10 foreign air carrier to engage in foreign air transporta-
11 tion utilizing that airport.

12 “(2) The Secretary shall promptly report to the Con-
13 gress any action taken under this subsection setting forth
14 information concerning the attempts he has made to secure
15 the cooperation of the nation in meeting the standards re-
16 ferred to in subsection (a) of this section.”.

17 AVIATION SECURITY ASSISTANCE TO FOREIGN
18 GOVERNMENTS

19 SEC. 7. The Secretary of Transportation is authorized to
20 promote the achievement of international aviation security by
21 providing technical assistance concerning aviation security to
22 foreign governments. Such technical assistance may include
23 the conduct of surveys to analyze the level of aviation secu-
24 rity in airports and the provision of training in aviation secu-
25 rity to foreign nationals. Such training in aviation security

1 may be conducted either in the United States or in foreign
2 nations. The Secretary may provide for the payment of sub-
3 sistence and expenses for travel within the United States for
4 foreign nationals receiving such aviation security training
5 in the United States. The Secretary may require a foreign
6 government to reimburse the United States for all, part, or
7 none of the cost of providing such technical assistance.

8 EXTENSION OF EXISTING SECURITY MEASURES

9 SEC. 8. Section 315 (b) of the Federal Aviation Act of
10 1958 (49 U.S.C. 1356 (b)) is amended by striking out
11 "those scheduled".

12 EXPLOSIVE TAGGANTS

13 SEC. 9. (a) Section 841 of title 18, United States
14 Code, is amended by adding at the end thereof the following:

15 "(o) 'Identification taggant' means any substance
16 which (1) is added to an explosive material during the man-
17 ufacture of such material and (2) is retrievable after detona-
18 tion and permits the identification of the manufacturer, the
19 date of manufacture of such material, and provides such other
20 information as determined by the Secretary of the Treasury.

21 "(p) 'Detection taggant' means any substance which
22 (1) is added to an explosive material during the manufac-
23 ture of such material, and (2) permits detection of such
24 material prior to its detonation."

1 (b) Section 842 of title 18, United States Code, is
2 amended by adding at the end thereof the following:

3 “(l) One year after the date of the enactment of this
4 Act, it shall be unlawful for any person or persons to manu-
5 facture any explosive material which does not contain an
6 identification taggant which satisfies the standards promul-
7 gated by the Secretary as provided in section 847.

8 “(m) Two years after the date of the enactment of this
9 Act, it shall be unlawful for any person or persons to manu-
10 facture any explosive material which does not contain a de-
11 tection taggant which satisfies the standards promulgated by
12 the Secretary as provided in section 847.

13 “(n) Two years after the date of the enactment of this
14 Act, it shall be unlawful for any person or persons to trans-
15 port, ship, distribute, or receive, or cause to be transported,
16 shipped, distributed, or received, in interstate or foreign com-
17 merce any explosive material which does not contain an
18 identification taggant which satisfies the standards promul-
19 gated by the Secretary as provided in section 847.

20 “(o) Three years after the date of the enactment of this
21 Act, it shall be unlawful for any person or persons to trans-
22 port, ship, distribute, or receive, or cause to be transported,
23 shipped, distributed, or received, in interstate or foreign com-
24 merce any explosive material which does not contain a detec-

1 tion taggant which satisfies the standards promulgated by
2 the Secretary as provided in section 847.

3 “(p) One year after the date of the enactment of this
4 Act, it shall be unlawful for any person or persons to import
5 any explosive material which does not contain an identifica-
6 tion taggant which satisfies the standards promulgated by
7 the Secretary as provided in section 847.

8 “(q) Two years after the date of the enactment of this
9 Act, it shall be unlawful for any person or persons to import
10 any explosive material which does not contain a detection
11 taggant which satisfies the standard promulgated by the Sec-
12 retary as provided in section 847.

13 “(r) Two years after the date of the enactment of this
14 Act, it shall be unlawful for any person to resell or other-
15 wise dispose of any explosive material sold as surplus by a
16 military or naval service or other agency of the United States
17 which does not contain an identification taggant which satis-
18 fies the standards promulgated by the Secretary as provided
19 in section 847. The shipment of surplus explosive materials
20 from the military establishment where sold to the purchaser's
21 place of business shall be in accordance with regulations
22 promulgated by the Secretary.

23 “(s) Three years after the date of the enactment of this
24 Act, it shall be unlawful for any person to resell or otherwise

1 dispose of any explosive material sold as surplus by a mili-
2 tary or naval service or other agency of the United States
3 which does not contain a detection taggant which satisfies
4 the standards promulgated by the Secretary as provided in
5 section 847. The shipment of surplus explosive materials
6 from the military establishment where sold to the purchaser's
7 place of business shall be in accordance with regulations
8 promulgated by the Secretary.

9 “(t) The requirements of subsections (l) though (s)
10 of this section shall not apply to any explosive material to
11 be used by the Department of Defense or another agency of
12 the Government for national defense or another agency
13 of Government for national defense or security purposes.
14 Any explosive material so designated shall be reported
15 promptly to the Secretary of the Treasury.”.

16 (c) Section 844 (a) of title 18, United States Code, is
17 amended (1) by striking out “(a) Any” and inserting in
18 lieu thereof “(a) (1) Any”, and (2) by adding at the
19 end thereof the following new subsection:

20 “(2) Any person who violates subsection (1) of section
21 842 of this chapter shall be fined not more than \$10,000
22 or imprisoned not more than ten years, or both.”.

23 (d) Section 845 (a) of title 18, United States Code, is
24 amended by inserting a new paragraph immediately follow-
25 ing paragraph (6) as follows:

1 “(7) the provisions of subsection (1) of section
2 842 of this title shall apply to paragraphs (4) and (5)
3 of this subsection.”.

4 AIRCRAFT SABOTAGE

5 SEC. 10. (a) Section 31 of title 18, United States Code,
6 is amended by striking out the words “Civil Aeronautics
7 Act of 1938” and inserting in lieu thereof the words “Fed-
8 eral Aviation Act of 1958” and by adding at the end thereof
9 the following two paragraphs:

10 “‘In flight’ means any time from the moment all the
11 external doors of an aircraft are closed following embarka-
12 tion until the moment when any such door is opened for dis-
13 embarkation. In the case of a forced landing the flight shall
14 be deemed to continue until competent authorities take over
15 the responsibility for the aircraft and the persons and
16 property aboard.

17 “‘In service’ means any time from the beginning of pre-
18 flight preparation of the aircraft by ground personnel or by
19 the crew for a specific flight until twenty-four hours after
20 any landing; the period of service shall, in any event, ex-
21 tend for the entire period during which the aircraft is in
22 flight.”.

23 (b) Section 32, title 18, United States Code, is
24 amended to read as follows:

25 “Whoever willfully set fire to, damages, destroys, dis-

1 ables, or interferes with the operation of, or makes unsuitable
2 for use any civil aircraft used, operated, or employed in
3 interstate, overseas, or foreign air commerce; or willfully
4 places a destructive substance in, upon, or in proximity to
5 any such aircraft which is likely to damage, destroy, or dis-
6 able any such aircraft, or any part or other material used,
7 or intended to be used, in connection with the operation of
8 such aircraft; or willfully sets fire to, damages, destroys, or
9 disables any air navigation facility or interferes with the
10 operation of such air navigation facility, if any such act is
11 likely to endanger the safety of such aircraft in flight; or

12 "Whoever, with intent to damage, destroy, or disable
13 any such aircraft, willfully sets fire to, damages, destroys, or
14 disables or places a destructive substance in, upon, or in the
15 proximity of any appliance or structure, ramp, landing area,
16 property, machine, or apparatus, or any facility, or other
17 material used, or intended to be used, in connection with the
18 operation, maintenance, or loading or unloading or storage
19 of any such aircraft or any cargo carried or intended to be
20 carried on any such aircraft; or

21 "Whoever willfully performs an act of violence against
22 or incapacitates any passenger or member of the crew of any
23 such aircraft if such act of violence or incapacitation is likely
24 to endanger the safety of such aircraft in service; or

25 "Whoever willfully communicates information, which

1 he knows to be false, thereby endangering the safety of any
2 such aircraft while in flight; or

3 "Whoever willfully attempts to do any of the aforesaid
4 acts—shall be fined not more than \$10,000 or imprisoned
5 not more than twenty years, or both."

6 (c) (1) Chapter 2, title 18, United States Code, is
7 amended by adding a new section after section 32 to read as
8 follows:

9 **"§ 32A. Offenses in violation of the Convention for the**
10 **Suppression of Unlawful Acts against the**
11 **Safety of Civil Aviation**

12 "(a) Whoever commits an offense as defined in sub-
13 section (b) against or on board an aircraft registered in a
14 state other than the United States and is afterward found in
15 this country—shall be fined not more than \$10,000 or im-
16 prisoned not more than twenty years, or both.

17 "(b) For purposes of this section a person commits an
18 'offense' when he willfully—

19 "(1) performs an act of violence against a person
20 on board an aircraft in flight if that act is likely to en-
21 danger the safety of that aircraft; or

22 "(2) destroys an aircraft in service or causes dam-
23 age to such an aircraft which renders it incapable of
24 flight or which is likely to endanger its safety in flight;

25 or

1 “(3) places or causes to be placed on an aircraft in
2 service, by any means whatsoever, a device or substance
3 which is likely to destroy that aircraft, or to cause dam-
4 age to it which renders it incapable of flight, or to cause
5 damage to it which is likely to endanger its safety in
6 flight; or

7 “(4) attempts to commit, or is an accomplice of a
8 person who commits or attempts to commit, an offense
9 enumerated in this subsection.”.

10 (2) The analysis of chapter 2 of title 18 of the United
11 States Code is amended by adding after item

“32. Destruction of aircraft or aircraft facilities.”

12 the following new item:

“32A. Offenses in violation of the Convention for the Suppression of Un-
lawful Acts Against the Safety of Civil Aviation.”.

13 (d) Section 101 (35) of the Federal Aviation Act of
14 1958, as amended (49 U.S.C. 1301 (35)), relating to the
15 definition of the term “special aircraft jurisdiction of the
16 United States,” is amended as follows:

17 (1) by deleting the word “or” at the end of sub-
18 section (d) (i) ;

19 (2) by deleting the word “and” at the end of sub-
20 section (d) (ii) and inserting in lieu thereof the word
21 “or”; and

22 (3) by adding a new subsection (d) (iii) as
23 follows:

1 “(iii) regarding which an offense as defined in sub-
 2 section (d) or (e) of article I, section I of the (Mon-
 3 treál) Convention for the Suppression of Unlawful Acts
 4 Against the Safety of Civil Aviation is committed, pro-
 5 vided the aircraft lands in the United States with an
 6 alleged offender still on board; and”.

7 (e) Section 902 (k) of the Federal Aviation Act of
 8 1958, as amended (49 U.S.C. 1472 (k)), is amended by
 9 adding subsection (3) to the end thereof, to read as follows:

10 “(3) Whoever while aboard an aircraft in the special
 11 aircraft jurisdiction of the United States commits an act
 12 which would be an offense under section 32 of title 18,
 13 United States Code, shall be punished as provided therein.”.

14 (f) (1) Chapter 2 of title 18, United States Code, is
 15 amended by adding at the end thereof the following new
 16 section:

17 **“§ 36. Imparting or conveying threats**

18 “(a) Whoever imparts or conveys or causes to be im-
 19 parted or conveyed any threat to do an act which would be
 20 a felony prohibited by section 32 or 33 of this chapter or
 21 section 1992 of chapter 97 or section 2275 of chapter 111
 22 of this title with an apparent determination and will to carry
 23 the threat into execution shall be fined not more than \$5,000
 24 or imprisoned not more than five years, or both.”.

25 (2) The analysis of chapter 2 of title 18 of the United

1 States Code is amended by adding at the end thereof the
2 following new item:

“36. Imparting or conveying threats.”.

3

AIRCRAFT PIRACY

4 SEC. 11. (a) Section 901 of the Federal Aviation Act
5 of 1958, as amended (49 U.S.C. 1471), is amended by
6 adding at the end thereof the following new subsections:

7 “(c) Whoever imparts or conveys or causes to be
8 imparted or conveyed false information, knowing the infor-
9 mation to be false, concerning an attempt or alleged attempt
10 being made or to be made, to do any act which would be a
11 crime prohibited by subsection (i), (j), (k), or (l) of sec-
12 tion 902 of this Act, shall be subject to a civil penalty of
13 not more than \$1,000 which shall be recoverable in a civil
14 action brought in the name of the United States.

15 pal or State government, or the Federal Government, who
16 are authorized or required within their official capacities
17 to carry arms, or other persons who may be so authorized
18 under regulations issued by the Administrator, whoever,
19 while aboard, or while attempting to board, any aircraft in,
20 or intended for operation in, air transportation or intrastate
21 air transportation, has on or about his person or his prop-
22 erty a concealed deadly or dangerous weapon, which is, or
23 would be, accessible to such person in flight shall be subject
24 to a civil penalty of not more than \$1,000 which shall be

1 recoverable in a civil action brought in the name of the
2 United States.”.

3 (b) Subsection (a) of section 1395 of title 28, United
4 States Code, is amended by striking the period at the end
5 of such subsection and adding the following: “, and in any
6 proceeding to recover a civil penalty under section 35 (a) of
7 title 18 of the United States Code or section 901 (c) or 901
8 (d) of the Federal Aviation Act of 1958, all process
9 against any defendant or witness, otherwise not authorized
10 under the Federal Rules of Civil Procedure, may be served
11 in any judicial district of the United States upon an ex
12 parte order for good cause shown.”.

13 (c) (1) Section 902 (m) of the Federal Aviation Act of
14 1958 (49 U.S.C. 1472 (m)) is amended to read as follows:

15 “FALSE INFORMATION AND THREATS

16 “(m) (1) Whoever willfully and maliciously, or with
17 reckless disregard for the safety of human life, imparts or
18 conveys or causes to be imparted or conveyed false informa-
19 tion knowing the information to be false, concerning an
20 attempt or alleged attempt being made or to be made, to do
21 any act which would be a felony prohibited by subsection
22 (i), (j), or (l) (2) of this section, shall be fined not more
23 than \$5,000 or imprisoned not more than five years, or both.

24 “(2) Whoever imparts or conveys or causes to be im-
25 parted or conveyed any threat to do an act which would be

1 a felony prohibited by subsection (i), (j), or (l) (2) of this
2 section, with an apparent determination and will to carry the
3 threat into execution, shall be fined not more than \$5,000 or
4 imprisoned not more than five years, or both.”.

5 (2) The table of contents of the Federal Aviation Act
6 of 1958, in the matter of title II (subchapter IX, chapter
7 20 of title 49, United States Code, section 1472 (m)), is
8 amended by redesignating

“(m) False information.”

9 to read

“(m) False information and threats.”.

10 (d) Section 903 of the Federal Aviation Act of 1958
11 (49 U.S.C. 1473) is amended by striking “Such” at the
12 beginning of the second sentence of subsection (b) (1) of
13 that section, and substituting therefor “Except with respect
14 to civil penalties under section 901 (c) and (d) of this Act,
15 such”.

INTERNATIONAL TERRORISM

TUESDAY, JULY 18, 1978

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
OF THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:41 a.m. in room 2167, Rayburn House Office Building, Hon. Glenn M. Anderson (chairman of the subcommittee) presiding.

Mr. ANDERSON. The Aviation Subcommittee will come to order.

Today, we begin hearings on a bill to provide more effective methods of dealing with the grave problem of international terrorism. The threat of terrorism remains very high. In a recent report to the Congress, FAA Administrator Langhorne Bond indicated that there were 30 hijackings of scheduled air carrier flights in 1977—5 in the United States and 25 foreign—more than in any year since 1972.

According to the report, the high visibility of civil aviation will continue to make it an attractive target for these criminal acts.

The bill is designed to deal in a comprehensive way with the threat terrorism poses to Americans both at home and abroad, and to aid law enforcement officials in preventing terrorist acts and bringing to justice the perpetrators of such acts.

It will give the President the tools necessary to deal with threats and acts of terrorism, and to work toward closer international cooperation in bringing the curtain down on terrorists. I realize there is little time to consider such an important measure in this session. However, due to the nature of the subject matter, I believe it is imperative that we act this year to provide a means for our Government to deal more effectively and promptly with terrorism.

I have introduced a bill, along with my colleagues, Chairman "Bizz" Johnson of the Public Works and Transportation Committee, Mr. Harsha, the ranking minority member of the committee, and Mr. Snyder, the ranking minority member of the Aviation Subcommittee.

It incorporates what we believe is an informed and constructive approach to the problem. We have worked jointly on the bill, and we intend to work with all due diligence to see it passed this session.

Our leadoff witness today is Secretary of Transportation Brock Adams. Before we get to you, Brock, let me introduce the chairman of our full committee, Chairman (Bizz) Johnson.

The CHAIRMAN. Thank you, Mr. Chairman. I commend you for holding these hearings on a very important subject affecting the entire international community. Unfortunately, international terrorism is one of the sad chapters of current events. It is a problem that has intensi-

fied in recent years, and it is a problem that can be resolved only through total international cooperation.

I note with interest that at the just concluded economic summit at Bonn, this country along with the six participants agreed on a formula to deal with international terrorism. Reports appearing in today's papers indicate that the Soviet Union and other Communist bloc countries are as deeply concerned as the Western Powers and are working in their own way with us to try to resolve this major problem. Thus, the action the committee is beginning today is one of major import for the future of air travel security in the years ahead.

The current security measures in effect in the United States at our airports have been a great success to date, but we must not relax our vigilance. The problem, however, in the international area is currently more serious, particularly when one considers the unprecedented numbers in which our citizens are traveling abroad. Our citizens certainly require and deserve the best efforts of the Government to protect them from terrorist acts wherever they occur.

This bill and related measures which have been introduced in the House and the Senate will provide the executive branch with more effective means to deal with terrorism on the international level. I share your concern, Mr. Chairman, that this legislation is necessary and that we should do our utmost to assure passage during this session of the Congress.

I welcome the presence of Secretary Adams, Mr. Langhorne Bond, and Mr. Lally before the subcommittee. Mr. Secretary. I hope that everything that we heard about yesterday has been cleared. You have made us a very fine Secretary. I well remember your service in the House as a Member of the Congress.

We always got along together. We are going to get along together, as far as I am concerned as chairman of this committee and the other members of the committee, on matters dealing with transportation across the board.

We will work our will, I am sure, in the spirit of compromise, and through the conferences we will come up with legislation that will be acceptable to the administration and the Secretary of Transportation.

Brock, I want to say that you made a very fine statement yesterday. I hope the air is cleared.

Mr. ANDERSON. Mr. Clausen?

Mr. CLAUSEN. Thank you, Mr. Chairman. I want to join our two California chairmen in welcoming our former colleague, Brock Adams, now serving as Secretary of Transportation, before the committee. I want to state that here is one of the areas in particular, where you have a unique background both as a legislator and as a result of your personal interests and understanding of aviation, generally. So I think your testimony will be very valuable.

Mr. Chairman and members of the subcommittee, I am pleased to be here to testify in support of legislation designed to help the United States combat air piracy on a worldwide scale.

While there are a number of different bills pending before the subcommittee, including several measures which I sponsored, the objectives of the various bills are the same, and I feel that the subcommittee will combine these proposals to arrive at the best possible language.

As a pilot myself, and one who has worked in the field of aviation over half of my life, I am pleased to be a part of an effort to discourage terrorism and minimize these senseless acts. Terrorist attacks have occurred with frightening frequency. The innocent have suffered long enough. The time has come for us to put a stop to these incidents and restore our airports, here and abroad, to places of safety and security.

The FAA's Civil Aviation Security Service compiles facts and figures on the number of hijackings and terrorist activities which take place and recently published these figures in its semiannual report to the Congress. I am sure that many of you are aware of these figures but a number of them are worth repeating here.

For example, in 1977 alone, there were 31 aerial hijackings worldwide, 26 of which occurred overseas. Sixteen of these hijackings were described as successful—where an aircraft has been seized, and where a political propaganda or other mission has been completed although the final result was the capture of the terrorists.

The previous year, 1976, there were only 16 hijackings of which 7 were described as successful. Two U.S. hijackings were rated successful that year.

It is clear from these figures that aerial piracy has been on the increase despite attempts here and abroad to control it.

The United States has been fortunate in that since November 10, 1972, there has been only one hijacking deemed successful by the FAA involving an American carrier. This excellent record is the result of stringent measures to protect our U.S. air carriers.

Our preboarding security is the most advanced in the world. In the first 6 months of last year, 243 million U.S. domestic passengers were screened through the now familiar magnetometers at boarding gates. An astounding 874 firearms of all types were turned up, resulting in 370 arrests. Yet, with all these precautions, there were still five hijacking incidents in the same period, although none were considered successful by FAA standards.

Securing our own airports will not, however, afford complete protection to all Americans. We have become inveterate travelers, both for business and pleasure, and our travel is by no means limited to U.S. carriers. Almost every act of terrorism which occurs abroad affects U.S. citizens.

Recognizing this fact, the FAA has provided technical assistance to countries seeking to upgrade their airport security systems. Our bill expands this authority and provides the necessary vehicle for appropriation of funds to carry out this educational process.

The legislation goes beyond the sharing of information and requires that sanctions be imposed against countries that harbor hijackers. A principal provision requires the President to submit to Congress every 6 months a list of countries that give sanctuary to terrorists. When the list is compiled, the President can then bar foreign aid, cut off arms sales, or turn down export licenses for equipment that might contribute to terrorism. It is true that current laws provide for some sanctions but they are discretionary. It is time for more definitive action. Therefore, our bill requires the imposition of specific sanctions.

The legislation I sponsored also redirects the efforts of the administration, assigning a higher priority to combating terrorism. The bill

gives us a more adequate administrative structure from which to handle terrorist problems and provides for swift and direct action.

I would like to bring to the attention of my colleagues one substantive difference which exists between my proposal, H.R. 13283, and the other bills pending before the subcommittee. Section 12(u) of my bill reads, "Black and smokeless powders, manufactured for use as propellant powders, shall be excluded from the provisions of this section." The purpose of this language is to exclude black and smokeless powders from the taggant provisions of the bill. To do otherwise would require the keeping of complete records of all transactions involving black and smokeless powders which would mean the Federal registration of all ammunition sales.

The House has already voiced its opposition to such Federal registrations when we cut the budget for the Bureau of Alcohol, Tobacco, and Firearms to prohibit the implementation of regulations designed to require all licensees including manufacturers, wholesalers, and retailers in the firearms business to report all transactions between themselves to BATF.

I urge my colleagues to incorporate the language of section 12(u) in the final proposal reported out by the subcommittee.

I would also like to urge my colleagues to act promptly on legislation to combat terrorism. We need to put the United States in a leadership role for the benefit of all air travelers throughout the world. The legislation you have pending before you can accomplish this goal.

Thank you.

Mr. EDGAR. Mr. Chairman?

Mr. ANDERSON. Mr. Edgar.

Mr. EDGAR. Mr. Chairman, I would just like to add my words of encouragement to those of our chairman, "Bizz" Johnson, and Mr. Anderson.

I really feel, Brock, that on the legislative agenda, transportation issues dealing with aviation, public transit, highways, bridges, terrorism—all of the issues in which you have played a dominant role are right at the crest of the hill. It is important for us for you to stay in the position that you are in.

I, too, appreciate your comments at the press conference yesterday. I would like to simply echo the words of many of the colleagues of the House in urging you to stay with the issues which all of us face.

There will be a couple of months for everybody to regroup their forces and to take a look at what we have been accomplishing. I think the pressures in your particular department have been exceedingly great, because of the number of issues which really impact on all facets of our lives.

I have appreciated your leadership, recognizing that we have differences, on occasion, on some of the issues, but I think, on the whole, your leadership has really been outstanding.

This administration has suffered from a lack of coordination at many levels, and I would just like to indicate my support of your being Secretary of Transportation for a long time.

Secretary ADAMS. Mr. Chairman, before Mr. Johnson leaves, I want to thank him very much for his kind comments and for yours and those of the other members of the committee. I very much enjoy working

with the Congress, particularly with this committee before whom we have so many pieces of legislation. And I know the members of this committee share a frustration, as I do, that we have not passed them all; but they are out of committee. Many are in conference; some are passed through both of the Houses. I am looking forward to our finishing these pieces of legislation this year.

I think that will happen, and I wanted you all to know that I will be here helping. I certainly understand the differences that come up during the development of legislation. I am well aware, from years on Capitol Hill, of the fact that we have to hammer out a number of differences of opinion.

Transportation is terribly complex, which means that you have groups with very strong interests and very differing interests. We have to hammer them out, and we will do so. And next year, we will do the ones that we have not completed this year. But I am pleased with the progress so far.

I talked with the President this morning, Mr. Chairman; that is one reason I was a few minutes late. He is most happy that I am remaining in the Cabinet and that things are running along well in my Department. But what I called him about this morning relates to this particular bill. This happens to be a very important time for us to testify on this subject. To the degree that I can in open session, I will update you completely and fully. If there are any questions that involve classified material, I would request, Mr. Chairman, that at that point, you might either go into executive session or we will submit the answers to you in the normal classified manner.

I will certainly try to avoid that to the greatest degree possible, and my statement and most of the things that I have to say do not involve that. But if we are involved in particular technical security measures at individual airports or if we are involved in particular responses, those are matters I would feel we would have to do in executive session or submit to you in written, classified documents.

With that, Mr. Chairman, I would like to request permission that I put my statement in the record, and then I will summarize it. There are several things, due to the events in Bonn the last 2 or 3 days, that I will add orally, because I only confirmed those with the President this morning.

Mr. ANDERSON. Your statement will be made a matter of the record and you can extemporize or present it any way you wish.

[The following was received for the record:]

STATEMENT OF BROCK ADAMS, SECRETARY OF TRANSPORTATION, BEFORE THE AVIATION SUBCOMMITTEE OF THE HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION, CONCERNING INTERNATIONAL TERRORISM, JULY 18, 1978

Mr. Chairman and members of the committee, thank you for inviting me to appear before you today on the subject of international terrorism. We in the Department of Transportation share your concern about the alarming increase in terrorist acts throughout the world and the increasing tendency to use terrorism to achieve political objectives. Clearly, there is a need to strengthen worldwide measures not only to condemn terrorism but to work toward its elimination from the political scene. We applaud the interest of this Subcommittee and your desire to build on the steps already taken by our government and governments elsewhere in the world to free all nations from this threat.

In November 1977, I appeared at a special meeting of the Council of the International Civil Aviation Organization (ICAO) in Montreal to point out the increasing severity of the threat of terrorism, to urge universal adoption of and adherence to the conventions on hijacking and aircraft sabotage and to emphasize to that group that we must have more stringent international standards for the security of aviation. Terrorist incidents have continued to occur since that time, and they underscore far better than my words the need for prompt and effective action.

Transportation, and particularly aviation, has been a target for terrorist attack. Accordingly, the Department of Transportation has been actively involved in anti-air piracy efforts for many years and submits reports to the Congress on the effectiveness of the U.S. civil aviation security program. The most recent report noted that the worldwide increase in hijacking which began during the first half of 1977 continued during the last half of the year. There were 30 scheduled airline hijackings worldwide in 1977, of which 5 involved U.S. carriers. This is almost double the total for 1976 and more than any year since the 1968-72 peak. So far this year, there have been 14 hijackings—11 involving foreign airlines.

These figures, while providing the basis for concern, also point the way to an effective countermeasure. Of the 25 foreign air carrier hijackings in 1977, 21 occurred because of weaknesses in passenger screening procedures. Similarly, of the 11 foreign hijackings in 1978, information available indicates that 6 were caused by ineffective passenger screening measures. In those incidents, the hijackers boarded the aircraft with their weapons through the normal boarding process. Effective passenger screening systems should have detected and intercepted those weapons. Eliminating the weaknesses in passenger screening systems should result in a significant reduction in the number of aircraft hijackings.

In contrast to the foreign experience, no U.S. hijacking since 1973 has involved real firearms or explosives passing undetected through passenger screening points. FAA regulations governing the security of air transportation currently cover 36 U.S. and 73 foreign airlines operating some 15,000 scheduled passenger flights each day to and from 620 U.S. and foreign airports and boarding some 585,000 passengers and 800,000 pieces of carry-on baggage daily. In spite of the complexities of this system and of the fact that the person or baggage we are looking for is literally one among millions, our security measures afford air travelers a level of security unmatched in any other type of travel. Our experience, as well as the experience of other nations who have adopted similar aggressive antihijacking programs, demonstrates the effectiveness of this system.

We have long recognized that universal application of effective passenger screening procedures greatly improves the security and safety of commercial air travel. Airline views on this point were recently expressed by Mr. Knute Hammariskjold, Director General of the International Air Transport Association, representing 109 of the world's major airlines. In June 2 messages to ICAO and to airline presidents and chief executives, Mr. Hammariskjold cited the May 20 attempted assault on passengers boarding an El Al flight at France's Orly Airport and its similarity to previous assaults of this nature at Athens (August 1973) and at Istanbul (August 1976). He called on the airlines to obtain commitments from their governments for effective screening or control of all passengers entering sterile departure areas. He noted that such actions by all nations would create a secure airport environment and would prevent the carriage of weapons in air transportation from one nation to another for the purpose of carrying out attacks at airports. In addition to improving overall air transport security, such measures could facilitate the flow of intransit and transfer passengers and reduce the costs of processing such passengers at many airports.

The commitment of the U.S. Government to effective passenger screening is firm. Our procedures have been in effect for more than five years and are fully consistent with the IATA recommendations. We applaud Mr. Hammariskjold and the airlines for their continuing efforts in seeking improvements in the effectiveness of international civil aviation security. We also applaud the vigorous efforts by airline pilots and their organizations to promote a safe and secure flying environment.

The U.S. has been a leader both in ICAO and in the United Nations in seeking international action to improve aviation security. Both organizations have, for a number of years, addressed themselves to the problem. However, while a number

of positive results have been achieved, until last year the progress has been slow. During this past year, the United Nation's General Assembly adopted a Resolution Condemning Acts of Unlawful Interference with Civil Aviation. ICAO, too, adopted resolutions urging member states to implement specific antihijacking measures including the screening of passengers and cabin baggage on all flights. We welcome these efforts.

In 1974, ICAO incorporated a number of Standards and Recommended Practices for Security in Annex 17 of the Convention on International Civil Aviation, known as the Chicago Convention. The U.S. and other like-minded nations believe that these Standards are not sufficiently stringent to assure an acceptable level of international aviation security, and a series of amendments to Annex 17 has been proposed. The proposals, which the ICAO Council submitted to member states for comment in May of this year, include the strengthening of two current Standards (which are essentially required actions), adoption of five new Recommended Practices (which are essentially discretionary actions), and the elevation of six current Recommended Practices to the level of Standards. Although the amendments fall short of the stringency the U.S. would have liked, they nevertheless represent very substantial improvements and the U.S. will work for their early adoption.

Of course, many, if not most, nations and airlines of the world now have active civil aviation security programs and are making significant improvements in the security of their air transportation systems. The United States has endeavored to speed these improvements by providing technical assistance, guidance and motivation for those countries with limited experience in this field.

We try to assure that interested nations have access to our knowledge and our expertise in security matters. FAA technical assistance teams have already visited 26 countries to provide advice and assistance in developing or improving their civil aviation security programs. Over 200 foreign officials and technicians have attended the aviation security training school at our Transportation Safety Institute in Oklahoma City. We have given in-depth briefings on all aspects of aviation security and made available training materials to foreign governments and airlines. For the most part, the Law Enforcement Assistance Administration has provided the funds necessary to support these efforts.

We regularly conduct security inspections of U.S. flag carrier and certain foreign carrier facilities outside the U.S. This involves visits to most of the major foreign airports. The purpose of these inspections is to assure that the airlines are in compliance with our Federal Aviation Regulations. During the course of the inspections, our representatives meet with foreign airport security officials and any airport security weaknesses or deficiencies observed are called to their attention. This inspection activity has produced security improvements at many foreign airports and has helped to assure the continuing effectiveness of airline security measures required by Federal Aviation Regulations.

Turning now to the legislation before this Subcommittee, Mr. Chairman, we strongly endorse the objectives of H.R. 13261 to improve the protection of U.S. citizens using commercial air service. We particularly urge that the provisions of Section 10 that would implement the Montreal Sabotage Convention be enacted at the earliest possible time. Section 11 of the bill would provide additional measures for prosecution and extradition that will strengthen existing deterrence for persons who would commit crimes affecting the security of air transportation. We also urge adoption of this section.

Section 8 of the bill would require an extension to charter operations of the security measures currently applicable to scheduled passenger operations. I am pleased to report that regulations have already been revised to this effect and screening of public charter flights will be required beginning July 25.

Section 6 is the section most pertinent to the Department of Transportation. It would require that assessments be conducted of certain foreign airports to determine the extent to which they effectively maintain and administer security measures. If it is determined by the Secretary of Transportation that an airport does not maintain effective security measures, the responsible government would be notified and corrective actions recommended. If corrective action were not taken within 180 days, the identity of the airport would be published in the Federal Register and prominently posted at U.S. air carrier airports. Further, consideration would be given to the imposition of certain measures against air carrier operations to or from that airport. We have examined this section carefully and believe it to be a reasonable, balanced approach to a most difficult problem.

Section 7 authorizes the Secretary to promote international aviation security by providing technical assistance to foreign states. As I indicated earlier, we have had for several years a limited program of assistance to foreign governments, funded primarily by LEAA. We welcome this authorization as it will enable us to continue this important and worthwhile program more effectively.

In my judgment, the best way to achieve lasting improvements in aviation security is through the multilateral efforts of all concerned nations, working together through ICAO, a recognized international, safety oriented, organization. Further, the work of ICAO should continue to be supplemented through bilateral efforts of those nations, including the United States, that have led in the development and implementation of effective aviation security programs.

It must be made clear, nonetheless, that the United States is prepared to take unilateral action, including the imposition of sanctions, if necessary to protect U.S. citizens. The provisions of H.R. 13261 place the nations of the world on notice of our resolve to counteract terrorist acts, and provide some of the tools necessary to do so. At the same time, this legislation would provide the mechanism for an active U.S. program of helping other countries to upgrade airport security and sharing with them our expertise and experience. This legislation adopts a firm policy toward countries whose airports do not have effective security, but it also provides for giving to those countries help they may need to make necessary improvements and to achieve an acceptable level of security.

That concludes my statement, Mr. Chairman. I will be pleased to respond to questions you may have on this subject.

TESTIMONY OF HON. BROCK ADAMS, SECRETARY, U.S. DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY LANGHORNE BOND, ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION; AND RICHARD F. LALLY, DIRECTOR, CIVIL AVIATION SECURITY, FEDERAL AVIATION ADMINISTRATION

Mr. ADAMS. Thank you, Mr. Chairman.

Mr. Chairman, I appreciate appearing here today to discuss the alarming increase we have seen in recent years in terrorist acts and the impact this has had on international aviation, to indicate what the response has been, and what the statutory authorities are, and to support the thrust of the bills that have been introduced both on the Senate side and on this side by yourself and other cosponsors on the committee, such as Mr. Clausen, the ranking minority member.

As I indicate in my statement, on November 3 of last year, I appeared before ICAO, which is the technical aviation safety group of the United Nations. It includes 131 nations and has a special executive council of 30 nations. We went through the urgent recommendations that the United States and several others were making to increase security measures at all airports in the world.

I am pleased to report to you that our recommendations were adopted almost in toto. We had support from both the nations that have indicated their support in the recent Bonn statement, and also from nations of the so-called "Block Countries," as well as the Soviet Union.

I also wanted to indicate to you that in September of 1977, a special coordinating committee was formed in the National Security Council to deal with terrorist activities. Mr. Bond and I are the representatives from the Department of Transportation, and Mr. Lally is our direct staff support. This committee has had meetings and will be having more. It serves as the mechanism both for response to specific acts, and for planning and putting into effect such things as may be necessary as a result of the agreement of the seven nations in Bonn.

One element I should stress, Mr. Chairman, is that the magnitude of the problem of preserving aviation security is enormous. Hundreds of thousands of people and pieces of baggage go through the domestic and international aviation system everyday. I mention that to make clear that I cannot appear before you saying that everything is perfect and that nothing will happen. I think that would be misleading, and I want to be certain that my testimony indicates to the committee that while we are in constant state of readiness, here is a constant threat and we cannot guarantee you that everything will always work.

But I do not want to indicate the types of steps we have taken. Last year, there were 30 hijackings of scheduled airlines throughout the world; five of these involved U.S. carriers. That is an increase over 1976. So far this year, there have been 14 airline hijackings worldwide; 11 of them involved foreign airlines and, of course, the remaining 3 were here.

I have indicated in my statement a comparison with prior years, and if the committee wishes, we can trace this back through the 60's and the 70's. But with the enactment by the Congress and the enforcement through the Federal Aviation Administration of enhanced passenger screening and other security measures, we had a dramatic drop in hijackings in the United States. In other words, the program has been extremely successful.

Again, I add the caveat, you want to knock on wood and with the volume that goes through, I am not trying to tell you that something might not happen at any moment. But the overall effect was an enormous reduction. For example, since 1973, Mr. Chairman, no U.S. hijacking has involved either real firearms or explosives passing undetected through a screening point. The hijackings that have occurred have involved hand weapons, or in one case, an overpowering of the system. For example, a hijacking occurred during this last year where a person with a shotgun actually charged right through the screening system; he had his weapon out before the guard had his weapon out, and therefore was able to board the aircraft.

I want to particularly pay my compliments to Mr. Bond and to Mr. Lally as I say that we have a system—which, again, I would only want to describe in detail in executive session or in privileged material—for working on hijackings. We have not had casualties this year, other than the one hijacker who committed suicide using the weapon after he had overpowered the guard and obtained the aircraft.

In terms of volume world-wide, Mr. Chairman, our security regulations presently cover 36 United States and 73 foreign airlines. There are 15,000 scheduled flights a day; they go from 620 United States and foreign airports, and they board 585,000 passengers and 800,000 pieces of luggage a day.

I think it is important that we keep those figures in mind, given the fact that we are looking in any instance for one individual, two or three individuals, both in the United States, and at foreign airports.

In addition to our meeting, in Montreal with ICAO, I would like to mention that the United Nations adopted a resolution against terrorism in general terms. Within ICAO there are now being circulated to members of ICAO—and I believe the committee has copies of these annexes; if they do not, we will supply those—proposed improvements

to annex 17 of the Convention on International Civil Aviation. These improvements raise the level of screening; they basically require that all passengers and baggage be screened in the signatory nations. There were certain additional things that we might have wanted in terms of particular types of equipment, but the recommended improvements are significant.

Mr. Chairman, we conduct a regular inspection program at the major airports of the world through the FAA security teams, to assure compliance with security regulations. I want to emphasize that since my testimony before the Senate committee, we have had complete cooperation from the airlines and the airports involved in terms of the FAA inspection teams and what they have requested the airports to do in terms of increasing their security. Their security has been increased where we have requested it.

As pointed out in our testimony, not only have we carried on this type of inspection program throughout the world, but FAA technical assistance teams have already visited 26 countries. We have had over 200 foreign officials visit the Transportation Safety Institute in Oklahoma City. We have given in-depth briefings on security matters to foreign governments and airlines. For the most part, the Law Enforcement Assistance Administration has provided funds to support these efforts.

We meet with the security officials at those airports. We meet with the governments. We call to their attention efficiencies or deficiencies that have occurred.

Mr. Chairman, turning to the bill itself, H.R. 13261, we particularly urge enactment of section 10, which is the legislation necessary to carry out the Montreal Convention, which is the most recent convention on aviation safety and to which we, the United States, are a signatory. We believe this implementing legislation will give us additional and proper authority to carry out our responsibilities under that convention. We also support section 11, because it will strengthen the existing measures for prosecution and deterrence, and we urge the adoption of that section.

Section 8 of the bill requires an extension of security measure to charter operations. Mr. Chairman, we have no objection to that section, but I would indicate that the Federal Aviation Administrator has already issued regulations extending security measures to public charters. These regulations become effective July 25. The reason this was not included before was that under prior regulations of the CAB, which required that groups be formed or that long-time ticketing procedures be used, you had, in effect, a built-in screening process. With the changes in the availability of charters, we felt that it was necessary now to apply more of the type of security arrangements we use with regular ticketing procedures.

Section 6 is most important to our present operations. I will refer at the end of my statement to our existing statutory authority which authorizes the President and the Secretary of Transportation to take certain actions with regard to airline operating authorities if an airport or an airline does not maintain security measures.

Section 6 of the bill would add new authority. It states that we inspect a particular airport and it is determined that it is not secure,

then the authorities are given a period of time in which to correct it. We believe the period of time, which is provided in H.R. 13261 of 180 days is proper.

If the problems have not been addressed in that period of time—and as I say, we have not received resistance from airports carrying out security measures we have recommended—but if they were not, we would identify the airport, publish it in the Federal Register, and post it in U.S. airports, so that people would be aware that there was a problem.

We are carrying out section 7 which authorizes providing technical assistance to foreign states. We have no objection to that section.

Mr. Chairman, I think that we need a multilateral approach, but I want to indicate to the committee—and this was shown by the recent statement of the President, and as I said I talked to the President this morning about the meeting with the other six nations in Bonn—that we are prepared to take unilateral action if multilateral action throughout the world is not possible.

There are difficulties in obtaining multilateral cooperation in all areas, in that some nations of the world have taken the position that these are political matters and political aspects are involved in hijackings or in harboring.

We do not take that position, Mr. Chairman. We take the position that the world-wide system of international aviation, as well as the domestic system, is entitled to security and safety, and should be beyond the reach of any type of terrorist activity. And we have pursued that policy both internationally and within the United States.

Finally, Mr. Chairman, I would simply state to you, so you understand our existing powers, that sections 1114 and 1115 of the Federal Aviation Act of 1958 give the authority to the President to suspend air operations to any nation that is harboring terrorist hijackers and also give the right to suspend air service between the United States and any nation that conducts service to that nation. So it is a very broad and sweeping power.

If we find that there are any additional sanctions that are needed, we will report them promptly to the Congress. There is also the power in section 1115 for the Secretary of Transportation to notify a country if they are not maintaining security provisions, and to suspend that nation's air service here if they do not meet those security requirements.

So, Mr. Chairman, we have not been unaware of the problem of terrorism. We are deeply concerned about it. I appreciate the committee holding the hearing this morning. I hope that the bill will be passed on both sides and that it will not have any type of legislative veto in it. I mention that specifically, because in these types of situations you operate on a very, very tight time schedule. In other words, the plane, if it is seized, is seized. It then moves to a particular nation and the nations of the world, particularly the President of the United States, must determine at that point whether or not a particular sanction would be applied. We therefore need the authority which we presently have to move on those situations.

Mr. Chairman, that completes my statement. I would be happy to answer your questions. I have Mr. Lally and Mr. Bond also with me,

and I would ask permission, Mr. Anderson, if any of the members have specific questions, that I might refer to them in some areas if there are technical matters involved.

Mr. ANDERSON. Very good. Well, thank you, Brock, for a very fine statement.

The Washington Post carried an item this morning concerning an accord reached at the summit conference regarding terrorism. Can you brief us on what that agreement was?

Mr. ADAMS. Mr. Chairman, basically the agreement is that the seven nations involved, if confronted with a nation that is harboring a hijacker or refusing to return a hijacked aircraft, would suspend air service to and from that nation. That is the basic framework of the agreement. There are no details at this point, which we will now work out with the return of the President, as to the triggering mechanism for suspension, the period of suspension, and the specific detailed approach to it.

Mr. ANDERSON. No other sanctions, outside of discontinuance of air service?

Mr. ADAMS. Those were the sanctions that were indicated in the agreement of the seven nations. There are other potential sanctions which can be used and, to a limited degree, have been used. The State Department witnesses will detail this for you, but we have used other economic sanctions against nations that have provided harboring.

There were basically four nations left that did any of this, and economic sanctions have been applied in certain cases.

Mr. ANDERSON. What specific types of assistance are currently being given to foreign governments, and to how many countries?

Mr. ADAMS. Mr. Chairman, we send technical teams from the Federal Aviation Administration—and we have overseas operations to do this—that go in and examine particular airports and make recommendations as to the type of security that they should have. We also make available all of the technology of the screening devices that we have. ICAO has held both a Pacific and an Atlantic regional meeting of all of the nations in those areas, in which we participated to inform them what each of the other nations were doing. We bring in their experts to Oklahoma City and put them through the courses that are conducted by our security people. And, of course, we provide any technical advice that any nation wants on whether to use electronic screening or various types of explosives detection equipment.

Mr. ANDERSON. Is this assistance done on a reimbursable basis or is it part of your budget?

Mr. ADAMS. We do not have a budget item for it. Where we have been required to supply resources, and so on, it has been supplied through LEAA, or on a reimbursement basis. Some nations have asked us to specifically come in, do an examination, and to make recommendations, and some of that has been done on a reimbursable basis.

Mr. ANDERSON. Does the Department have an R. & D. program to develop equipment capable of detecting explosives going on board aircraft?

Mr. ADAMS. Yes, sir, we have an ongoing R. & D. program that covers detection techniques, and also follows the so-called taggant system.

Mr. ANDERSON. What is the status of that program?

MR. ADAMS. The taggant system, has basically been run by the Treasury Department and we have cooperated with them. The idea is to implant within all explosives made, substances by which they may be detected, or prevent the devices that can cause detonation of explosives so that they can be defused without the usual danger that is present.

We are also exploring vapor detection concepts and we have active dog teams with airport assignments. I would prefer that if we go into details of those, Mr. Chairman, that we do that in executive session.

We also have a program covering all airports on explosive security which includes examination and placement of lockers and protection of spaces within airports that may be danger spots.

MR. ANDERSON. Falling short of going into executive session, you did not mention taggants in your statement, and I wondered if you had any comments about the taggant section of our bill?

MR. ADAMS. Mr. Chairman, we support it. As I say, it is basically run through the Treasury Department. We hope that that type of program can be successful. We have reservations about its being the total answer, in that the flow of explosives internationally makes it very difficult to be certain that all are tagged.

In other words, the taggant program basically operates on the theory that the explosives, as manufactured, will have within them a substance that will enhance detection. However, it is possible to obtain explosives from other sources in the world that do not come out of the production areas. And you are dealing with terrorists who may be very sophisticated and very dangerous.

But we support it, Mr. Chairman. I probably should point out here that in the United States we have had a far larger number of hijackings committed by persons for reasons other than terrorism; they may be mentally deranged or they may be fleeing from a crime, or they may have other non-terrorists motives.

Of course, taggant use in those areas would be very helpful, in determining if an explosives device were present.

MR. ANDERSON. I participated in a demonstration in my own districts that was put on by the Treasury Department. It was a very good demonstration, and they showed that you could blow up—as a matter of fact, they let me push down the button that blew up an automobile and a house—and they were able to go right into the area and identify the taggants in just a short period of time.

MR. ADAMS. As I say, Mr. Chairman, we suggest that program. What I was pointing out to you is that it relies upon the explosives being under control while they are being produced.

MR. ANDERSON. Yes, Mr. Taylor?

MR. TAYLOR. Thank you very much. Mr. Secretary, it is good to have you here.

MR. ADAMS. Thank you.

MR. TAYLOR. I was wondering, Mr. Secretary, in the provisions in the bill which require the Secretary to post a list of unsafe airports, if such requirements should not be limited to repairs where they might be more successful in carrying that out.

MR. ADAMS. Mr. Taylor, we have been very concerned about that, and that is why we favor the 180-day provision before any posting would take place. I indicated to the Senate that we were opposed to their

original provision. And this is the compromise that came from it, which is now that we allow 180 days for corrections before we publicize security deficiencies, because otherwise, yes, you are confronted with the very problem you mention.

I do not want, before the committee or before the American public, to outline which airports in the world are ones that might be subject to terrorist attack.

Mr. TAYLOR. Well, if a U.S. passenger travels to an airport on this list of unsafe airports, would the passenger assume the risk of the consequences, and maybe thus preclude any recovery action for damages?

Mr. ADAMS. I cannot answer that. That would be a matter of the tort law, and the agreement between the two countries as to whether tort law of one country or another would apply.

We would, by posting, certainly then have a traffic advisory alert. And the main force of that provision, Mr. Taylor, is another sanction, something less than suspending their air service, but it would certainly have a tremendous effect, as you might guess.

I believe I indicated before you came into the room that we have had very good cooperation from the airport operators of the world, not just in the United States. Whenever we have requested changes, they have not resisted.

One of the problems that exists is that if you go a sustained period of time without something having happened and you are using, basically, personnel for your screening, as with all personnel, they tend to let down and that is the moment when it happens.

Mr. TAYLOR. Mr. Secretary, do you believe that this legislation that we are considering, H.R. 13261, is worthwhile and that it will actually be effective in providing tools in helping to cope with terrorist activity?

Mr. ADAMS. Yes. We think we have a significant number of tools now, Mr. Taylor, but we are in support of the legislation, because it does contain the provisions on the Montreal convention which we consider should be put into place, to indicate our good faith with the international community that is working with us on this. And the potential posting provision is an additional tool. So, yes, we are in support of the legislation.

Mr. TAYLOR. Thank you. Thank you, Mr. Chairman.

Mr. ANDERSON. Mr. Hefner.

Mr. HEFNER. Thank you, Mr. Chairman.

I am happy to have you here, Mr. Secretary. I apologize for being late and not hearing your statement. I only have one question, and this is just a matter of curiosity. All the investigations, for instance, where there have been explosives, are they mostly carried on the plane like carryon luggage, rather than being checked in?

Mr. ADAMS. Mr. Hefner, since we put in our security screening devices—and, again, I knock on wood on this—no hijacker has penetrated them with concealed explosives or weapons. As I indicated earlier in my testimony, we had the system overwhelmed once last year by somebody having a weapon out before the guard had his weapon out, and thus was able to enter the aircraft.

Mr. HEFNER. Well, it seems to me that the agreement, from what I can see from the Washington Post article—is on the right track as far as the sanctions go. It seems to me that this would be a very effective

way to stop the hijacking that is taking place, but it might deter people in the future if they have no place to go or no place to stay.

I think the President and the summit are on the right track, and I compliment them for it. I thank you for being here today and, as always, having a very precise and informative statement.

Mr. ADAMS. Thank you, Mr. Hefner. We are pleased with what occurred at Bonn, and it strengthens our international position because we do not have to do this unilaterally now.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. Thank you very much, Mr. Chairman.

Mr. Secretary, I wish to reiterate the statements that our chairman, Mr. Anderson, had uttered originally, and our full chairman, Mr. Johnson. I want to thank you personally for what you have done to revitalize Midway Airport, which is in my district and my little pet project since I was elected to serve down here. I have haunted everybody and hounded everybody; you have been very kind and understanding. As you know, Midway is ready, willing, and able to go, with much thanks to you.

However, on this particular subject, this is a kind of a sore spot for me. I kind of feel that traveling every week, like we do, it should suffice for a Congressman to be able to show identification like a policeman does to the girl at the trick box and be able to get by without dragging yourself through a mile and a half of nuisance.

I have seen specifically where police officers go in and flash their badges and they get through. Now, it so happens that I have been a collector of badges for 30 to 35 years, and I bet I have 200 of them at home in a frame. I could get one of those old deputy sheriff or deputy coroner badges and flash it on and be able to get through without any problems of any kind, just to show the possibilities of what could happen in getting through that box.

Also, I want to mention one little thing as to the sensitivity of the particular instrument that we have to pass through. On my last trip down here, fooling around with the kids on the 4th of July—illegally, I will admit—I had some blank cartridges in my pocket, which I did not know about; I changed suits.

I had a little container that had 50 pellets in there which were blanks and each one had gun powder in them. Now, I have been through that little obstacle course and was detected with a fountain pen in my pocket, and yet I got through with the container full of blanks and gunpowder in them with no detection whatsoever.

Yet, there was enough powder there at least for three or four pretty good sized caliber bullets.

Mr. ADAMS. Mr. Fary, if we go into the technical explanation of that, I would rather do it in executive session to explain the difference between the two, because various devices are used in response to various types of threats that are involved in airports.

Your fountain pen was picked up with one type of detection, and I would rather discuss the others, as I say, in an executive session if the committee wishes it.

Mr. FARY. I have been trying to figure out whether the machine has a high and a low on it and could be adjusted to detect a larger metal object, because I can recall time and time again being detected on crazy

little nonsensical things that you carry in your pocket. However, I do not want to detain you.

Thank you very much. It is nice to be with you again, and thanks again for what you have done for Midway.

Mr. ADAMS. Thank you, Mr. Fary. We hope that that will work well and we expect that it will.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. Brock, I am sorry; I have been in and out so much that I missed half of your testimony. I assure you that I will read it.

On a personal note—and I know this must have been mentioned here this morning—but I was glad to read the Washington Post. I heard Jim Wright's statement and Jimmy Howard's, and I want to associate myself with them and say that we think you do a great job.

I have no questions on this testimony, but we appreciate your appearance, as always, before us this morning.

Mr. ADAMS. Thank you, John Paul; I appreciate that.

Mr. ANDERSON. Mr. Flippo.

Mr. FLIPPO. Mr. Chairman, thank you.

I enjoyed your testimony, Mr. Secretary, and I have no questions.

Mr. ANDERSON. Mr. Goldwater.

Mr. GOLDWATER. Thank you, Mr. Chairman.

Mr. Secretary, it is nice to see you again.

Mr. ADAMS. It is a pleasure to see you this morning, Mr. Goldwater.

Mr. GOLDWATER. It is certainly nice to see the Administrator of the FAA with you. It is, in fact, very reassuring to me to see the Administrator and the Secretary sitting together and, in fact, speaking together. I hope this bodes well for the future, and certainly for the importance of the FAA in the Department of Transportation.

I also was late this afternoon, but I understand that some of my colleagues congratulated you on your statement in the press. Certainly, I want to join with them, because I think you are doing a particularly effective job down there and I would hate to see any change, at least currently.

Mr. ADAMS. Thank you, Mr. Goldwater. I am very grateful for that statement. As I indicated to the chairman and to some of the others, I intend to stay and we are going to get our legislation through.

Mr. GOLDWATER. Well, there is a lot of work to do and we need good people, and from my past experience in working with you here in the Congress, I think we have the right person in the right job.

I do not have any particular questions, but I would just again say that I am just so very pleased to see this very close association and good working relationship.

Mr. ADAMS. We have a very good one, Mr. Goldwater.

Mr. GOLDWATER. That is what I understand.

Mr. ANDERSON. Thank you, Mr. Goldwater.

I, too, want to thank you for your presentation this morning, Brock. I want to comment on the fact that you and Langhorne and Mr. Lally are here together this morning; I think it is very, very good. I was rather surprised that Langhorne did not have a statement of his own; I was expecting it.

Mr. ADAMS. We have a very good working relationship, Mr. Anderson. And on the special coordination committee, either Mr. Bond or myself attend each meeting and therefore we have to maintain very close contact as these occur.

I want the committee to be assured that we cannot produce miracles, but that we are working on this subject just as hard as we can and we hope our responses will continue to be adequate.

Mr. ANDERSON. When Langhorne usually sits in that chair, he usually is not so quiet. As a matter of fact, he usually takes longer than you have taken this morning.

I am rather happy that our hearings are winding up rather short this morning. We are expecting to be called in just a moment or two to appear before the Rules Committee on the noise bill.

Mr. ADAMS. I want to say publicly, Mr. Chairman, that I am very hopeful—and I have indicated this not only to the media, but to other Members of Congress—that the two bills that you are presenting to the Rules Committee—the noise bill and the regulatory reform bill—will receive rules and will be passed by the House and will go to conference and will become law.

I am supportive of your efforts in this area and will continue to be so.

Mr. ANDERSON. We go before the Rules Committee this morning on the noise bill and we go before rules tomorrow on the regulatory reform bill, so we are moving fairly fast on both of these.

Mr. ADAMS. I am very pleased, Mr. Chairman. Thank you very much.

Mr. ANDERSON. Thank you very, very much.

Tomorrow, we will hear from Ambassador Quainton of the State Department, Congressmen Gilman and Lloyd, and the Air Line Pilots Association. The hearings will begin again in this room at 9:30 a.m.

At this time, the hearing is recessed.

[Whereupon, at 10:27 a.m., the hearing recessed, to reconvene at 9:30 a.m., Wednesday, July 19, 1978.]

The first thing I noticed when I stepped out of the car was the cold, crisp air. It was a relief after the warm, humid air of the city. I walked towards the building, feeling a sense of purpose. The building was a large, imposing structure with many windows. I looked up at it, feeling a sense of awe. I walked towards the entrance, feeling a sense of anticipation. I opened the door and stepped inside. The interior was a large, open space with high ceilings. I walked towards the center of the room, feeling a sense of freedom. I looked around at the people who were there, feeling a sense of connection. I walked towards the front of the room, feeling a sense of purpose. I opened my mouth and spoke. The words came out of my mouth, feeling a sense of release. I looked at the people who were listening, feeling a sense of hope. I walked towards the back of the room, feeling a sense of peace. I closed my eyes and took a deep breath. The world was mine. I was free. I was happy. I was whole. I was me.

INTERNATIONAL TERRORISM

WEDNESDAY, JULY 19, 1978

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
OF THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:35 a.m., in room 2167, Rayburn House Office Building, Hon. Glenn M. Anderson (chairman of the subcommittee) presiding.

Mr. ANDERSON. The Subcommittee on Aviation will come to order.

Our first witness this morning will be Ambassador Anthony Quainton, Director of the Office for Combating Terrorism, Department of State.

Mr. Quainton, we are very happy to have you here. We do have your prepared statement, and you can read it for the record or you can extemporize, as you wish.

TESTIMONY OF AMBASSADOR ANTHONY QUAINTON, DIRECTOR, OFFICE FOR COMBATING TERRORISM, DEPARTMENT OF STATE

Ambassador QUAINTON. Thank you very much, Mr. Chairman. I would like to read it since it is fairly short and it may be of interest to people here who have not had a chance to read it in toto.

Let me say what a great pleasure it is for me to testify before your committee today so soon after having direction of the State Department's Office for Combating Terrorism. As you know, this office is the focal point for the coordination of our Government's efforts to deal with terrorism; it is responsible for long term policy planning in this area as well as the preparation of detailed contingency plans and crisis management. The office was given a new mandate last year in order to enhance its ability to deal with the growing problems of international terrorism and to insure that there is prompt, effective and detailed coordination among the various U.S. Government agencies concerned.

The Special Coordination Committee of the National Security Council, chaired by the Assistant to the President for National Security Affairs, has overall supervisory responsibility for the work to combat terrorism. Under the SCC, there is a senior-level interagency executive committee which deals on a regular basis with counter-terrorist policy and the many complex issues of contingency planning related to it. The Departments of State, Defense, Justice, Treasury, Transportation, Energy, the CIA, and the NSC staff are represented. The State Department chairs this committee with the Justice Department's representative as vice chairman.

There is also a working group representing an additional 20 agencies and departments with less direct involvement in these problems. In the working group, questions of wider interest, for example, relating to research and technology, can be discussed and recommendations can be prepared for more detailed executive committee review.

Because the Department of State will have to manage the U.S. Government's response to international terrorist incidents, we have recently upgraded our plans and procedures. The State Department's Operations Center is on duty around-the-clock and has a capability for virtually instantaneous communications with other agencies' operations centers, with senior officials and with our diplomatic missions. In the event of a major terrorist event, we would immediately set up a task force or working group to handle the detailed management of our reaction to the incident. The Special Coordination Committee would also convene immediately in the event of a major crisis.

Behind these structures, there are, of course, the ongoing tasks of intelligence collection and analysis, not only by agencies in our own Government, but also through our exchanges with friendly governments abroad. Our goals are to be informed in advance of likely incidents so that we can take necessary countermeasures and to have available sufficient information on which to take decisions in an actual crisis situation.

The U.S. Government has taken a significant number of measures to demonstrate its opposition to terrorism. We have made abundantly clear that we will reject terrorist blackmail and demands for ransom or the release of prisoners. We have sharpened airport security within the United States. We have improved the security of our officials and our premises overseas. We have developed an active program to advise private companies on measures to protect themselves.

The fight against terrorism is now an integral part of our relations with all governments. We seek their cooperation in combating this scourge and in bringing terrorists to justice. The measures agreed to at the Bonn summit against countries which refuse to extradite or legally prosecute airplane hijackers are a significant example of such cooperation. In addition, as Secretary Adams made clear in his testimony, we are working through ICAO to upgrade international standards for airport security.

We are also working with a number of like-minded states to obtain additional accessions to The Hague and Montreal Conventions against hijacking and aircraft sabotage. The number of actual accessions increased in 1978 from 82 to 90. At least 14 other countries are well along in the ratification and accession process. Fewer and fewer hijackers can count on landing in countries which once gave them sanctuary.

There remains much to be done. Not all governments accept our view of terrorism. Some proclaim as freedom fighters those whom we know to be terrorists. Some continue to arm and train terrorist groups. Others provide sanctuary or financial assistance. Some may be fearful of retaliation. Others are willing to risk their relations with third parties and are reluctant to take resolute and determined action. We are pressing all governments to assume their full international responsibilities. In this effort, we are encouraged by the November 3, 1977,

consensus resolution of the United Nations General Assembly which called on all countries to adopt effective measures to prevent acts of aircraft hijackings and other interference with civil aviation.

Recognizing that terrorism is a problem which must be combated forthrightly and vigorously and that there is not one battleground but many, we welcome the initiative which the Congress has taken in moving to enact a bill to combat international terrorism. It is a timely piece of legislation.

Terrorism is showing no signs of diminishing as the terrible and brutal killings in Italy of Aldo Moro and others have recently dramatically shown. If we are to succeed in our effort, the Congress and the Executive must work together. As Secretary Vance indicated last January in his testimony before the Senate Governmental Affairs Committee:

Congress and the administration must work closely on this vital issue so that we are prepared to deal with terrorist acts rapidly, decisively, and effectively.

H.R. 13261 represented a step forward in this collaborative effort. We welcome the principal elements of this bill: the definition of terrorism and the description of appropriate measures to be used against governments which demonstrate a pattern of support for terrorism; the effort to improve international aviation security by drawing attention to the critical question of airport security and by modifying the United States Code to implement the Montreal Convention on aircraft sabotage; and, finally, the provision designed to add identification and detection taggants to the explosive materials which terrorists might use.

These measures will enhance U.S. capabilities to combat terrorism. They must be used with imagination and determination. They must be supplemented by efforts to deal with those cases where the inspiration and motivation of terrorist acts arise from deeply felt and long-standing political grievances. The administration, through diplomatic means, is working to overcome these grievances, be they in southern Africa or the Middle East.

The terrorist problem is obviously an extremely complex one. It is transnational as well as multinational in scope. A great proliferation of groups with varying interconnections between them has taken place. In dealing with these groups and with their patrons, we often have to consider a wide range of factors and possible courses of action. The sanctions proposed in the bill would be appropriate in dealing with many situations, but their imposition should be considered in the light of each situation. In each case, we should take into account their likely effectiveness and the impact they will have on our ability to combat terrorism as well as their impact on other political, economic, and security interests of the United States. They should be such that they can be altered as appropriate in response to a positive evolution in the policy of the state subject to sanction.

The provision of H.R. 13261 which provides for automatic application of sanctions would, in fact, hinder our ability to adapt our tactics to the situation at hand. We feel that selectivity in applying sanctions is essential to gain the maximum leverage in attempting to change the policies of a country supporting terrorism. If it is determined that

a particular sanction would not be effective in influencing a country's policy on terrorism, it would be better simply not to use it, rather than to waive the sanction and risk the interpretation that we are being lenient. We would, however, propose to retain that portion of the bill which contains the requirement to report to the Congress on the use or nonuse of sanctions. Strong reporting and consultative provisions would thus be retained.

With respect to the reporting requirement of the bill, which we regard as a vital means of keeping the Congress and the public informed of significant trends and actions, we would suggest a modification. We would expand section 3(b)4 to provide for a description of the response of the U.S. Government to an incident, including those actions taken by the President not encompassed by the legislation.

Finally, let me reiterate the administration's conviction that this legislation will reinforce our ongoing efforts to combat terrorism. It will provide a basis for close collaboration between the legislative and executive branches on this issue of vital public concern. It is in this spirit of cooperation that the Department has indicated its support for the broad objectives of H.R. 13261. It is in this spirit that my office will be working with the Congress in the period ahead.

I would be happy to answer any questions which you, Mr. Chairman, or members of the committee, may have.

Mr. ANDERSON. Thank you, Ambassador Quainton, for your presentation.

What is the size of your staff, and how does the Office for Combating Terrorism fit into the organizational structure at the State Department.

Ambassador QUANTON. I might give you just a brief history. The Office was set up in 1972 when the problem of international terrorism became a preoccupying one for the U.S. Government.

The Office has six substantive officers, the Director and five others, whose responsibilities are divided functionally over a range of different kinds of terrorist problems. As Director of the Office, I am charged with the chairmanship of the interagency structure which I described in my testimony; at the lowest level, the chairmanship of the working group which brings together all departments who have an interest in terrorism, even a peripheral one.

I chair, also, the executive group of the eight principal Government departments with an interest in terrorism, and through this mechanism, coordinate the policy formulation and the planning with regard to international terrorism, and prepare for the White House senior level group recommendations for action, both in anticipation of terrorists incidents and, should they take place, in their handling.

Mr. ANDERSON. So, then, the size of your staff is really you and five others?

Ambassador QUANTON. That is correct, sir.

Mr. ANDERSON. Can you be a little more specific about what your staff does?

Ambassador QUANTON. Well, with a perspective of just over 1 week on the job, I am not sure I know, in detail, everything that they have done in the past. But, for example, one of the actions which the staff

will be working on very intensively in the period immediately ahead are the means which the U.S. Government should take to implement the Bonn declaration which the President joined with other heads of state in making the day before yesterday; what diplomatic means and what multilateral means might be used to implement that declaration.

More recently, for example, since I have been in the job, when there was a seizure by two terrorists of the Chilean Consulate in San Juan, the Office for Combating Terrorism was directly involved in coordinating with the Justice Department, which had primary responsibility because this was a domestic terrorist issue but with foreign policy implications, because it was a foreign consulate which was seized, to try and work out the most expeditious way of liberating the hostages and resolving the incident. As you know, this incident was resolved very quickly, within a period of some 18 hours.

In the past, the Office has taken charge of the management of aircraft hijackings. In the State Department's operations center, a task force is set up, chaired by the Director, bringing together representatives of other parts of the State Department; getting together representatives of the intelligence community, as appropriate; representatives of the Department of Transportation, and so forth.

We are the staff body, both for the interagency committee structure, and the staff body for managing the crisis situations as they arise.

Mr. ANDERSON. I notice the membership of the key departments: State, Justice, Treasury, Energy, CIA, Defense, and Joint Chiefs. I would have thought because of Transportation's deep involvement in this that they would be in there. Why is not the DOT involved in the NCS Special Coordination Committee, the one at the top?

Ambassador QUANTON. That is, indeed, an omission, sir; they are active members, when subjects of concern to them are under review.

Mr. ANDERSON. I get down to the executive committee which is just below that and, again, the Department of Transportation is not listed there, either. I see that Transportation is listed in the interagency working group on terrorism, the lower group.

In other words, it should have been listed in both the special coordination committee, as well as the executive committee?

Ambassador QUANTON. Yes, sir. There has not yet been, since I have been on the job, a meeting of the special coordination committee, whereas the executive committee has met and I have seen the active participation of the Department of Transportation in that body.

Mr. ANDERSON. Does the senior level interagency executive committee referred to in your testimony meet on a regular basis, and if so, how often?

Ambassador QUANTON. It does, indeed, meet on a regular basis. Since I have been the Director of the Office for Combating Terrorism, we have had one meeting; we have another meeting this afternoon. We will be meeting again next week. We do not have a timetable which says we will meet the first Monday of every month, but I think it is understood by members of the executive committee, all of whom are senior officials, that we will meet at least once a month, and more often, as at the present time, when there are serious issues which we should consider on an interagency basis. The same would be true of the interagency working group.

Mr. ANDERSON. You indicate that the interagency task force would convene in the event of a major terrorist act. Would this be the case in the event of an act on U.S. soil by foreign terrorist groups?

Ambassador QUANTON. Jurisdiction for managing the U.S. response to terrorist acts varies, depending on the nature of the act. An act which takes place outside the United States would be managed by the Department of State in the State Department operations center in the first instance.

Terrorists acts which take place in the United States would be managed in the first instance by the Department of Justice, which is the vice chairman of the committee structure. In the case of hijackings, where the Federal Aviation Administration has principal responsibility—in the case of domestic hijackings, they have the principal lead, and would take on the coordination of a hijacking in this country.

If the hijacking took place outside the United States, the responsibility would be with the State Department, working in close coordination with the Department of Transportation.

Mr. ANDERSON. Does this overlapping jurisdiction cause any problems or any confusion?

Ambassador QUANTON. Up to the present time, it has not. We are looking very carefully in the interagency committee structures to make sure that the lines of command are clearly understood; that the responsibility of particular agencies are clear; and that when a particular incident takes place, we are not groping for the appropriate structure with which to deal with it.

The three basic cases which I described for you have the agreement of all the members of the executive committee, but we are trying to refine our crisis management capability so that there are no ambiguities and there are no questions about who is responsible for the primary management of any particular incident. To date, we have not had any major problems.

Mr. ANDERSON. Can you tell us in some detail what was agreed to at the Bonn summit meeting earlier this week with reference to terrorism?

Ambassador QUANTON. Well, as you have seen in the public statements, it was agreed by the seven heads of state who were at Bonn that sanctions, the cutting off of air services to and from a country which harbors hijackers or fails to punish them or fails to return the hijacked aircraft, would be imposed.

The provisions of the Hague Convention—this announcement is basically consistent with the Hague Convention, which is an international convention obliging party states to either try, or extradite hijackers and return the aircraft. What it adds is the provision making possible a sanction in terms of cutting off of air services.

This is consistent with existing U.S. legislation which already has given the U.S. Government the authority to do so. However, we have not in the past had the kind of international consensus for these sanctions which we now appear to have as an outgrowth of the Bonn summit.

We are extremely pleased that a number of our very closest friends have joined with us in agreeing to take these important steps to punish those states which refuse to take action.

Mr. CLAUSEN. Will the gentleman yield?

Mr. ANDERSON. Yes.

Mr. CLAUSEN. Along those lines and in light of the so-called hijacking agreement that was reached in Bonn, do you feel that this legislation is still necessary and, if so, why, and if not, why not?

Ambassador QUANTON. This legislation, as I have read it, deals with a wider range of subjects than aircraft hijacking, and even in the area of hijacking, provides for a range of other sanctions which we would want to consider in the case of a country which conspicuously supports international terrorism, be that hijacking or other terrorist acts.

So we feel that the legislation does much more and there are many other elements besides the hijacking one which we welcome as a part of our whole structure of combating terrorism.

Mr. CLAUSEN. So you would encourage the committee to go forward with this legislation as a supplement to the Bonn summit?

Ambassador QUANTON. I would, indeed, sir.

Mr. ANDERSON. You indicate that the United States is active in pushing for new accessions in the Montreal Convention against aircraft sabotage. Since this country has ratified but not implemented that convention, does that pose problems for you in your efforts to persuade other nations to sign and implement the convention?

Ambassador QUANTON. We have dealt with this question of other countries acceding to it on its merits. I can speak from my own experience most recently overseas in which I was asked, as were all ambassadors, to take up this issue on an urgent basis with the countries to which they were accredited.

Our position with other governments is that these are conventions which deserve, on their merits, to be signed or adhered to, ratified, and implemented. My own experience has not been that many countries have waived a finger at us for not having implemented the convention, although obviously we have an obligation to implement the conventions to which we are a party.

Mr. ANDERSON. You refer to the murder of Aldo Moro as a terrorist act. Was that murder within the definition of international terrorism contained in H.R. 13261?

Ambassador QUANTON. The murder of Aldo Moro and the whole range of killings, shootings, and bombings which have been carried out by the Red Brigades in Italy are terrorist acts. The question of whether they are international terrorist acts is a very complex one and depends on the degree to which it is possible to demonstrate ties between these terrorists and outside governments or entities. There is very little evidence on this point.

Strictly speaking, the Aldo Moro terrorist killings do not fall within the broad definitions which are proposed in this act.

Mr. ANDERSON. In the case of Aldo Moro, if it is determined that the terrorists were Italians in Italy, then this act would not apply. But if it were determined that the terrorists were terrorists from someplace else, then it would apply.

Ambassador QUANTON. That is my understanding.

Mr. ANDERSON. In your testimony, you did not refer to two sections contained in the Senate bill and the House bill; namely, the concurrent resolution section and the so-called Federal Capabilities Report.

Could you give us your views on those two sections?

Ambassador QUANTON. I would be pleased to. The concurrent resolution provision of the Senate bill has been one which, for both practical and constitutional reasons, has given the administration great difficulties. In practical terms, it would inhibit our ability, when the President determined that a country no longer was engaging in a pattern of support for terrorism, to remove a sanction or to modify our sanction actions which we might have taken when such a country was listed as having been engaged in a consistent pattern. There are more serious constitutional questions about the President's authority which I believe the Justice Department is prepared to address in its testimony.

With regard to the capabilities report, we see some merit in a report which would describe the capabilities of the U.S. Government, but we also see the risk that such a report would, depending on the detail with which our capabilities were set out, provide to potential terrorists, and others, excessive information about our own planning, about our own capabilities, and about the way in which we would react to potential or actual terrorist incidents. We find that of some concern in the general sense.

Mr. ANDERSON. I know we have a recorded quorum; I think perhaps we had better go over and answer and rollcall and come back.

So at this time, we will stand in recess for about 15 minutes.

[Whereupon, a brief recess was taken.]

Mr. ANDERSON. The subcommittee will come to order.

Mr. Ambassador, this bill requires the President to impose four specific economic sanctions against states he lists as supporting international terrorism. Does authority presently exist for discretionary, as opposed to mandatory, imposition of those specific sanctions; how, technically, are they imposed?

Ambassador QUANTON. It is my understanding, Mr. Chairman, that with respect to the various sanctions which are in your bill, whether they relate to military assistance or goods which may have a potential military use, for example, the executive branch does have the authority to make a determination, cutting these off to countries which show a pattern of support of terrorism.

As perhaps you know, we have, without having made a determination of a pattern of support, taken a number of these steps with regard to certain countries in the Middle East where we have been concerned about their policies vis-a-vis their neighbors or vis-a-vis the whole question of terrorism.

So, yes, I think the answer is we could, indeed, use, and have in the past, on occasion, used some of these specific sanctions.

Mr. ANDERSON. Which states today would be placed on the list of states supporting international terrorism?

Ambassador QUANTON. That is an extremely difficult question to answer for a number of reasons. There are, and I think we are all aware of them, a number of states who, in the past and presumably today, provide financial support, provide logistical support, and provide training to various terrorist groups; not only the Palestinian terrorists, but the Japanese Red Army, the Basque terrorists, and a whole range of groups.

Many of these states are in the Middle East, but the support for individual terrorist groups goes far beyond this. I am not at this point in a position to give you a list of countries which would meet all the requirements in the legislation, not knowing what the final form of the legislation will be.

In the past, we have drawn attention to the support which countries such as Libya, Iraq, and South Yemen have given to terrorism. These countries are very much aware of our concerns about their past support, but whether they would be listed after the act came into force would depend on their performance and on whether their performance had changed; a decision would be taken in light of the circumstances which existed 6 months after the enactment of the act, as to whether or not they were engaged in a pattern of support.

At this point, I cannot tell you what countries specifically would be listed.

Mr. ANDERSON. Now, in the instance, say, of the three countries—Iraq, Libya, and South Yemen—what would be the effect of the four enumerated sanctions against these states, because we do very little trading, if any.

Ambassador QUAINTON. That is correct. We do not have any arms relationship with them, for example—with any of them. My understanding is that because Iraq and Libya are members of OPEC, they would not be subject to generalized preferences, your fourth sanction.

What could conceivably apply is the question of nonmilitary items which are of potential military use. In the past, we have denied, in the case of Libya at least, licenses for certain nonmilitary items which we judged would be intended for military use. So that sanction certainly could be applicable, depending on the circumstances at any given moment, depending on their requests and demands to us.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. Mr. Ambassador, let me pursue that subject of sanctions just a little further. This bill requires that the President impose certain sanctions if he determines that a state “demonstrates a pattern of support for acts of international terrorism,” which we have been over in this colloquy.

The bill also requires that the President may not impose sanctions if required by interests of national security. Should the Presidential authority to suspend the imposition of sanctions on the basis of national security, do you feel, be broader in the language of this bill?

Ambassador QUAINTON. I think that we would welcome the maximum ability to choose the criteria under which a sanction would be imposed on a state supporting terrorism. National security is obviously one element which we would have to take into account in considering whether or not, if we had that option—if the sanctions were not automatic to impose sanctions, or even if they were automatic. In determining to seek a waiver, national security would clearly be an important consideration.

But, equally, our economic interests might be important; we might want to consider them. We might want to consider, indeed, the likely impact of the steps we were going to take. It might be possible to summarize all our interests as national security interests in some sense, but I think they are normally understood in a somewhat more restric-

tive sense. There are other important interests which we may have in our relations with another country which we would want to take into account in making any determination on which sanction or how many sanctions to impose.

Under the present bill, of course, national security is the criteria which the President must use in deciding to waive a sanction.

Mr. HAMMERSCHMIDT. Mr. Ambassador, I notice in your statement you say:

We welcome the principal elements in this bill: the definition of terrorism and the description of appropriate measures.

And then you further state:

In the spirit of cooperation, the Department has indicated its support for the broad objectives of this bill.

I am sure that we do not want to do anything legislatively to tie the hands of the executive branch's effectiveness toward the goal that we are seeking to do here, and that is why I asked that past question. I know the committee would want to counsel with you to make sure that the language is not too restrictive.

Would you agree with the statement that airport security in most of the world is ineffective?

Ambassador QUANTON. My knowledge of airports around the world is not sufficiently large to make that judgment. Certainly, we know that many, many countries, particularly those in Europe that are friends and allies, have taken major steps to tighten up their security; the West Germans are a splendid example of this.

If you get further afield into some of the smaller countries of the Third World, I think there is no doubt that you could find inadequate airport security practices. An ongoing problem in my personal experience, is that where airport security is very good today, it may be very bad tomorrow, because of lack of personnel or some particular reason, and these things change very much from day to day.

But to characterize, worldwide, airport security as poor, would not be accurate, given the fact that the number of hijackings has declined and it has declined in significant part because of the enhanced measures which have been taken at airports to detect weapons of potential hijackers.

Mr. HAMMERSCHMIDT. Well, Mr. Ambassador, if you do not have that knowledge now, under the terms of the bill you would have to acquire it to implement it, as I see it. The bill requires that the names of unsafe foreign airports be posted in U.S. airports, as well as published in the Federal Register, if corrective measures are not taken within a certain time by the foreign airport.

Ambassador QUANTON. That is correct.

Mr. HAMMERSCHMIDT. Let me ask you further, does this requirement not make the terrorist's job easier in selecting a target for hijacking?

Ambassador QUANTON. Great care would obviously have to be taken in posting the names of unsafe airports, particularly that such posting not describe the areas in which an airport is unsafe; that is, we would not want to pinpoint the deficiency to make it possible for a potential terrorist to use that deficiency to his own advantage.

Nonetheless, the sanction which the posting represents would, in our view, help us to get tighter airport security in those airports which are deficient. So a balance has to be struck between our desire not to give away the game to the terrorists, but also our desire to use means which would persuade countries to change their policies in the broad area of terrorism or in the specific area of airport security.

Mr. HAMMERSCHMIDT. As you see it from your vantage point in the State Department, would not the posting requirement have an adverse effect on certain bilateral relations? Would that create a problem?

Ambassador QUAINTON. Yes, it could. It would again depend on the state of our relations with that country at a given time. It would depend on the range of other measures which we might be taking to deal with proterrorist sentiment in that country.

Mr. HAMMERSCHMIDT. Would a U.S. citizen who was injured by a terrorist act at a posted airport be precluded from recovering in an action for damages, because he would be considered to have assumed the risk? I realize you may not be able to supply that answer right off-hand, because it is a highly complex legal answer.

Ambassador QUAINTON. I do not know the answer, sir. I would endeavor to find it out.

Mr. HAMMERSCHMIDT. Would you please supply that for the record?

Ambassador QUAINTON. Surely.

[The following response was received:]

The Department of Justice, which also testified before the subcommittee, will provide this response since it is a matter of civil law.

Mr. HAMMERSCHMIDT. The bill requires the President to submit detailed reports on all acts of international terrorism. Do you think this is a reasonable requirement?

Ambassador QUAINTON. Again, the question is how wide does the Congress wish the definition of acts to be? I think there is no question that it would be extremely important to report in full on all acts which involve American citizens and on all major acts of international terrorism, such as hijacking, such as the seizure of buildings for hostage purposes, or trains, or whatever it may be.

If it is a question of reporting in detail on every bombing incident, for example, which may involve the emplacement of a single detonating device outside a building, there are literally hundreds of such terrorist incidents taking place by known terrorist groups around the world. To report all of these would impose a very heavy burden on the administration in its reporting requirements.

I think it is important that we focus on those incidents which are of general interest and specific interest to the United States. But we will, of course, report on what ever range of incidents the Congress needs, there is no question about that. We welcome a dialog on that issue with you.

Mr. HAMMERSCHMIDT. This language is rather explicit. It says that "Six months after the date of enactment of this act, and every 6 months thereafter, the President shall transmit to the Congress a report on those incidents he determines to be acts of international terrorism." Then it goes on to say, "except those involving U.S. citizens, he must report in 30 days." So it is in that area where we wonder if it is going to create problems for the executive branch.

Ambassador QUANTON. It will create some problems, and I think it might be well in certain very limited kinds of terrorist acts, such as bombings, which I mentioned, to consider a statistical report to supplement the detailed reporting on larger incidents.

Mr. HAMMERSCHMIDT. Mr. Ambassador, thank you very much.

Mr. ANDERSON. Mr. Levitas.

Mr. LEVITAS. Thank you, Mr. Chairman.

Mr. Quanton, one of my concerns about this legislation is I do not think it is tough enough and I do not think it can make that much of a contribution, but it may be better than nothing.

Since we do not have direct relations with some of the nations that have been involved and provided haven to terrorists, are there means for considering indirect pressures by saying that we will sever relations or transport relations with these nations which we do have relations with that continue to trade or provide transportation or services to those countries we do not have relations with?

Ambassador QUANTON. This is some kind of secondary effect on other countries with whom we have—

Mr. LEVITAS. Yes.

Ambassador QUANTON. This poses enormous problems, as we have discovered in the past in a whole range of issues, not the least of which are the aircraft hijacking ones and the provisions of the 1974 anti-hijacking act in this country.

It is obviously in our power in certain cases to take steps against other countries who themselves aid countries who aid terrorists. But as in the case of the direct sanctions procedures which the bill proposes, it seems to us to be extremely important that in making a determination to impose sanctions we take into account the overall state of our national interests and of relations with that particular country, which is not to preclude it.

Mr. LEVITAS. It seems to me that the provisions of section 1114 of the antihijacking act already provide a basis for secondary action, and I am simply suggesting that perhaps that approach needs to be carried over into this legislation.

Ambassador QUANTON. That does indeed exist, as you rightly observe. It is part of the Bonn declaration which the President made. The declaration is entirely consistent with existing U.S. legislation. We are perhaps one of the very few countries that will not have to take legislative action to implement the Bonn declaration.

We attach great importance to the creation of a consensus, so that when we take action, if we do, we be joined in that action by other major powers in the aircraft field. That I think is extremely important. In that respect, the Bonn declaration moves us down the road toward an international consensus to use the sanctions which we already have the power to use. It is an important step forward in our whole multi-lateral effort to deal with hijacking.

Mr. LEVITAS. Do we have in our Government the capacity, the capability or the resources similar to those possessed by the West Germans and the Israelis to send commando groups in to rescue American citizens who have been held hostage?

Ambassador QUANTON. Yes, we do. We have created in recent months a military capability which could be used to rescue hostages

in cases of necessity. Obviously, the use of such a unit would have to be very carefully considered; it would require the very highest levels of our Government to make that determination because of the implications it might have, not only for the safety of those being rescued, but for the relations with the country in which the hostages might be found. But we have, indeed, taken steps to assure ourselves that we have the capability, if necessary, to mount a rescue operation.

Mr. LEVITAS. Thank you. Thank you, Mr. Chairman.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. Mr. Ambassador, the bill, as I understand it, says that a State demonstrating a pattern of support for international terrorism shall be placed on the list of States supporting terrorism.

How do you determine what constitutes this pattern of support for international terrorism?

Ambassador QUAINTON. In making a determination about a pattern of support, we would review all the information which is available to the U.S. Government from all sources, public and confidential, from our various intelligence resources and from information which may have been made available to us by other friendly governments through the day-to-day diplomatic exchanges which we engage in with them.

Because of the nature of terrorist groups and their very closed structure and the high importance which they place on the secrecy of their acts, the information which we will have may well be fragmentary. It will be the best judgment we can make, based on all the information available about training, about logistical support, about financing, and about diplomatic support. We will see whether, in our judgment and on the information which we have, we can characterize the situation as a pattern of support. But all these elements would go into the decision.

Mr. TAYLOR. Does the United States provide foreign countries with security information and technology?

Ambassador QUAINTON. We do, of course, have an exchange of information on security matters with a number of friendly countries. On the question of technology, in certain limited areas we have exchange programs, again, with our allies. How far that extends, I could not give you an answer here; there are obviously a number of countries involved.

But, yes, we do; where we see a common interest, particularly in this terrorist field. We do, within clearly defined limits, exchange information and technology.

Mr. TAYLOR. Thank you, Mr. Chairman.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. No questions.

Mr. ANDERSON. Mr. Ambassador, I guess that concludes your part of the program. Thank you very, very much.

Ambassador QUAINTON. Thank you, Mr. Chairman.

Mr. ANDERSON. At this time, then, we will have the secretary of the Air Line Pilots Association, Capt. Thomas Ashwood.

We do have your prepared statement, Mr. Ashwood, and it will be made a matter of the record at this point.

[Statement referred to follows:]

STATEMENT OF THOMAS ASHWOOD, SECRETARY, AIR LINE PILOTS ASSOCIATION,
INTERNATIONAL

Mr. Chairman, I am Captain Thomas Ashwood, Secretary of the Air Line Pilots Association (ALPA), which represents 50,000 professional pilots and flight attendants. I am also Chairman of the International Flight Security Committees for both ALPA and the International Federation of Air Line Pilots Associations.

I am grateful for the opportunity to appear before this committee. I am even more grateful that you are considering legislation to combat the growing scourge of international terrorism. Unfortunately, we live in a time when a few warped and dangerous individuals can place the lives of hundreds of innocent persons in jeopardy.

Terrorists are usually willing—sometimes even eager—to sacrifice themselves for whatever cause they subscribe to. They have no concern for their hostages, regarding them only as mere aids in achieving an objective.

The growing supply of sophisticated weapons and explosives available today to terrorists make them even more dangerous. For example, Mr. Chairman, we know there are small surface-to-air missiles available right now to various terrorist groups. We also know of at least two incidents in which terrorists with these missiles have been arrested near airports. It is only a question of time until someone uses such a missile to shoot down an airliner and murder the innocent persons on board.

Even more frightening is the prospect that some of the large amount of nuclear material available will find its way to a terrorist group. Sooner or later, innocent residents of a city will find themselves facing nuclear destruction not from a hostile nation but from a small band of fanatics.

Some may ask, what does terrorism have to do with commercial aviation? The answer is: Quite a lot because airliners and their passengers are one of the most attractive targets for terrorists.

The reasons for this attraction include the following:

Airlines are highly identifiable with their country. Most are government-owned, and even privately-owned airlines such as Pan American and TWA are widely considered to represent their countries.

The place of attack can be selected from a variety of airports considering such factors as security arrangements, closeness to the destination and political stance of the government.

Modern airliners cost up to \$50 million. Where else can something so valuable be taken so easily?

The aircraft are relatively fragile and can be easily disabled or destroyed with a few dollars worth of easily obtainable materials.

There will be as many as 400 passengers of different nationalities on a single flight. They make invaluable hostages.

The hijacked aircraft provides the terrorist with a fast, reliable means of escape to almost any part of the world.

One of the goals of terrorists is publicity. Aircraft hijackings and airport terminal attacks are proven world-wide attention-getters.

Because terrorism today is frequently international, there are some who say the United Nations is the proper body to deal with it. However, the airline pilots of the world have been struggling for more than eight years to find measures to block the terrorism that threatens us and our passengers. Many of our efforts have been in the forums of the U.N., and they have been without success.

We have been forced to conclude that the U.N. has neither the will nor the way to take effective measures against international terrorism. The only practical method, we have decided, is firm action by a few powerful nations.

The legislation you are considering is an example of the kind of action we are talking about. We are pleased and relieved that the Congress is taking action now on the vital issue of international terrorism.

For too many years, Mr. Chairman, airline pilots have been pleading for diplomatic solutions to the problem of international hijackings, and for too many years the United States has been merely talking about it.

Meanwhile, international terrorism continues to grow like a cancer. Because we have an effective security system in this country, we tend to overlook the fact that aircraft hijackings are on the increase. There were 30 throughout the world last year, exactly twice as many as in 1976.

Airline pilots believe legislation is sorely needed to cope with the growing number of hijackings and other incidents of international terrorism. In response to this threat, Mr. Chairman, you and more than 20 other members of Congress, have introduced H.R. 13261, An Act to Combat International Terrorism.

We commend all of you who have taken the initiative in sponsoring this legislation. As drafted, this bill would give the President and the Cabinet a number of tools that can be used effectively and flexibly in dealing with terrorists, countries that aid them and foreign airports that have poor security.

The House bill is similar in many ways to one that Senator Ribicoff has sponsored in the Senate. Three committees have already reported the Senate bill, and we expect it to be passed this year.

Sections 4 and 5 of the House bill, which require the President to identify publicly those countries that support international terrorism and to take action against them, provide an appropriate mixture of firmness and flexibility.

There are only a few countries that, in the language of the bill, "have demonstrated a pattern of support for acts of international terrorism." Libya and Algeria are two that come quickly to mind. But even one country supporting terrorists is too many. We hope that firm action by the U.S. and other countries will cause these outlaw nations to change.

We also believe that the section on improving security at foreign airports will have a major impact on hijackings. Effective screening of passengers before boarding is the most important single action foreign governments could take to cut down on hijackings.

Such screening now takes place only in a few countries, such as the U.S., the United Kingdom and Israel. Security in most of the world is usually non-existent or at best ineffective.

The figures speak for themselves. Of the 25 hijackings involving foreign aircraft last year, the Federal Aviation Administration found that 21 "occurred because of weak passenger screening procedures."

Incidentally, to illustrate the scope of international terrorism, those 25 hijackings took place in 17 different countries, and the hijackers boarded the aircraft at 24 different airports.

The requirement that the Secretary of Transportation display prominently in U.S. airports the names of those foreign airports that have inadequate security will help publicize the lamentable security situation in most of the world.

U.S. airlines are already required to screen passengers boarding at foreign airports. In some instances, our airlines have been increasing their share of passenger traffic because people prefer to fly on the airline with less chance of being hijacked. That has caused some resentment on the part of some foreign governments and airlines.

Mandatory screening of passengers would do away with that competitive edge for U.S. airlines, but it would make flying safer for all of us.

Another move that will make flying safer is the use of explosive taggants. There are two types—identification taggants that tell investigators what kind of explosive was used after the explosion occurred, and detection taggants that enable hidden explosives to be detected before they go off.

Detection taggants will make it much easier for airlines and security officials to fight the growing threat of aircraft sabotage. Our main concern is that legislation require detection taggants. Identification taggants are helpful and should be required also, but they will not aid the victims of an explosion on an aircraft.

Detection taggants are not yet fully developed, and it could be as long as three years before they are in production. On a cautionary note, Mr. Chairman, legislation should not require the use of detection taggants before effective ones that cannot easily be circumvented are developed.

Section 9 of H.R. 13261 provides for the general phase-in of taggants over the next three years. Unlike the Senate legislation, it does not exempt smokeless and black powders used in bullets from the requirement to have taggants.

We much prefer your bill, Mr. Chairman, and we urge you not to exempt these powders. Almost 40 percent of the explosions set off by terrorists involve smokeless or black powder. The main reason smokeless powder is not used more widely is that it is not packed as conveniently as other explosives such as dynamite.

Black powder is not a significant threat, but terrorists could easily switch to using smokeless powder if it is the only common explosive not required to have a detection taggant.

We consider the sections on nations aiding terrorism and airport security to be the heart of any anti-terrorism legislation, and we strongly support them. Regarding other provisions of H.R. 13261, we offer the following comments:

—Section 8, which would extend the current safety and security standards for passenger flights to charter ones, is long overdue. ALPA has repeatedly pressed for the same level of security on all kinds of flights. We are gratified that the Federal Aviation Administration issued a rule last month requiring security screening of charter passengers. This rule goes into effect July 25.

—Sections 10 and 11 are necessary for the U.S. to implement the 1971 Montreal Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, and we therefore support them.

—Section 4 allows the President to remove a nation from the list of countries aiding international terrorism. In the Senate version, removal of a country from the list is permitted only if Congress does not disapprove it. The Justice Department consider this provision to be unconstitutional. We prefer the House version because it removes one more obstacle to passage of this important legislation.

No one disputes the need for effective legislation to combat international terrorism, Mr. Chairman. As I mentioned earlier, the Senate is expected to pass a bill this year.

Frankly, we are far less optimistic about the prospects for H.R. 13261 in the House. This bill has been referred jointly to no less than four committees. This committee is the first to schedule and holding hearings. Joint referral of a bill to four committees discourages action and adds to the time the bill is reported.

But time is slipping away. The 95th Congress will be history in a few months. On behalf of the airline pilots and our passengers, I urge you, Mr. Chairman, and the members of the Aviation Subcommittee to heed our plea and exercise your leadership. We have been terrorist targets too long. Give us a law to help protect us and our passengers.

Thank you, Mr. Chairman, for the opportunity to be heard on this vital legislation. We are ready for your questions.

Mr. ANDERSON. Please proceed.

TESTIMONY OF THOMAS ASHWOOD, SECRETARY, AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

Mr. ASHWOOD. Thank you, Mr. Chairman. You are very kind to include our prepared statement in the record, and if I may, I will just talk about the statement rather than try to read from it.

I am the Secretary of the Air Line Pilots Association. I am also supposedly the so-called specialist for the pilots association here in the United States and also for the international federation throughout the world, and I mention that just to establish my qualifications.

We are very grateful for the opportunity to appear before this committee and to comment on this very important piece of legislation. We are very deeply concerned, and have been for a number of years, over not just the growing threat of hijacking and sabotage and attacks on civil aviation, but the whole subject of terrorism itself. It affects the daily lives of all of us, not just pilots and their passengers, because the growing supply of sophisticated weapons available to terrorists these days makes them even more dangerous.

It allows literally a handful of fanatics to hold an entire nation, even the size of the United States, to ransom by the acquisition of an aircraft full of passengers or a similar type of structure full of innocent hostages.

What is even more frightening, as far as we are concerned, and we are well aware that it has been well publicized, the availability and the ease with which a fairly intelligent physicist can construct a nuclear weapon. We are afraid that it is only a matter of time before such a

thing actually occurs. The thoughts of what that would do are just too horrible to contemplate.

The hijacking syndrome itself is really only a small part of the overall terrorist scene. I would suggest respectfully that that is only the start of the piece of the scenario of a hijacking, because it is just not the act itself; it is the demands made upon governments and industry as a result of the hijacking, and the blackmail that follows it, I think, are even more dangerous.

They can subvert a nation's laws, and if a handful of fanatics can subvert a nation's laws, I think all laws are in jeopardy.

Airlines are highly identifiable with the country of their source, and this concerns us particularly, because U.S. aircraft fly all over the world, and this is why our concern about security at foreign airports is so deep. We are TWA and Pan American aircraft, for instance, flying to just about every major country in the world.

I am afraid I must disagree with the Ambassador who preceded me. I do not believe—and I know from experience, because I am a working line pilot—that the state of the security as applied to most of the airports of the world is good. It is pretty poor, as a matter of fact. With the exception of one or two countries outside of the United States, the level of security is abysmal at best.

Our aircraft fly in and out of those airports, and our passengers, American citizens, fly in and out of those airports, and they are exposed—that is the word—they are "exposed." And Americans make good hostages because of the preeminent position we adopt in world politics.

Also, aircraft cost up to \$50 million; that is a big piece of change to haul within a very fragile piece of equipment that can be destroyed with a few dollars' worth of chemicals.

It is interesting to note that this is an international problem. We are dealing with international terrorism, which is usually the title applied to this subject. We have an international body, which is the United Nations, and people have asked, why is the U.S. Congress concerned with this matter; it is not a parochial matter. It is an international matter.

We have been working with the United Nations, or more accurately attempting to work with the United Nations for the past 8 years. We have come to the inescapable conclusion that they have neither the will nor the means to do anything that is really significant in regards to stopping the menace.

The can condemn it, which they do frequently; they pass resolutions condemning it, but nothing practical ever comes out of that particular body. I am sure you gentlemen have much more experience with that than I do.

The legislation you are considering, therefore, we believe is one of the most effective measures that could be taken against international terrorism. We have long exhorted Congress and the administration that bilateral and multilateral agreements between a few powerful nations—the nations that control the industry of the world, the food of the world, the foreign aid of the world that is issued—they are the people that can actually bring a stop to this particular menace, and I believe it can be stopped. And it can be stopped through diplomatic and

political means, rather than mechanical means, which are just a stop-gap measure, and by that, I refer, of course, to the type of mechanical security you see at airports throughout the United States right now.

We deplore the fact that we have to turn our airports, which are public places, into armed camps. But we have had to do it, and we have had to do it since 1973 when they first started installing this equipment at the airports.

We have always viewed that as being, if you will, a temporary measure, and we hope it is temporary and that the solution will be found politically and industrially.

[Whereupon, Mr. Stump assumed the Chair.]

Mr. ASHWOOD. I also disagree with the fact that the incidence of hijacking is on the wane. If my figures are correct here, and I do believe they are, there were 30 throughout the world last year, which is exactly twice as many as in 1976. So, they are on the increase, and we have every reason to believe that they will continue to increase through this year and into next year in consort with other acts of terrorism, particularly in the European area.

I have heard comments saying that the posting of, if you will, offending nations, if I can use that expression, would be detrimental to a number of things—our diplomatic stance with those countries, and so forth. And, besides, we do not have trade or we do not have technical exchanges with the countries that we are talking about, and let us name them: They are Iraq, South Yemen, Algeria, and Libya. These are the people that are causing and helping to cause all the problems throughout the world in regard to terrorism. But, I would suggest, sir, that nations are very sensitive to international public opinion, and to be posted on a list, like an international outlaw, surely will have some salutary effect upon their thinking, and surely the peoples of those countries are not all bad people and surely they will pressure their own governments. I am sure nobody would like to be listed internationally as being an outlaw, and aiding and abetting people that employ terrorist activities.

Obviously, we heartily endorse the section on improving the security at foreign airports. And if I can address that for a moment, sir, there is a very small pool of expertise throughout the world; the largest pool of expertise lies in the United States. We have a division of the Federal Aviation Administration—Technical Security Division is the title of it, I believe—that probably has the best brains in the world in regard to airport and aircraft security. And I have noticed of late, sir, because of certain budget cuts taking place within the FAA, that they have been cut back with the other Departments, too.

I believe this is a wrong move at the wrong time, because that Department, in our opinion, needs to be expanded, so that the expertise that is available there can be made available to other countries that seek it from us.

Combating terrorism is a relatively new field and, consequently, there are not too many people that are qualified to act on it, to assist, to construct security systems at airports throughout the world. And the FAA has largely been called upon to do this. We seldom find ourselves in a position, as airline pilots, to say anything nice about the FAA, but we certainly make an exception as far as the Department

of Technical Security is concerned, because they have very fine people and they do a very fine job under difficult circumstances.

If we are going to pass legislation calling for increased or better security at foreign airports, I think those foreign countries that agree to do it will turn to us and ask for our assistance. And I think it is necessary that we do have the resources available to comply with that request. It is a lot cheaper than paying for hijackings that might occur there.

[Whereupon, Mr. Anderson resumed the Chair.]

Mr. ASHWOOD. We can show quite clearly, since 1973, that security against hijackings does work. There are 524 airports in the United States, and I think the record of the past 5 or 6 years speaks for itself as to how effective this security can be. Mandatory screening of passengers is a necessity and, as I said, hopefully, a temporary necessity, but it will be with us for some time. And until we do solve the problem politically, I think we are going to have to keep it; how long that will be, of course, is a matter of subjective judgment.

If I can address the part of the bill which addresses itself to the use of explosive taggants. There are two types of taggants, those which tell investigators what kind of explosive was used—that is, after the fact—and the detection taggants which enable hidden explosives to be detected before they go off. I believe that the state of the art and all the indications are that the research and development going on now will enable us within a short period of years to have devices on board our aircraft that would enable the pilot in the cockpit to tell, with a flick of a switch or a push of a button, whether there are explosives on board his aircraft or not. And this process will be rapidly accelerated if this legislation is passed in regard to the taggants on explosives.

Section 9 of H.R. 13261 provides for a general phasein of taggants over the next 3 years. Unlike the Senate legislation, it does not exempt smokeless or black powders, as used in bullets.

We much more prefer your bill, Mr. Chairman, and we urge you not to exempt these powders. Almost 40 percent of the explosions set off by terrorists involve smokeless or black powder. The main reason why smokeless powder is not used more widely is that it is not packaged as conveniently as dynamite, for instance. But we do know that if dynamite is tagged—and, ultimately, all, if this passes, dynamite produced in the United States will be tagged—than the terrorists will just turn to smokeless or black powder, which is almost as effective and certainly just as destructive as far as an aircraft is concerned.

We consider the sections on nations aiding terrorism and airport security to be the heart of any antiterrorist legislation, and we strongly support them.

And If I may make some comments on other provisions of the bill, we offer the following:

Section 8, which would extend the current safety and security standards for passenger flights to charter ones—in the United States, that is—is long overdue, and we have repeatedly pressed for the same level of security for all kinds of flights. We are extremely gratified that the FAA issued a rule last month requiring security screening of charter passengers. I mention this, sir, because although we have accomplished our goals in this regard, it was only through the pressure from Con-

gress that this actually happened, through previous testimony that we have given and previous work by Members of both the Senate and House of Representatives, and we thank you for that.

Sections 10 and 11 are necessary for the United States to implement that 1971 Montreal Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, and we therefore support them, also.

Section 4 allows the President to remove a nation from the list of countries aiding international terrorism. In the Senate version, removal of a country from the list is permitted only if Congress does not disapprove it. Apparently, the Justice Department considers this provision to be unconstitutional. Therefore, we prefer the House version, because it removes one more obstacle to the passage of this legislation.

No one disputes the need for effective legislation to combat international terrorism, Mr. Chairman. As I mentioned earlier, the Senate is expected to pass a bill this year. Frankly, we are less optimistic about the prospects for H.R. 13261 in the House. This bill has been referred jointly to no less than four committees. This committee is the first to schedule and hold hearings. Joint referral of a bill to four committees discourages action and adds to the time the bill is reported.

We had some events take place, sir, the day before yesterday in Europe at the summit meeting, with a rather surprising move on behalf of the Japanese, and a very general resolution dealing with international terrorism and how to deal with it in terms of sanctions.

An agreement was reached between seven nations, and we strongly support that, but we are rather surprised that after almost a decade of pressure that it should come about almost as an aside at a summit meeting. The very general, broad-sweeping terms of the resolution, of course—I guess they are talking in principle, and we support those principles.

They mention sanctions, but they do not mention what sanctions; there are no details. We are very fortunate that we have this bill right here available to us now and available to the President right now, which does, in very fine detail, outline what sanctions will be imposed if this law passes.

So rather than being preempted by the events of 2 days ago, I would suggest respectfully that this bill is even more important now than it was 2 days ago, because the move has been made and the agreement has been reached, and the United States is in a position, I believe, of being the first amongst those seven nations to say, "Well, we do have the fine details of what we agreed upon in Europe several weeks ago."

Time is slipping away and the 95th Congress will be history in a few months. So on behalf of the airline pilots and our passengers, sir, I respectfully urge you and members of the Aviation Subcommittee to heed our plea and exercise your leadership.

I am not a diplomat, sir, nor am I a legislator; I am a professional airline pilot. I am a little out of place in these types of proceedings, and it is a little sad that we have to reach this stage to protect our professional careers and the lives of our passengers and crews.

We have been terrorist targets for too long; I personally have been one myself. And we ask you to please give us the law that we need to protect ourselves, our passengers, and our crews.

I thank you, Mr. Chairman, and I stand ready to answer any questions you may have.

Mr. ANDERSON. Thank you, Captain, for an excellent presentation. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. I have no questions, Mr. Chairman, but I want to thank Captain Ashwood for a very helpful statement.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. I have no questions.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. No questions.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Thank you very much, Captain, we appreciate it.

Mr. ASHWOOD. I am sorry; I left you speechless.

Mr. ANDERSON. Our next witness is our very fine and distinguished colleague from California, the Honorable Jim Lloyd.

Jim, we are very happy to have you here.

TESTIMONY OF HON. JIM LLOYD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. LLOYD. Thank you very much, Mr. Chairman and honorable members of the committee. I appreciate the opportunity to be here today, and I also thank you for the opportunity to testify on behalf of the chairman's international terrorism bill.

I am, of course, a cosponsor of this legislation, and a sponsor of my own bill. Of course, my bill differs in a few ways. In particular, it creates a Cabinet level council to combat terrorism. The Council is composed of the Secretaries of State, Defense, Transportation, and the Treasury. Other members are the Attorney General and the U.S. Ambassador to the United Nations, the Director of the CIA, the Director of the FBI, and assistants to the President for domestic affairs and national security affairs.

My bill also suspends all direct and indirect flights from nations aiding terrorists. Among these nations are Libya, Algeria, Syria, and Uganda. This proposal was accepted at a recent Bonn economic summit. The seven nations involved pledged to sever civil air relations with nations giving asylum or, in any other way, harboring aircraft hijackers, or which refuse to return hijacked aircraft or hostages.

I urge the committee to consider adding these provisions to the final form of the bill. At this time, I would like to include a section-by-section analysis of my bill for the record.

[The following was received for the record:]

H.R. 10086 A SUMMARY

TITLE I—REORGANIZATION OF THE EXECUTIVE

- (1) Establishing a council to Combat Terrorism in the Executive Office of the President.
- (2) Council membership is as follows:
 - (a) Secretary of State
 - (b) Secretary of the Treasury
 - (c) Secretary of Defense
 - (d) Secretary of Transportation

- (e) The Attorney General
 - (f) U.S. Ambassador to the United Nations
 - (g) Director of Central Intelligence
 - (h) Assistant to the President for Domestic Affairs
 - (i) Director of the Federal Bureau of Investigation
 - (j) Assistant to the President for National Security Affairs,
- or their delegates.
- (3) The Council shall report to Congress the identity of individuals involved in terrorist activities and a description of their activities. The report shall include a list of nations abetting such individuals or groups. The list shall be known as List of Countries Aiding Terrorist Enterprises (LOCATE). Congress shall have the power to review and change the LOCATE list.
- (4) All direct and indirect flights from LOCATE countries shall be suspended.
- (5) Sale or transfer of items on the U.S. Munitions List shall be suspended to LOCATE countries.
- (6) Export or transfer of nuclear material, technology and equipment shall be prohibited to LOCATE countries.
- (7) Further economic sanctions may be imposed.
- (8) Airports not meeting minimum U.S. safety standards shall be identified. Economic sanctions may be imposed on countries where these airports are located.

TITLE II—POLICY ON INTERNATIONAL AGREEMENTS

- (1) Compliance with the following international agreements is declared a priority:
- (a) Convention for the Suppression of Unlawful Seizure of Aircraft.
 - (b) Convention for the Suppression of Unlawful Acts Against the Safety of Civilian Aviation.
 - (c) Convention on the Prevention and Punishment of Crimes Against Internationally Protected Persons.
- (2) Strengthening nuclear non-proliferation efforts are also declared a priority.
- (3) All explosives shall be placed on the U.S. Munitions List.

TITLE III—EXTENSION OF SAFETY AND SECURITY MEASURES

- (1) Existing safety and security requirements are extended to charter and commuter air services.
- (2) Explosive taggants are mandatory on all items shipped into and within the U.S.

TITLE IV—AIRCRAFT SABOTAGE AND PIRACY

- (1) Violations of the Convention for the Suppression of Unlawful Acts Against the Safety of Civilian Aviation shall be \$10,000 and not more than 20 years.
- (2) Threats against an air facility or false information given in relation to a threat or actual terrorist activity shall be punishable by no more than five years and from up to \$1,000 and \$5,000 in fines.

Mr. LLOYD. Terrorist actions are increasing and growing in scope, and this is not an isolated phenomenon in Europe and the Mideast. We are facing proliferation of terrorist activities which are likely to reach the United States. Air terrorism is already strongly rooted here.

There have been 1,800 major incidences of terrorism in this decade; 512 persons were killed; 551 were injured, and 363 were kidnapped. Aviation is the most seriously hit. Let me deviate just a moment by pointing out, gentlemen, that interestingly enough, some of the heaviest users of commercial aviation today are ourselves; we are the people who ride those airplanes. Of course, the risk factor goes up a great deal for us.

Just under 500 skyjacking attempts were made over the last 10 years, with over 1,000 fatalities. Every month for the past 2 years, there have been 120 bomb threats in airports. The total for all bomb threats must be staggering. The shocking thing about these figures is the success

rate for the terrorist activities. Less than half of all skyjackers have been convicted.

Some of these terrorists are living with state support in certain nations, and others are training in host countries. We should identify these countries and apply diplomatic and economic pressures—better yet, I would change the word to “sanctions”—upon them. It is time we do something about the antiterrorism bill.

I want to say that I think this is an excellent place to start, and I think the chairman is certainly embarked in the right direction and I commend him for this action.

Mr. ANDERSON. Thank you very much, Jim, for an excellent presentation, and we commend you for coming here and helping us along a little bit.

Mr. HAMMERSCHMIDT. Well, I have no questions, but I am certainly appreciative of our colleague coming before us with this informative statement and with his other suggestions, which I am sure the committee will take a close look at.

Jim, thank you very much.

Mr. LLOYD. Thank you, Mr. Hammerschmidt.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. Mr. Chairman, I have no questions. I would just like to thank the gentleman for his excellent testimony.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. No questions, except to thank Jim for being here and for this very impressive testimony. We certainly appreciate your intense interest in this very important matter.

Mr. LLOYD. Thank you.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Jim, thank you very, very much.

Mr. LLOYD. Thank you, Mr. Chairman, for the opportunity to be here with you this morning.

Mr. ANDERSON. We are very happy to have our colleague from New York, the Honorable Ben Gilman. Ben, we have your prepared statement here, and it will be made a matter of the record. You can read it, extemporize it; the floor is yours.

TESTIMONY OF HON. BENJAMIN A. GILMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW YORK

Mr. GILMAN. Thank you, Mr. Chairman, and distinguished members of the committee. It is a privilege to be able to appear before the Public Works Aviation Subcommittee and to join you in these important proceedings. You are certainly to be commended for your effort to focus attention on the problems of international terrorism and for seeking possible legislative remedies to these very critical problems.

The sad fact is that living with terrorism has become a way of life for many millions of people around the globe. The pattern of terrorism continues to grow and to spread throughout the world. As co-operation between terrorists and terrorist organizations increases, so do the bombings, the kidnappings, the assassinations and all of the hijackings.

These acts of terror have become a popular tool, too popular a tool for all those seeking to impose their will on a world community which is unable or unwilling to defend itself. The most frightening aspect of this trend is its arbitrary nature, where innocent victims are gripped by the consequences of terrorist activities, often being slaughtered for no apparent reason. As indicated by a PLO terrorist leader in 1970: "There can be no geographic boundaries or moral limits to the operation of the people's camp. In today's world, no one is innocent, no one is neutral." And this, certainly, is the thinking of many terrorist leaders.

As a product of this insanity, over the last 10 years, worldwide, there has been nearly 1,000 terrorist incidents resulting in the deaths of over 1,300 people and more than 3,600 wounded. Unfortunately, under current laws and current levels of international cooperation, more than three-fourths of all terrorists escape punishment for their actions while they are almost certain to achieve their aim of gaining widespread publicity for their cause.

The conviction rate for terrorists and the length of actual sentences imposed has been unimpressive. While the FBI has a better than 90 percent capture rate for criminals involved in kidnappings for ransom, a terrorist involved in an international kidnapping has about an 80 percent chance of escaping capture or death. Sadly, the average sentence for those who are caught and brought to trial has been only 18 months.

At a time when the threats of terrorism are at an all time high, our current domestic and international efforts fall way short of the tasks before them. Earlier this year, FBI Director William Webster, testifying before the Congress, stated that the Bureau's presently strained resources are not adequate enough to cope with a major terrorist campaign. In fact, he warned that the proposed budget cuts this year would threaten already existing investigations of terrorist incidents.

The people of this Nation, through their Government, must respond to this attack on the civilized world. We must join together in seeking to mobilize the necessary forces in this and other nations which would be equal to the task of combating the bands of terrorist fanatics and the conditions from which they spring. We must seek to deny a safe haven to terrorists and to establish sanctions against states which aid them, harbor them, or fail to prosecute or extradite them.

We must impress upon each other the collective threat posed by terrorism. As history has shown, terrorism begets other acts of terrorism and violence. Our response can only be to create a dedicated, aggressive, coordinated, multinational effort to apprehend and punish terrorists wherever and whenever they strike. We must meet this challenge. As pointed out by the Washington Post in its March 17, 1978 editorial, and I quote:

The terrorist are pressing the question whether a government actually exists—or, is it only the legal shell of a government, with nothing inside? Is it capable of acting, at last, to preserve itself and public order?

During the past few years in different forums, I have sought to denounce terrorism and to alert those still unmoved to action that terrorist acts feed on each other. A civilized society cannot for long fail to respond to the threats to its very existence which are posed by the

ever-increasing incidents of terror. It is impossible to forget that the hateful creed of the terrorist is that there are no innocents; any individual, regardless of age or sex, regardless of station, is a potential victim.

I have had the privilege in the past and in the present Congress of authorizing and cosponsoring much needed legislation to deal with terrorist-related problems. One such resolution, House concurrent resolution 72, which is currently pending before this committee, deserves your attention. The resolution calls for an international study of the causes of terrorism, urges the President to both take action against nations aiding terrorists, and to seek stronger international sanctions against such countries and strive for conclusion of an effective international convention against terrorism.

In the specific area of air piracy and hijacking which is currently under study by this subcommittee, H.R. 13261 will, as stated by its author, Chairman Anderson, "deal in a comprehensive way with the threat terrorism poses to American both home and abroad." This bill and similar legislation now before you can contribute meaningfully by enabling our Nation to deal more effectively and promptly with terrorism.

As a complement to these vital efforts, we must encourage the world community to fully support the existing international treaties dealing with air piracy and hijacking.

The Tokyo Convention of 1963, The Hague Convention of 1970, and the Montreal Convention of 1971 provide for the classification of air piracy as an international crime and provide for the extradition or prosecution of hijackers. Unfortunately, these conventions have not had unanimous acceptance or adherence.

Recently, however, there have been some encouraging signs of an awakening in the world community to threats posed by terrorist hijackings. On November 3, 1977, the United Nations General Assembly, for the first time, adopted a resolution condemning air piracy and called upon all governments to take steps to tighten security and to agree to prosecute or extradite hijackers. In addition, at this week's Bonn Economic Summit Conference, the seven heads of state reached an important agreement on air piracy and terrorism that includes a call for suspension of air flights to and from those countries that provide assistance to hijackers.

I urge the members of this subcommittee to seize this opportunity to strengthen these efforts through the passage of the legislation pending before it, thereby strengthening our Nation's hand in combating terrorism. The terrorist challenge to the civilized world was summarized recently in a Washington Post editorial of May 16, 1978, stating:

The breakdown of law enforcement tends, unfortunately, to be circular. One successful crime incites other people with guns to try the same thing. Demoralization among the police spreads. To reverse the deterioration requires vigorous political intervention by the national leadership.

This subcommittee is playing an important role in providing the needed leadership to combat terrorism. Now, the United States as a nation should take the lead to enlist all nations and peoples that are outraged by the brazen attacks, assassinations, threats, the taking of

innocent hostages and other vile forms in which international terrorism manifests itself.

Thank you, Mr. Chairman.

Mr. ANDERSON. Thank you very much, Congressman Gilman, for an excellent presentation. We do appreciate your support very much.

Do the bills being considered go far enough, in your opinion, to effectively deal with international terrorism, and if not, what else could we be doing?

Mr. GILMAN. Well, I think, certainly, your bill strikes home at the piracy provisions and gives some teeth to the law where it was missing before. I would like to see us do more in the international community to make certain that there will be extradition, to make certain that we provide some penalties for those nations that do not observe the need to extradite and to punish air pirates and those involved in terroristic activities beyond their boundaries.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. Ben, I want to thank you for a very helpful statement. It is thought provoking and one that will certainly help the deliberations of our committee. Thank you very much.

Mr. GILMAN. I thank the gentleman for his kind words.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. I have no questions, Mr. Chairman.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. I would just like to add my appreciation to our colleague for being here. I know of his long interest in this very serious matter of international terrorism and the work that he has done, and we certainly appreciate it and appreciate your testimony before our committee.

Mr. GILMAN. I thank the gentleman for his support for this legislation and for the interest of the entire committee in what I consider to be a very critical issue. Thank you again, Mr. Chairman.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Again, thank you, Congressman Gilman, for an excellent presentation.

At this time, we will recess. Tomorrow, we take up again at 10, and we have a rather full schedule tomorrow. We will look forward to seeing you here. Thank you very much.

[Whereupon, the hearing was recessed at 11:58 a.m., to reconvene Thursday, July 20, 1978, at 10 a.m.]

INTERNATIONAL TERRORISM

THURSDAY, JULY 20, 1978

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
OF THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:10 a.m., in room 2167, Rayburn House Office Building, Hon. Glenn M. Anderson (chairman of the subcommittee) presiding.

Mr. ANDERSON. The meeting of the subcommittee will come to order.

This morning, we are very privileged to have as witnesses two of our colleagues from over in the Senate, Senator Ribicoff and Senator Javits.

TESTIMONY OF SENATOR ABRAHAM RIBICOFF, OF CONNECTICUT AND SENATOR JACOB K. JAVITS, OF NEW YORK

Senator RIBICOFF. I ask unanimous consent that the full statement go in the record. I will make some brief comments from the prepared statement.

[Statement referred to follows:]

JOINT STATEMENT OF SENATOR ABE RIBICOFF OF CONNECTICUT, AND SENATOR JACOB JAVITS OF NEW YORK

Mr. Chairman and members of the Subcommittee. It is with appreciation that we appear before this Subcommittee today. The matter before us—combatting international terrorism—is of grave importance. On behalf of the 34 Senate cosponsors of an Act to Combat International Terrorism (S. 2236) we appreciate the opportunity to present testimony on a bill which will enhance this nation's capabilities in combatting terrorism.

In light of the extensive hearings which you have planned on H.R. 13261 and in light of our Committee responsibilities, we shall make our statement brief. We wish to submit for the Subcommittee's record, as an addendum to our statement, the Senate Governmental Affairs Committee Hearing Record and the Committee Report on S. 2236. As you will note, the Committee's record with respect to S. 2236 is exhaustive. We hope the material will be useful in your examination of the companion measure H.R. 13261.

We are pleased to note that many of the provisions of H.R. 13261 are similar to S. 2236 as reported by the Governmental Affairs, Foreign Relations, and Commerce Committees. We would like to highlight the provisions of this measure which are essential to strengthening United States leadership in the world community in fighting international terrorism.

The first provision concerns the improvement of foreign airport security. This section requires the Secretary of Transportation to determine the extent to which major foreign airports effectively maintain and administer security measures. It provides for certain procedures to be followed in the event that an airport authority would refuse to correct any deficiencies—procedures which would result

in the suspension of service to and from the United States. The procedures as set forth by this section of the bill are reasonable. These procedures encourage consultation between the United States and the foreign government in the event of deficiencies. They provide for a reasonable time period for the correction of any deficiencies. This provision will serve to increase the safety of the world's traveling passengers by bringing new pressures on foreign airport authorities to update and continuously monitor airport security procedures.

A second provision critical to the bill is the section concerning presidential authority to combat international terrorism. Section 5 of H.R. 13261 is identical to Section 6 of S. 2236. This provision requires automatic, unilateral sanctions to be used against countries which demonstrate a pattern of support for international terrorism. Such countries would be placed on a list according to other provisions of the bill. In order to provide for flexibility, this section is not mandatory. The bill provides for a waiver of these sanctions if the President finds that the interests of national security so dictate.

If the President finds such a waiver is necessary, he must submit his reasons to the Congress, and the prohibitions set forth in the bill would no longer apply. We believe very strongly that automatic sanctions are critical to the success of this measure and that adequate flexibility has been provided in their application. The Administration has insisted that the application of these sanctions be discretionary and therefore they actively oppose this section of the bill. Before the Senate Committees they sought an amendment which would require the President simply to consider the imposition of economic and trade sanctions against any country found to have demonstrated a pattern of support for international terrorism. Even existing law requires the automatic application of sanctions against nations found to aid and abet terrorism, unless the President determines that national security interests dictate the need for a waiver. The Administration position on this section of this bill would seriously weaken the measure now before you and existing law. Giving the Administration total discretion in the application of sanctions against such outlaw countries has not been effective in the past—the provisions in the existing law have never been used. It is time to bite the bullet and to put the United States on record. The Foreign Relations Committee unanimously accepted an amendment by Senator Javits to clarify and underline the necessity of automatic sanctions.

A third provision of the bill which is critical to its success as a measure to combat terrorism is the section concerning explosive taggants. We believe that the Federal system for regulating the production, distribution and use of explosives is totally inadequate. The widespread criminal and terrorist misuse of explosives occurs frequently as a result of thefts. The program provided for in this measure—a comprehensive identification and detection taggant program—is important in our battle against terrorism. The Governmental Affairs Committee considered the exclusion of black and smokeless powder and amended the bill to accommodate the concerns of the manufacturers and users of these products. An amendment to delete black and smokeless powders from this section of international terrorism was deleted because of the statistics showing the deadly effect of bombs using these explosives. We hope that the Subcommittee will retain these provisions.

Other provisions of the bill are important and we would like to state our position briefly on these. The definitions of international terrorism are carefully drawn so as to include within the provisions of this bill the most outrageous and direct actions. In this regard the Foreign Relations Committee Report draws an important distinction between terrorism *per se* and acts of violence which occur in on-going hostilities.

The Report on Acts of International Terrorism will serve as an important tool in keeping the Congress informed as to the extent and nature of activities which in the past have frequently never been known to the Congress or the public at large. The List of States Supporting International Terrorism will itself serve to brand as outlaws among nations those countries which support terrorism. The implementation of the Montreal Convention is important to multilateral efforts in combatting terrorism.

Mr. CHAIRMAN. The bill before you is a carefully drafted measure which, as a whole, will advance the United States position as a world leader in combatting terrorism. In the past few months, indeed, in the past few days, other nations and multilateral gatherings have taken bold steps to combat terrorism. The Inter-Parliamentary Union has denounced terrorism. The Soviet Union, according to recent press reports, is taking a new strong stand in cooperating with other

nations in combatting terrorism. Nations participating in the Bonn Economic Summit Conference have made an unprecedented agreement regarding the suspension of airline service to and from nations which harbor terrorists. This is a very important and constructive initiative. We must act now.

The measure before you is a timely, reasonable bill which should be enacted expeditiously. We urge you and your colleagues to work together to bring this measure to the early attention of the full House. It is critical that the United States act quickly. The momentum is with us.

Thank you for the opportunity to appear before you today.

Mr. ANDERSON. Please proceed.

Senator RIBICOFF. Thank you very much, on behalf of Senator Javits, (chief cosponsor of the Senate legislation) and myself for the courtesy of your committee Mr. Anderson, in inviting us to be with you. You are the primary sponsor of this legislation in the House and we are most appreciative of the leadership you have taken.

We feel that it is especially important that we act during this session. In view of the very welcomed and surprising declaration at Bonn, we are pleased to have you move ahead with this legislation. It is important to have the seven leaders of the countries which are the major carriers to issue a joint declaration against terrorism, as a backdrop to this legislation. Frankly, the declaration was much more than I had hoped for, but most welcomed. It is critical to recognize and encourage the international efforts of combating terrorism.

I know that from our respective experiences, as former Members of the House and Members of the Senate, that there are many obstacles to legislation. The antiterrorism bill is a piece of legislation that has moved through a lot of obstacle courses. So many committees are involved. The Senate is running through its obstacle courses. Thus far the bill has had the unanimous approval of Government Affairs, the Foreign Relations, and the Commerce Committees. It is now in the Intelligence Committee. I talked to Senator Bayh yesterday and he assures me that the Intelligence Committee will report it out soon. I would anticipate that once the Intelligence Committee acts that the leadership in the Senate will schedule this bill for immediate floor action. We do not anticipate any difficulty.

You are the lead committee in the House. You now have to run your obstacle courses through, my understanding is, Judiciary and International Relations. That, of course, presents problems. It would be my hope that on a measure of such national-international significance that we would act quickly and get it to the President's desk before we adjourn in October.

We have some materials—the committee report and the committee's hearing record—which may be of help, and I would ask unanimous consent to submit those documents to this committee for any use that the committee might find helpful in your deliberations.

We are pleased to note that many of the provisions of your bill and ours are practically identical. I am sure that the minor differences which exist could be addressed in conference.

We feel this legislation is absolutely essential to strengthening America's position as a lead country in fighting international terrorism. A major provision of this bill concerns the improvement of foreign airport security. Here, the Secretary of Transportation is required to determine the extent to which major foreign airports provide, maintain, and administer effective security measures.

It is our understanding American security arrangements are the best in the world. We should have a lead role in improving security measures worldwide because of the large volume of American travelers who insist foreign airports also have proper security measures.

The second provision critical to the bill is the section concerning Presidential authority to combat international terrorism. This provision requires automatic unilateral sanctions to be used against countries which demonstrate a pattern of support for international terrorism.

Such countries would be placed on a list according to other provisions in the bill, and in order to provide for flexibility, this section is not mandatory. The bill provides for a waiver of these sanctions if the President finds the interests of national security so dictate.

Other provisions of this bill are important and we would like to state our position briefly on those. The definitions of international terrorism are carefully drawn so as to include within the provisions of this bill the most outrageous and direct actions.

The "Report on Acts of International Terrorism" will serve as an important tool in keeping the Congress informed to the extent and nature of activities which, in the past, have frequently never been known to the Congress or the public at large.

A list of States supporting international terrorism will itself serve to brand as outlaws among nations those countries which support terrorism.

The bill before you, Mr. Chairman, is a carefully drafted measure which, as a whole, will advance the United States position as a world leader in combating terrorism. In the past few months—indeed, in the past few days—other nations and multilateral gatherings have taken bold steps to combat terrorism.

The Inter-Parliamentary Union has denounced terrorism, and very interestingly the Soviet Union, according to recent press reports, is taking a new, strong stand in cooperating with other nations in combating terrorism. Also, as I said at the beginning, the nations participating in the Bonn Economic Summit Conference have made an unprecedented agreement regarding the suspension of airline service to and from nations which harbor terrorists.

In the final analysis, no modern nation can exist without international air traffic. Once you invoke such sanctions against a country that is in the terrorism business, they will find themselves strangled, for air traffic is necessary and essential to their survival as a viable country.

Since we are a lead country, it is up to us to exercise our power, knowingly and deliberately, to invoke sanctions against countries who harbor or train terrorists, and who condone terrorism. If we do it, other countries will follow. A most encouraging factor, as I say, was the meeting at Bonn, where the seven leaders of the major countries of the world agreed to act in concert.

I would hope the Congress will exercise its responsibility in making the United States a world leader. We have done so in our committee, and you have, in your committee. This is not only important for the United States, but it is also important for all humanity.

I thank you, Chairman Anderson, for having these hearings. My colleague, Senator Javits—

Mr. ANDERSON. Senator, pardon the interruption, but we have a vote to respond to over in the House Chamber. We will be back in 10 minutes, and I know that I have some questions and I know that some of the other members do, also.

Senator RIBICOFF. Thank you very much. We will wait, Mr. Anderson.

Mr. ANDERSON. We will be in recess for 10 minutes.

[Whereupon, a brief recess was taken.]

Mr. ANDERSON. The meeting will come to order.

When we recessed, Senator Ribicoff had just completed his statement. Senator Javits, the floor is yours.

Senator JAVITS. Mr. Chairman, the Foreign Relations Committee of the Senate has been over this bill. I am a member of both committees, and we find joint membership very useful in that regard.

Now, the main issue which came up in Foreign Relations which you should know about was the question of the automaticity of these sanctions which the President can impose. And if any of you have the report of our committee, you will find that situation dealt with at page 94.

The four sanctions are: No assistance under the foreign assistance laws; no sale, extension of credit or guarantee respecting defense articles or services—the so-called foreign military sales proposition; no export license for either commodities or technical data with any potential military application; and no duty-free treatment under the Trade Act.

Those are very important, and both Senator Ribicoff and I felt very strongly about automaticity. Of course, the President and his people in the Department felt very strongly about national security, so we compromised in this way, and this is the thing I would like to call to your attention.

We said, "Yes, you may suspend any one of these sanctions, or all of them, on national security grounds, but you must give your reasons in writing, both to the Speaker of the House and the President pro tempore of the Senate."

We felt that that was a very good resolution, because the President has to go public and he has to give his reasons. When you are dealing with terrorism, those reasons would have to be pretty persuasive in order to pass muster in a public way.

The second thing which I think is critical, because I have experienced it myself, as I do a good deal of traveling as a member of Foreign Relations—and, indeed, Senator Ribicoff does, too, as a member of the Finance Committee—is the tightening up of airport security controls.

Just to give you an example of how loose some of this security is, only about 3 months ago I boarded a plane from Dakar to the United States at the Dakar Airport. It was about 2 or 3 in the morning. There was a varied group of all kinds of people from all over the world, maybe 120 or 130; it was a 707 aircraft.

The door opened and we just poured in, period. And if it had not been 2:30 a.m., I think I would have turned on my heel and gone back to my hotel and gone the next day. Now, that is just one airport and one airplane. It gives you a little idea of why we feel so strongly about the fact that the American people must be put on notice.

Now, it is a fact that the State Department might notify me or notify you or Senator Ribicoff if they smelled a rat at some airport. What about the rest of the passengers, Americans and non-Americans? If we know anything, why should we leave them at hazard? And, second, why run the risk of these wide open airports? We weep too late over the fact that a plane is hijacked, people are killed, and that the hijackers are successful.

Often, hijackings have a double negative effect. The success of a hijacking will tend to free other prisoners who have been taken because of a hijacking or other terrorist action. Today, nations will turn loose terrorists, for some flimsy reason to get rid of them, so they do not have another terrorist act in order to free these prisoners and, therefore, have to deal both with the terrorism and with the political problem of turning loose those they have already caught.

These reasons are very persuasive. I give the most enormous credit to Senator Ribicoff for originating this legislation. The moment he mentioned it, I was on it with him. It was an issue I had been working on, just like he had, for many years.

I think it is a splendidly balanced bill which has now run, as I say, the gauntlet of three committees of the Senate—Governmental Affairs, Foreign Relations, and Commerce.

The other matter that I would like to call to the committee's attention is that we have not, by any means, been as vigorous as we should be in the international community. There is an attitude among many of the African and Asian new nations—particularly in Africa which represent over 40 of 154 United Nations members—that wars of national liberation are going to be inhibited in a fight against international terrorism and that they cannot be free. They are all free now; I do not know how they define freedom. Now, they may destroy it by their own action in accepting military dictators like Idi Amin, or whatever else they do, but that is their business.

They are free, as far as their opportunity to control their own destinies is concerned. But they have got some unbelievable idea that there is some other struggle for freedom they are fighting, and that to keep that option in their own hands, they cannot take effective international action to prohibit terrorism.

This notion is going to proliferate, Mr. Chairman, unless we can take the lead. I think that my colleague has emphasized the magnificent achievement at Bonn—probably the most important thing done at the Summit was the antiterrorism declaration. Both Senator Ribicoff and I have so expressed ourselves to the President of the United States.

Unless this really works—and that is why celerity and vigor in passing this legislation is essential—I think you are going to get an incident or a series of incidents that will inflame the world against these less-developed countries that are blocking progress in this field. They have, for years, literally prevented a treaty from being tabled, from getting the necessary signatures in the United Nations in order to deal effectively with terrorism.

Like crime, you are not going to get rid of it entirely, but we can master it if we act together. And this bill which is before you is very, very critical on that score.

Finally, I would like to direct your attention to one other thing. I know that a provision of our bill dealing with taggants—that is, the

means to identify explosives through a telltale indication in the explosive itself which will survive the explosion—runs afoul of all kinds of hangups about weaponry, and the National Rifle Association, and so on.

I hope that we will find the wisdom in our hearts not to yield that item on that ground. It really has absolutely nothing to do with it; it does not lead to gun control or anything remotely approaching that. It is simply an intelligent way of trying to identify terrorists.

There is a point at which we have to stop bending the knee to this craven image that we are all men and that if we want firearms, we are entitled to them. There is some responsibility to society.

I hope very much that completely consistent with any feelings members have about gun control that an effort will be made, at long last, to really unscramble the eggs. We can argue about gun control, and we have for years. There has been some that has been quite inadequate, but that is another issue.

But I hope that we will find, as I say, the wisdom and the strength in our own hearts to at least show a discriminating sense of selectivity in respect of a matter like this. Our committee, I think, is just as motivated as your members, Mr. Anderson, on that subject. We discussed it very thoroughly and finally decided that it was the right way to go.

I cannot tell you how pleased I am that you are taking up this legislation and I hope that you will push it through in the same spirit that the seven heads of government did at Bonn. Thank you very much.

Senator RIBICOFF. I would like to add a few comments, if I could, Mr. Chairman.

I think it is significant that this bill is coming up before your Aviation Subcommittee. I worked very closely with the Air Line Pilots Association's Captain O'Donnell. We ran this by them and worked very carefully with their counsel and staff. The International Air Line Pilots Association has also the enthusiasm, because these are the men on the front line; they have the responsibility for not only their own lives, but those of their passengers.

And I have an example to show how it works if you get tough. About 6 months ago Lufthansa was very unhappy with the inspection methods at the Algerian Airport. They asked to send Lufthansa inspectors to inspect the security arrangements on passengers coming on the planes. The Algerian Government refused this request of Lufthansa. Lufthansa then canceled their airline service to Algeria. Within a matter of days, the Algerian Government turned around and began conducting inspections according to Lufthansa specifications.

When this bill was first introduced, in the statement I mentioned certain countries that I thought had lax airport security. Within 24 hours I was visited by the Ambassadors of these countries who were deeply upset and deeply disturbed.

There was an immediate correction in these countries of their lax boarding procedures. Every country in the world is concerned and is sensitive to international air travel. Because we have the responsibility in this country for about half of the international air traffic, what the United States does becomes a forerunner.

There is a great opportunity for your subcommittee to take the lead in the House. I am sure that working together with you, Chairman

Anderson, that we can come out with a good bill that will be so important for the safety and lives of millions and millions of air travelers from all nations of the world. I do appreciate your holding these hearings.

Senator JAVITS. May I add another fact?

Based on the investigation of the State Department, they actually publicized four nations which aided and abetted terrorists, and they were, respectively, Libya, Iraq, and South Yemen. Now, I hold back the last, Somalia, because they have advised us that they have taken it off the list.

I mention that because they are getting a little bolder in actually naming names, and I think that should encourage the Congress to proceed in a forthright way in that field. Thank you.

Mr. ANDERSON. Thank you, Senator Ribicoff and Senator Javits, for your presentation. I want to say that we are well aware of the work that you have done on this legislation. As a matter of fact, we have followed your hearings quite closely.

Our staff has worked with your staff, and quite a bit that is in your bill, you will find in our bill.

Senator Javits, you mentioned the section on economic sanctions, and you will note in our bill that it is very similar to yours. We have a section there where we say:

If the President finds that the interests of national security so require, he may suspend the applicability of any part of the prohibitions listed in subsection—of this section. In such case, he shall report his reasons therefore in writing to the Congress, and those prohibitions shall not apply.

Now, my question to you is, we limit that rather tightly by saying "in the interest of national security." Do you think that is perhaps too tight? Do you think that should be loosened up a little bit, or do you think we should hold it to only "in the interests of national security?"

Senator JAVITS. We had that debate in Foreign Relations. We had a vote on it and we came out in favor of leaving it just as it is. The vote was divided, by the way, but prevailed, I think, decisively.

We feel that the rubric of "national security" is inclusive enough to cover any serious aspect of our international relations which would induce a President to suspend all or any of these sanctions. And we believe that this is a serious enough proposition in terms of world anarchy to deserve the national security definition.

Mr. ANDERSON. Will the economic sanctions that we are talking about applying in the bill against states which demonstrate a pattern of support for terrorist groups be effective against such nations as Iraq, Libya or South Yemen, or is there more that we should be doing than just these economic sanctions?

Senator RIBICOFF. Even without this bill, because of the action of Congress, the State Department has moved in two instances. I know that Libya has sought to buy certain Boeing planes. The engines of those planes are made in Connecticut, and the company asked me whether I would take the pressure off, because the State Department in its review called attention to this bill. I said no, because these planes could be used for military purposes. The sale was refused. Now, Libya ordered some flat-bed trucks from a United States company;

they said they needed them for earthmoving. But it became very apparent that these flat-bed trucks could be used to transport tanks to the Egyptian and other borders. So the State Department refused permission for the license for the transportation and sale of those trucks. Now, I think it becomes very important for us to exercise those sanctions. Sure, we are going to lose an order now and then. But once countries realize that there is a mutuality and that there is a vested interest in every nation to act in concert, the selfish attitude of one nation to try to get one commercial order over another will start disappearing. I believe that public opinion in every country is so outraged at what terrorism has come to be recently that you find that even the Communist countries are concerned.

Terrorism, today is really anarchism. They owe no loyalty to any nation or to any ideology or philosophy. They do not know what they want, but they act as anarchists to destroy society as it is, irrespective of any cohesiveness.

It is important for us to exercise these sanctions, to take this lead. It is my feeling is that world public opinion will force other nations to follow the lead of the United States.

Mr. ANDERSON. Your bill has a concurrent resolution provision, and ours does not. Now, this seems to be one of the few differences between the bills.

Can you give us your views on the importance of the concurrent resolution?

Senator RIBICOFF. Yes; in the event the President wants to remove the name of a country from the list, our feeling is that by a concurrent resolution, we could override the President. We do have a role to play and we wanted to make sure that as far as Congress is concerned and the President is concerned, that we act in harmony.

We want to give the President every possible break, but we certainly reserve to ourselves the right to review the President's action in removing the name of a country from the list.

Senator JAVITS. Mr. Chairman, if I may just add a point respective of this, this concurrent resolution is found in section 5(e)(2) of our bill and relates to deletion from the list of countries which have a pattern of aiding and abetting terrorism.

I realize the President has raised a serious constitutional question. This occurs, of course, not only in this bill, but in many bills. I believe the proper constitutional test should be whether or not what we are doing is susceptible of legislation, or whether it is analogous to the regulatory powers which we vest in regulatory agencies, et cetera, simply because modern conditions make it impossible to have statute law which will project itself into the future without so proliferating legislation as to nullify it.

I believe, therefore, that it is a selective proposition on a case-by-case basis. Congress would certainly have the power to either list or not list a given nation. Therefore, it seems to me, as we would have the power and as it is a responsibility which is so detailed that we could not anticipate it, and if we did, that it would cause a really intolerable burden of legislation, constantly perhaps changing with the times, that it is a suitable case for a congressional veto.

Frankly, I do not think the constitutional question is affected by whether it is a one-house or a two-house, because one house could pre-

vent action from occurring, and therefore one house could veto; that is a political question. In some cases, we have one house and in some cases, two houses.

But my own judgment as to the constitutional status of such legislation is that it depends upon the particular thing which you are trying to reach. In some cases, it may be susceptible of veto by the Congress in the sense that it thereby limits the authority which it gave by law, and in some cases it may not.

In my judgment, this is a suitable case for the employment of the veto.

Mr. Chairman, may I just state that I must go to a markup, where I am being waited for. So if anybody wants me urgently—

Mr. ANDERSON. There are some questions; I think we will be fairly fast here, though.

Mr. SNYDER. I just want to say that I appreciate the Senators both being here and giving us the benefit of the expertise that they have acquired during their hearings and their particular knowledge about the matter.

I had a couple of questions, but none of them are of sufficient import that we cannot deal with them later on down the line.

Senator RIBICOFF. Well, I will stay. I have to go to the Finance Committee, too, but I will stay unless there is a vote over there.

Mr. SNYDER. Well, I had some questions about this posting being an assumed risk, defenses, and so forth. I will take those up with the Justice Department and see how they resolve it.

I appreciate you all being here and thank you for your expertise, and join with you, too, in your observation that the antiterrorism statements of the President may not be only the most important thing that he did at Bonn, but it may be the only thing he will be able to fulfill, and we ought to try to move forward to give him some element of accomplishment.

Thank you, Mr. Chairman. Thank you, Senators.

Senator RIBICOFF. Thank you for your wise comment.

[Laughter.]

Mr. ANDERSON. Mr. Young.

Mr. YOUNG. No questions.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. I was going to ask Senator Ribicoff this question: Certain time limits are set forth concerning the requirements for identification and detection of taggants. I wonder why imported explosives are required to contain these taggants before the U.S. manufactured explosives are.

Senator RIBICOFF. Well, I must confess I do not know the answer to that.

Mr. HAMMERSCHMIDT. I believe that the detection taggants are on a 1-year time frame as it pertains to imported explosives and 2 years for domestic.

Senator RIBICOFF. I do not think there should be a differentiation. This is the first time that this has been called to my attention, but I would say there should not be a differentiation between standards for explosives that are imported and explosives that are manufactured in the United States.

I do not know if it is this committee that should settle that, or the committee with primary jurisdiction. In the end, I think it could be done by regulation. I am sure, but I would look that up.

Do you know the answer to that one? I do not know that one.

Senator JAVITS. The answer is that these time limits were recommended by the Secretary of the Treasury, and he has the power in the bill to make them shorter or longer. If you will allow us, we will get a letter from him for this record as to his rationale for that difference.

Mr. HAMMERSCHMIDT. I notice that both bills contain this provision; I just did not know why.

Senator JAVITS. We will get that.

Senator RIBICOFF. We have just been notified that there is a vote on the Senate floor. But if there are any questions that you have of us, if your staff will get to our staff, we will put those answers in writing.

A suggestion like you have just made is a sound one, in asking the Secretary of the Treasury to set the time periods. Our apologies to you for running away, but this is an occupational hazard of our profession.

Mr. HAMMERSCHMIDT. We are most appreciative for your very valuable time. Thank you.

Mr. ANDERSON. Thank you.

Senator JAVITS. Thank you very much.

Senator RIBICOFF. Thank you gentlemen.

Mr. ANDERSON. Our next witness is the Department of Justice, Mary C. Lawton, the Deputy Assistant Attorney General, Office of Legal Counsel; accompanied by James Price, Special Agent Supervisor, International Terrorist Unit of the Federal Bureau of Investigation.

TESTIMONY OF MARY C. LAWTON, DEPUTY ASSISTANT ATTORNEY GENERAL, OFFICE OF LEGAL COUNSEL, DEPARTMENT OF JUSTICE, ACCOMPANIED BY JAMES PRICE, SPECIAL AGENT SUPERVISOR, INTERNATIONAL TERRORIST UNIT, FEDERAL BUREAU OF INVESTIGATION; AND HOWARD ARENDT, SPECIAL AGENT, FEDERAL BUREAU OF INVESTIGATION

Ms. LAWTON. Mr. Chairman, I would like to introduce Special Agent Howard Arendt, of the Federal Bureau of Investigation, who is also with us.

Mr. ANDERSON. Thank you very much. We do have your prepared statement here and it will be made a matter of the record.

[Statement referred to follows:]

STATEMENT OF MARY C. LAWTON, DEPUTY ASSISTANT ATTORNEY GENERAL, OFFICE OF LEGAL COUNSEL

Mr. Chairman and Members of the Subcommittee:

The Department of Justice appreciates the opportunity to present its views on H.R. 13261, the proposed Anti-terrorism Act. As you have requested, we will address our testimony today not only to H.R. 13261, but also to the companion bill, S. 2236, as reported by the Senate Committee on Governmental Affairs.

I will confine my testimony today to areas of the bills that are of particular concern to the Department of Justice, especially the implementation of the Montreal Convention and the reporting requirements with respect to terrorist incidents.

1.

Sections 10 and 11 of H.R. 13261 would amend the existing laws relating to aircraft hijacking. The amendments are designed to bring the United States into full compliance with the Montreal Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation and provide additional sanctions for hijacking, threats and hoaxes. The Department of Justice recommended these provisions to the Congress last year and it strongly supports their enactment. We are pleased to see that these provisions as also carried forward in sections 14 and 15 of S. 2236, as reported.

Section 10 of H.R. 13261 clarifies the language of 18 U.S.C. 32 and substitutes a new burden of proof. Rather than being obligated to prove an intent to damage aircraft, the revised provision would require only proof that the conduct involved is likely to damage aircraft—the standard of the Montreal Convention. Further, acts of violence against passengers which are likely to endanger an aircraft in service are added to the list of prohibited acts. Finally, existing law would be amended to prohibit the communication of false information which endangers an aircraft in flight.

Section 10 would also add a new provision to the criminal code extending jurisdiction to prosecute or extradite hijackers and others threatening aircraft when the events occur outside the United States but the aircraft lands in the United States with the terrorist still on board or he is otherwise found within the United States. This extension of jurisdiction is consistent with the provisions of the Montreal Convention and follows the historic rule that the nation which apprehends a pirate may assume jurisdiction over him.

Other amendments in H.R. 13261 make it criminal to threaten to damage an aircraft as well as to actually damage it. There is also provision for civil penalties for carrying arms abroad aircraft or conveying false information regarding an aircraft. This would permit the government to impose a sanction on conduct which, while serious, does not warrant the full criminal penalty.

The Department of Justice strongly supports these provisions of H.R. 13261.

2.

Section 3 of H.R. 13261 would require the President to submit an unclassified report to Congress on any terrorist incident affecting or involving citizens of the United States as well as a semi-annual report on international terrorism. Information which is properly classified or protected by law could be withheld from an unclassified report, but there is no provision for withholding Grand Jury information protected by Rule 6(e) of the Federal Rules of Criminal Procedure, or other information the disclosure of which would interfere with a pending investigation, prejudice the rights of potential defendants, or endanger the life of law enforcement personnel.

As international terrorism is defined in the bill, it would encompass acts which constitute violations of federal and state law and which would be investigated by the Federal Bureau of Investigation and perhaps by State or local law enforcement authorities as well. A public report, issued while the investigation is still going on, might well abort the investigation or so prejudice the rights of a defendant as to require a dismissal if an indictment. In our view, the bill must be amended to avoid such an interference with the criminal justice process.

Grand jury materials and other investigative information, while extremely sensitive, are usually not classifiable in the interest of national defense and foreign policy. Thus, the provision for classification would not serve to protect these matters from public disclosure.

Section 3(d) of H.R. 13261 attempts to address this issue by excepting from disclosure requirements investigatory records compiled for law enforcement purposes protected by the Freedom of Information Act. 5 U.S.C. 552(b) (7). However, this approach to protection of investigatory records is technically insufficient. By explicit terms, the Freedom of Information Act does not apply to disclosures to the Congress. 5 U.S.C. 552(c). Accordingly, a reference to the Act in a provision requiring a report to Congress provides no protection at all for sensitive information relating to an on-going criminal investigation. We urge that any reporting requirement in the bill state explicitly that the disclosure of investigatory records compiled for law enforcement purposes is not required, without reference to the Freedom of Information Act.

3.

In two important respects, H.R. 13261 is a major improvement over S. 2236, as reported by the Senate Committee on Governmental Affairs. Section 7 of the Senate bill would require a comprehensive report on, and evaluation of, the federal government's capabilities to combat terrorism. While we acknowledge the importance of Congress having access to this information to fulfill its legislative role, we believe that compiling such information in a single report may risk access by terrorists to information which would aid them in their plans. H.R. 13261 wisely omits the requirement for such a formal report. Similarly, S. 2236 would require considerable detail in a report on the security deficiencies of foreign airports. In contrast, H.R. 13261 requires the Secretary of Transportation to report those airports where deficiencies exist and his efforts to see that they are corrected without detailing the precise nature of the deficiencies.

H.R. 13261 and S. 2236 both call upon the President to identify and take sanctions against countries which give aid and support to international terrorism. Unlike H.R. 13261, however, S. 2236 would allow Congress to veto the President's determination that a country no longer warrants retention on the list of those supporting terrorism. As the President has made clear, he views such congressional veto provisions as unconstitutional. In our view the House bill wisely adopts the approach of authorizing the President to make the determination of whether the policies of another country have changed sufficiently to warrant its removal from the list.

4.

With the technical change suggested above to protect against public disclosure of information concerning pending Grand Jury proceedings and criminal investigations, the Department of Justice supports H.R. 13261 and urges the Congress to enact it.

Ms. LAWTON. Thank you, Mr. Chairman.

The Department's primary concern with this bill, of course, is the provisions of sections 10 and 11 relating to aircraft hijacking, provisions that we believe are necessary to bring the United States into full compliance with the Montreal Convention.

They add important tools for us in dealing with hijacking. In one instance, it would extend jurisdiction so that hijackers, whose crime basically took place outside the United States could, nevertheless, be tried there. They could be extradited back to the country where the hijacking occurred, if that country wished, or we could try them here.

This is new in the area of aircraft piracy, but is not new in the concept of piracy. For years, it has always been recognized that the country which apprehends a pirate can assert jurisdiction to try him, and this would simply carry that concept, which has been part of the law of the sea, into the law of the air, as well.

We have one technical concern with the bill—and I believe it truly is technical—and that is, the provisions of section 3 requiring an unclassified report to the Congress, and then a classified report on information which is protected in the interest of national security, do not make explicit provisions for the protection of grand jury information which may be in our possession, but which is, of course, the property of the courts and which is bound by court rule.

Since the definition of terrorism encompasses some acts which take place in the United States and are part of our prosecutive jurisdiction, there would be a problem with our reporting grand jury material to the Congress without the courts permission.

The classic illustration, Mr. Chairman, would be, for example, the *Letelier* case; a bombing now under investigation in a grand jury where the information in our possession is largely grand jury information that we are not at liberty to disclose.

The bill, I think, did not intend to create the problem. It does provide an exception from the report of information protected under the law enforcement records exemption of the Freedom of Information Act. However, as a technical matter, that act does not apply to any request for information by Congress.

So the cross-reference to the Freedom of Information Act really undoes itself almost immediately. I think it is purely technical. If the act simply said that information pertaining to ongoing investigations need not be disclosed in the report, period, without citing the Freedom of Information Act, the problem would be resolved.

Mr. ANDERSON. In other words, on page 5, line 15, if we struck the reference to section 552(b)(7) of title 5, United States Code?

Ms. LAWTON. That would take care of our problem, yes, and I believe that is the intent of the bill. It is just a technical matter, because of the language of the Freedom of Information Act.

Earlier in your questions, you raised the issue of the concurrent resolution vetoing Presidential action. As you know, the administration views that device as being unconstitutional, and we much prefer the version that you have introduced Mr. Chairman, over the Senate version of the bill, in that regard.

The power to undo Presidential action does, of course, exist in the Congress. It is a question of whether the Congress does it by legislation or whether the Congress simply handles it through the political process. But we do believe that the concurrent aspect of the Senate bill is unconstitutional.

The other point I would like to make, Mr. Chairman, is that we believe the House bill, H.R. 13261, is a considerable improvement over S. 2236, as reported out of the Committee on Governmental Affairs, because it does not require such detailed public reports on airport security and on the evaluation of U.S. capabilities and weaknesses in dealing with terrorism.

Certainly, this is information that Congress must have, but to compile it all into a single report which, in the nature of Washington, could get out, however protected, is to alert terrorists to exactly where the weak points are. This is the concern that we had with the Senate bill.

The report that is required in your bill, Mr. Chairman, is a much more generalized report, and the additional information could be furnished to the Congress in briefings, without running that risk of pointing out to terrorists exactly where our weaknesses are, and we think this is an improvement.

With that one technical problem we have, Mr. Chairman, we fully endorse H.R. 13261 and urge its enactment.

Mr. ANDERSON. Thank you very much. In reading your statement, I was a little surprised that no reference was made to what I consider a very important portion of this bill, that of tagging explosives.

This provision, in my view, will certainly assist in preventing terrorist acts, and also assist our law enforcement officers in bringing to justice the perpetrators of such acts. The obvious other benefit would involve the detection and identification of explosives used for all crimes, not just terrorism-type crimes.

What is the Justice Department's view of that section? And I am specifically directing this question to the FBI representative.

Mr. PRICE. Mr. Chairman, the question on the taggants is really an area that has been developed and is being developed by the Alcohol, Tobacco, and Firearms Division of Treasury. Our interest in the taggant operation, really, is from an investigative point of view.

We look upon the taggant development program as an additional investigative aid that certainly would be most helpful in conducting any type of a crime scene investigation in a bombing incident. The technical aspects of it, I think, will be presented to you by officials from ATF.

But as far as the Bureau is concerned, it certainly would be an additional investigative tool that would be most beneficial in conducting a bombing type of investigation.

Mr. ANDERSON. I believe that we have ATF on the schedule on Tuesday to testify.

Mr. PRICE. And they would, I think, be prepared to go into the technical aspects of it.

Ms. LAWTON. We did, however, Mr. Chairman, pull together some figures. In the United States, as you know, we have been fortunately free of the rash of hijackings that occur elsewhere. But there are a number of bombings that occur, and in 1977, 90 percent of all incidents that we would characterize as terrorist incidents in the United States took the form of bombings.

So the use of explosives is the single most important terrorism that we have presently in the United States, so that the taggant program would be extremely helpful. We are not the technologists on that, but we do have some figures. You might also be interested to know that of the bombs we have identified, 52 percent were made of black or smokeless powder.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. Thank you, Mr. Chairman.

You indicated that you liked the House bill better than the Senate bill insofar as the Senate bill apparently requires a lot more disclosure as to a compilation of what your determinations are as it concerns unsafe airports, and giving notice to terrorists of where the easy shots are, and so forth.

I just wonder if we do not go too far, particularly this list of unsafe airports that has to be published in the Congressional Record and posted prominently at all airports. Would that not have the same pitfalls that this report that you are talking about would have?

Ms. LAWTON. Not to the same degree. Now, listing an unsafe airport does run that risk, certainly. On the other hand, we owe a duty to the passengers who may be running risks. It is a hard balance to strike.

Listing the airport is less troublesome than listing the precise weakness within that airport; it is a question of degree. Largely, we would defer to the FAA on that issue, but I understand the problem. I do not really know the answer; it is a circular problem.

It is dangerous to leave the passengers unwarned, but it is also dangerous, of course, to list these airports; you are identifying targets. You are not identifying where the weakness is, which is an improvement over the Senate bill, but the difficulty arises, and I do not know a safe way out of it.

Mr. SNYDER. If a passenger were apprised of that list of unsafe airports, and had an urgent or compelling need, nevertheless, to go there

and some misfortune befell him as a result of the acts we are contemplating in this bill, would he or she not be precluded from recovery by virtue of having assumed the risk?

Ms. LAWTON. I do not see this particular bill, Congressman, as altering the Warsaw Convention, which defines aircraft liability. It is an argument that unquestionably would be raised in any litigation, but there is no direct amendment here to the Warsaw Convention which defines the liability of aircraft.

Now, the question of foreign law, depending on the airport where the matter occurred, would also intervene. So it is impossible to say with any certainty whether it would affect liability. We rather doubt that it would, but it is impossible to judge, based on the foreign law that would govern.

Mr. SNYDER. In your prepared statement in regard to the congressional veto section that you addressed yourself to in your extemporaneous remarks, you said that the President viewed the section as unconstitutional. In your remarks, you said "we," referring to Justice.

Do I conclude that both statements are accurate?

Ms. LAWTON. Both statements are accurate. It has been our position since 1931, which was when the Office was founded.

Mr. SNYDER. We have been going contrary to that on some other bills lately.

Ms. LAWTON. A lot of other bills, Congressman. We do have one such issue in litigation; someday we will have this resolved.

Mr. SNYDER. Which one is it? I am curious.

Ms. LAWTON. It is an immigration matter. There was a congressional veto of a waiver of deportation.

Mr. SNYDER. You mean it took you since 1931 up until recently to find a good case?

Ms. LAWTON. To find an arguable case, yes. The courts tend to stay out of our disputes.

Mr. SNYDER. Thank you very much.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. I have no questions.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. I have no questions, Mr. Chairman.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Thank you very much for your presentation.

Ms. LAWTON. Thank you, Mr. Chairman.

Mr. ANDERSON. Our next witness is the Air Transport Association, James E. Landry, vice president and general counsel for the ATA, accompanied by Harry J. Murphy, director of security.

We do have your prepared statement, and it will be made a matter of the record.

[Statement referred to follows:]

STATEMENT OF JAMES E. LANDRY, VICE PRESIDENT AND GENERAL COUNSEL, AIR
TRANSPORT ASSOCIATION OF AMERICA

My name is James E. Landry and I am Vice President and General Counsel of the Air Transport Association of America, which represents virtually all of the scheduled airlines of the United States. I am accompanied here this morning by Mr. Harry J. Murphy, the Association's Director of Security.

Airline security officials throughout the scheduled airline industry have dedicated their efforts over the last several years to achieving the highest possible level of security for U.S. airline operations world-wide. Most importantly, they have not been alone in striving toward that goal; they have worked side-by-side with equally dedicated security experts in our government, with the strong encouragement of the Congress and every Administration, in what has been described as one of the finest examples of government/industry cooperation in many years.

This common task, unfortunately, appears destined to be an unending one in today's society. That is why we are pleased to have this opportunity to be here this morning, and we commend the Subcommittee for calling these hearings and focusing on legislative changes to strengthen Federal programs and policies for combating terrorism.

Mr. Chairman, we were also deeply gratified by this week's press accounts of the agreements reached at the economic summit, promising immediate action by seven of the major aviation powers of the world, to cease commercial air service to or from any country that harbors airline hijackers. We look forward to the early implementation and expansion of this dramatic accord to all civilized nations.

SCOPE OF THE PROBLEM

While the number of hard core international terrorists is actually quite small (perhaps only a few hundred), their despicable actions, fed by instant global publicity, have seriously affected many elements of government, business and the general public. Ambassadors and military attaches, Prime Ministers and other public officials, as well as private citizens, have been slain, banks robbed, planes, ships and trains hijacked, and public, commercial and residential buildings and automobiles bombed.

Aircraft hijackings by terrorists and other criminals have received massive publicity, yet they constitute a small percentage of the problem. For instance, of the 151 hijackings of U.S. aircraft since 1968, four could be ascribed to terrorists. In the last seven years, there has been only one terrorist hijacking of a U.S. aircraft. Fortunately, and due in substantial measure to the achievements of government/industry aviation teams around the world—with the U.S. among the acknowledged leaders—aircraft hijackings by international terrorists declined dramatically after the peak year of 1970. The trend was away from the formidable barriers erected by most of the world community against aviation terrorism and toward what have become relatively simpler, more easily accomplished forms of terrorism, such as bombing, incendiary attacks and armed assault.

We recognize the fact that there has been an increase in the number of foreign hijackings in the past year. And, as long as we face the dreadful experience of one aircraft sabotage, or one successful hijacking, or any other mindless act against the users and operators of civil aviation, we face the challenge of enhancing the unified effort to thwart these vicious crimes against mankind. We understand that to be the focus of this Subcommittee's deliberations.

CURRENT AVIATION PROGRAMS TO COUNTER TERRORISM

In exploring ways to meet the challenge, it is useful to consider what has been done to date. The aviation-related aspects of terrorism represent a matter of serious concern to the airline industry as well as governments. Consequently, the deterrent programs in place today were developed by the aviation industry in conjunction with governments. All U.S. carriers operate under a standard security program approved by the Federal Aviation Administration. Each year the member carriers of ATA spend more than one hundred million dollars on screening of international flights (both to and from the United States) and domestic flights. The FAA regulatory role includes inspection of the security operations of all U.S. carriers as well as the foreign carriers flying to, from or within the U.S.

INTERNATIONAL AIRPORT INSPECTION PROGRAM

This activity is supplemented by the inspection program of the Security Advisory Committee of the International Air Transport Association (IATA), whose membership includes over 100 of the world's major international airlines. IATA has developed and promulgated its own airport security standards for inter-

national airports. At the invitation of the governments involved, in-depth security surveys under IATA sponsorship have been conducted at airports throughout the world. This is an ongoing program in which ATA member carrier security experts frequently participate; indeed, Mr. Steele, Director of Security of TWA, and Mr. Sullivan, Vice President, Audits and Security of Pan American are presently members of a team that is conducting a security survey at a large foreign airport.

IATA RESOLUTION

Another significant act by the world's airlines was the passage of a resolution of IATA's Annual General Meeting held in Madrid last November, calling upon the International Civil Aviation Organization (ICAO) to amend the Chicago Convention by incorporating the Tokyo (Crimes Aboard Aircraft), Hague (Hijacking) and Montreal (Sabotage) Conventions therein and applying the provisions requiring expulsion of member states failing to ratify the amendments so incorporated.

A further important step in building uniformity and security discipline worldwide was a June 2, 1978 message from the Director General of IATA to the presidents of all member airlines urging them to make every effort to obtain commitments from their governments to implement IATA recommended security practices, particularly the sterile concourse concept for screening passengers.

We endorse the IATA message and we are certain that, where possible, machine screening through a sterile concourse would enhance security at the world's airports.

ICAO ACTIONS

The airline industry strongly supported the proposal by Secretary of Transportation Adams, as presented to a special meeting of the ICAO Council, urging that the highest priority be given to the October 1977 ICAO Assembly resolutions on security, that a variety of security measures formulated by ICAO be upgraded from recommended practices to worldwide standards, and that the promising program of regional aviation security seminars be increased and expanded. Our industry also wholeheartedly applauds the United Nations Resolution condemning aerial hijackings, and others acts of violence against civil aviation, and calling upon all states to improve security arrangements at airports and ratify or accede to the Tokyo, Hague and Montreal Conventions.

CARRIER SCREENING

As can be seen, much has been done by the carriers, by the U.S. Government, by IATA, by IAO, and by the UN to insure recognition of the universal need for quality deterrent programs. In addition, there is increased carrier recognition that they must provide security for their flights, whether or not governments participate. Fortunately, a willingness of foreign authorities to grapple with the security problem is the general experience. However, in situations where the performance of airport authorities has appeared inadequate, our carriers, as well as those of other flags, have taken it upon themselves to provide the necessary personnel and equipment to insure safe and speedy transportation for our passengers and cargo. At times, these are individual carrier undertakings; at other times, joint efforts.

The section of H.R. 13261 that impacts most directly on airline operations and therefore is of particular interest to our industry is the proposed amendment to section 1115 of the Federal Aviation Act of 1958 relating to security standards in foreign air transportation. Section 1115(a) would require the Secretary of Transportation to assess periodically the effectiveness of security measures at foreign airports. These assessments would be made in consultation with the appropriate aeronautic authorities of the concerned foreign government. We believe that provision should also be made for consultation with the U.S. flag carriers serving that airport since the members carriers of ATA would be willing to provide additional security, if necessary, to remedy deficiencies in the security measures at the airport.

As mentioned previously, our carriers have taken it upon themselves to provide personnel and equipment to enhance security at some foreign airports and would be willing to extend this practice to other locations where it proves necessary. In short, we believe that a viable alternative to withholding or revoking the operating authority of any carrier to engage in foreign air transportation at an airport would be to permit the carrier or carriers to supply the manpower and equipment to get the job done.

Section 1115(d) (1) sets a six month time limit for remedial steps to be taken by a foreign government prior to publishing in the Federal Register, and posting notices at U.S. airports, the names of the foreign airports where security measures are found to be below ICAO standards. We believe that in most instances the six month period would be adequate, but there could be occasions when additional time would be required. We believe that H.R. 13261 should be amended to cover such situations, especially since interim measures by carriers may help to bridge any time gap.

The airline industry heartily supports section 7 which authorizes aviation security assistance to foreign governments. Expert, impartial surveys of international airports and well-conceived training programs in aviation security for foreign nationals are to the mutual advantage of all countries.

Section 8 accommodates the extension of existing security measures to charter flights. I am pleased to advise this Subcommittee that, on July 11, government and air carrier security officials met and came to agreement on amendments to the FAA approved Carrier Standard Security Program to include appropriate security provisions for charter flights.

Section 9 would require mandatory use of identification and detection taggants in the manufacture of explosives. The airline industry has always supported such a program and strongly endorses the proposed provision. I should add that we in the airline industry urge that an even greater emphasis and priority be given to the research and development effort for detection taggants in keeping with our primary goal of crime prevention.

Sections 10 and 11 set forth the penalties, including civil penalties, for aircraft sabotage, damage or interference with the operation of an aircraft, acts of violence against crew members or passengers, aircraft piracy, conveying threats and imparting false information concerning attempts to commit crimes such as sabotage, air piracy and damage to aircraft. The airline industry has long supported the Departments of Justice and Transportation in efforts to obtain such penalty provisions, and we therefore endorse these provisions as well.

In addition, section 10 sets forth certain other amendments of our Criminal Code, occasioned by U.S. ratification of the Montreal (Sabotage) Convention. I had the privilege of serving as an adviser to the U.S. delegation in the development of the Montreal Convention and am particularly conscious of the wisdom and dedication which went into its formulation. The airline industry wholeheartedly endorses these amendments and any other steps necessary to insure full U.S. implementation of this important treaty.

Mr. Chairman, a subject that is allied to crimes against aircraft, and a source of concern to airline security officers, is the carriage of loaded weapons in checked baggage.

The Civil Aviation Security Service of the Federal Aviation Administration recently amended Part 121.585 of the Federal Aviation Regulations on the carriage of weapons aboard aircraft. A copy of the amended regulation is attached, and I request that the attachment be included in the record. One of the provisions in the amended Part 121.585 is that "no certificate holder may knowingly permit any passenger to carry, nor may any passenger carry, while aboard an aircraft being operated by that certificate holder, in checked baggage, a loaded firearm."

The member carriers of the Air Transport Association strongly supported the Notice of Proposed Rule Making that led to amending Part 121.585 of the Federal Aviation Regulations. One of the reasons for this strong support is that in November 1976, an employee of Frontier Airlines was killed when a firearm discharged accidentally while checked baggage was in the process of being transported to an aircraft.

A violation of the FAA regulation could result in a civil penalty of up to one thousand dollars. We believe that carriage of a loaded firearm in checked baggage is a criminal offense and we strongly urge that a federal law be enacted to insure that people who carry loaded firearms in baggage to be checked aboard a commercial aircraft are duly punished.

We believe this could be accomplished by inserting after the word "knowingly" in Title 18, section 922(e) of the U.S. Code the following: "to cause to be transported aboard any common or contract carrier for movement in interstate or foreign commerce any loaded firearm or"

ADDITIONAL SUGGESTIONS

Member carriers of our association have also asked that we relay to the committee three suggestions to enhance the efforts to combat terrorism:

(1) Continue the recent improvement in the Federal Government's collection, evaluation and dissemination of intelligence information.

(2) Seek the cooperation of the news media in order to avoid the reporting of terrorist actions in such a manner as to aid or abet terrorists during an ongoing incident or to encourage future acts of terrorism.

(3) Urge that Interpol, with its membership of more than 100 nations, give high priority to the investigation, apprehension and prosecution of criminal terrorists as well as the improvement of security at the world's airports.

* * * * *

In conclusion, Mr. Chairman, we appreciate the opportunity to be here. We believe that you are performing an admirable public service in holding these hearings and bringing to the attention of the American public the true facts about terrorism. We pledge a continuation of the utmost cooperation of our member airlines in bringing these heinous crimes to an end.

We will be pleased to respond to any questions the Committee may have.

[From the Federal Register, vol. 43, No. 57—Thursday, Mar. 23, 1978]

§ 121.585 Carriage of weapons.

* * * * *

(b) No certificate holder may knowingly permit any passenger to carry, nor may any passenger carry, while aboard an aircraft being operated by that certificate holder, in checked baggage, a loaded firearm.

(c) No certificate holder may knowingly permit any passenger to carry, while aboard an aircraft being operated by that certificate holder, in checked baggage, any unloaded firearm unless the following conditions are met:

(1) The passenger has declared to the certificate holder before checking the baggage that a firearm is in the baggage; and the certificate holder has obtained from the passenger, before checking the baggage, a declaration that any firearm carried in the baggage is unloaded. The declaration may be oral or written, as the certificate holder considers appropriate.

(2) The firearm is carried in a container the certificate holder considers appropriate for air transportation.

(3) When the firearm is other than a shotgun, rifle, or other firearm normally fired from the shoulder position, the baggage in which it is carried is locked, and only the passenger checking the baggage retains the key.

(4) The baggage containing any firearm is carried in an area that is inaccessible to passengers, other than the flight crew compartment.

(d) No person having a deadly or dangerous weapon accessible to that person may bring any alcoholic beverage while aboard an aircraft operated under this part.

(Secs. 313(a), 316, 601, 604, and 902(1) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1354(a), 1357, 1421, 1424, and 1472(1)); and Sec. 6(c), Department of Transportation Act (49 U.S.C. 1655(c)).)

NOTE: The Federal Aviation Administration has determined that this document does not contain a major proposal requiring preparation of an Economic Impact Statement under Executive Order 11821, as amended by Executive Order 11949, and OMB Circular A-107.

Issued in Washington, D.C., on March 16, 1978.

LANGHORNE BOND,
Administrator.

[FR Doc. 78-7606 Filed 3-22-78; 8:45 am]

Mr. ANDERSON. Please proceed.

TESTIMONY OF JAMES E. LANDRY, VICE PRESIDENT AND GENERAL COUNSEL, AIR TRANSPORT ASSOCIATION OF AMERICA, ACCOMPANIED BY HARRY J. MURPHY, DIRECTOR OF SECURITY

Mr. LANDRY. Thank you, Mr. Chairman. As you indicated, my name is James E. Landry, and I am vice president and general counsel of the Air Transport Association, which represents virtually all of the

scheduled airlines of the United States. I am accompanied here by Mr. Harry J. Murphy, the association's director of security.

Airline security officials throughout the scheduled airline industry have dedicated their efforts over the last several years to achieving the highest possible level of security for U.S. airline operations worldwide. Most importantly, they have not been alone in striving toward that goal; they have worked side by side with equally dedicated security experts in our Government, with the strong encouragement of the Congress and every administration, in what has been described as one of the finest examples of Government/industry cooperation in many years.

This common task, unfortunately, appears destined to be an unending one in today's society. That is why we are pleased to have this opportunity to be here this morning, and we commend the subcommittee for calling these hearings and focusing on legislative changes to strengthen Federal programs and policies for combating terrorism.

We are also deeply gratified by this week's press accounts of the agreement reached at the economic summit, promising immediate action by seven of the major aviation powers of the world to cease commercial air service to or from any country that harbors airline hijackers. We look forward to the early implementation and expansion of this dramatic accord to all civilized nations.

Mr. Chairman, in my prepared statement, I dwell at some length on the scope of the problem of terrorism and the degree to which it has impacted on aviation. And I go on at some length and talk about the various steps that have been taken by the carriers themselves and within the International Civil Aviation Organization, within IATA, and by various governments of the world in combating the problem that we are dealing with here today.

If I may now, I would like to turn to the specific provisions of the bill that we have before us here today, H.R. 13261.

The section that impacts most directly on airline operations, and therefore is of particular interest to our industry, is the proposed amendment to section 1115 of the Federal Aviation Act of 1958 relating to security standards in foreign air transportation. Section 1115 (a) would require the Secretary of Transportation to assess periodically the effectiveness of security measures at foreign airports. These assessments would be made in consultation with the appropriate aeronautic authorities of the concerned foreign government. We believe that provision should also be made for consultation with the U.S.-flag carriers serving that airport, since the member carriers of ATA would be willing to provide additional security, if necessary, to remedy deficiencies in the security measures at the airport.

As mentioned in my prepared statement, our carriers have taken it upon themselves to provide personnel and equipment to enhance security at some foreign airports and would be willing to extend this practice to other locations where it proves necessary. In short, we believe that a viable alternative to withholding or revoking the operating authority of any carrier to engage in foreign air transportation at an airport would be to permit the carrier or carriers to supply the manpower and equipment to get the job done.

Section 1115(d) (1) sets a 6-month time limit for remedial steps to be taken by a foreign government prior to publishing in the Federal

Register, and posting notices at U.S. airports, the names of the foreign airports where security measures are found to be below ICAO standards. We believe that in most instances the 6-month period would be adequate, but there could be occasions when additional time would be required. We believe that H.R. 13261 should be amended to cover such situations, especially since interim measures by carriers may help to bridge any time gap.

The airline industry heartily supports section 7 which authorizes aviation security assistance to foreign governments. Expert, impartial surveys of international airports and well conceived training programs in aviation security for foreign nationals are to the mutual advantage of all countries.

I might say, Mr. Chairman, that even today, a couple of the industry's top security experts are engaged in a survey of one of the world's leading airports, and this sort of activity goes on quite frequently.

Section 8 accommodates the extension of existing security measures to charter flights. I am pleased to advise this subcommittee that, on July 11, Government and air carrier security officials met and came to agreement on amendments to the FAA approved carrier standard security program to include appropriate security provisions for charter flights.

Section 9 would require mandatory use of identification and detection taggants in the manufacture of explosives. The airline industry has always supported such a program and strongly endorses the proposed provision. I should add that we in the airline industry urge that an even greater emphasis and priority be given to the research and development effort for detection taggants in keeping with our primary goal of crime prevention.

Sections 10 and 11 set forth the penalties, including civil penalties, for aircraft sabotage, damage or interference with the operation of an aircraft, acts of violence against crew members or passengers, aircraft piracy, conveying threats, and imparting false information concerning attempts to commit crimes such as sabotage, air piracy, and damage to aircraft. The airline industry has long supported the Departments of Justice and Transportation in efforts to obtain such penalty provisions, and we therefore endorse these provisions as well.

In addition, section 10 sets forth certain other amendments of our Criminal Code, occasioned by U.S. ratification of the Montreal, or Sabotage, Convention, and the airline industry wholeheartedly endorses these amendments and any other steps necessary to insure full U.S. implementation of this important treaty.

Mr. Chairman, a subject that is allied a crimes against aircraft, and a source of concern to airline security officers, is the carriage of loaded weapons in checked baggage.

The Civil Aviation Security Service of the Federal Aviation Administration recently amended part 121.585 of the Federal Aviation regulations on the carriage of weapons aboard aircraft. A copy of the amended regulation is attached to my prepared statement, and I request that the attachment be included in the record. One of the provisions in the amended part 121.585 is that, and I quote:

No certificate holder may knowingly permit any passenger to carry, nor may any passenger carry, while aboard an aircraft being operated by that certificate holder, in checked baggage, a loaded firearm.

The member carriers of the Air Transport Association strongly supported the Notice of Proposed Rule Making that led to amending part 121.585 of the Federal Aviation regulations. One of the reasons for this strong support is that in November 1976, an employee of Frontier Airlines was killed when a firearm discharged accidentally while checked baggage was in the process of being transported to an aircraft.

A violation of the FAA regulation could result in a civil penalty of up to \$1,000. We believe that carriage of a loaded firearm in checked baggage is a criminal offense and we strongly urge that a Federal law be enacted to insure that people who carry loaded firearms in baggage to be checked aboard a commercial aircraft are duly punished.

We believe this could be accomplished by inserting after the word "knowingly" in title 18, section 922(e) of the United States Code the following clause, quote: "to cause to be transported aboard any common or contract carrier for movement in interstate or foreign commerce any loaded firearm or," and then go on with the rest of the text.

The member carriers of our association have also asked that we relay to the committee three suggestions to enhance the efforts to combat terrorism: First, that we continue the recent improvement in the Federal Government's collection, evaluation, and dissemination of intelligence information; second, that we seek the cooperation of the news media in order to avoid the reporting of terrorists actions in such a manner as to aid or abet terrorists during an ongoing incident or to encourage future acts of terrorism; third, that we urge that Interpol, with its membership of more than 100 nations, give high priority to the investigation, apprehension, and prosecution of criminal terrorists, as well as the improvement of security at the world's airports.

In conclusion, Mr. Chairman, we appreciate the opportunity to be here. We believe that you are performing an admirable public service in holding these hearings and bringing to the attention of the American public the true facts about terrorism. We pledge a continuation of the utmost cooperation of our member airline in bringing these heinous crimes to an end.

We will be pleased to respond to any questions the committee may have.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. No questions.

Mr. ANDERSON. Mr. Young.

Mr. YOUNG. No questions, Mr. Chairman.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. No questions.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Mr. Landry, could you give us some insights into the current level of security at the major foreign airports served by U.S. carriers by way of comparison with security at U.S. airports? Yesterday, a witness made a general statement indicating that security at foreign airports was very bad.

Mr. LANDRY. Mr. Chairman, I think that it is certainly true, as the record has indicated, that the U.S. airports and the U.S. system have achieved the highest level of security that we experience any-

place in the world. But I think with regard to the major foreign airports, there are some where the security is very, very good, as good as it is at our own airports. There are others where it is a bit weak. There are some where it is intermittently weak, where one day security is good and another day security is not so good. There is not the same high level of security consciousness at some of those places in the world as we have achieved here in the United States.

Perhaps Mr. Murphy, our director of security, would like to add a few thoughts on that.

Mr. MURPHY. I think it could be called spotty in some areas. The level of awareness is there one day, and the next day it may not be there. There is a need to develop an acute security consciousness in every employee at each airport.

Mr. ANDERSON. There was a statement yesterday that security at foreign airports is very bad. You would not agree with it, but you would not disagree with it; in some cases, it is true; in some cases, it is not.

Mr. MURPHY. In some cases, the security is bad most of the time. Sometimes, if there is a threat, if there is any contingency plan in progress, then everybody is on their toes, and at other times, they are liable to be lackadaisical.

Mr. ANDERSON. During the peak of the highjacking efforts in the United States, during which our aircraft were routinely ordered to Cuba by the hijackers, two events occurred contemporaneously which, in effect, put an abrupt end to hijacking. Those events were the new passenger screening program and the action of the Cuban Government to no longer accept hijackers with open arms. While those events occurred at mostly the same time, nearly all of the credit has been given to the screening program. I believe that if more credit had been given to the inability of hijackers to seek haven in Cuba, we may have been further along toward convincing other countries that the way to stop hijacking is to convince the potential hijacker that there is no place to go.

Would you comment on this?

Mr. LANDRY. Mr. Chairman, if I could add, perhaps, a third ingredient to the two factors that you cited, which I think were key factors in the dramatic improvement of security here in the United States and the quelling of the hijacking activity. And that third one, I think, was the closing of the ventral door on certain aircraft. You may recall that at one time, hijackers were using that, and in a couple of instances successfully, to parachute out of aircraft that they had hijacked, perhaps after acquiring money in their extortion attempts.

I do believe that the three steps, the improved screening, the agreement with the Cubans and the closing of the ventral door were all rather contemporaneously, widely publicized. It may be that not everyone in the United States was conscious of the fact that Cuba was no longer a safe haven, but certainly that is a terribly important tool in ending hijacking, and that is why we so wholeheartedly applaud what has been accomplished at the economic summit. I think that is the beginning. We have a nucleus now of seven nations that have condemned outlaw nations that are going to provide safe haven. I hope more and more countries will swiftly join in that crusade and

that, eventually, there are very, very few outlaw nations out there, and I suspect when that pressure rises, perhaps one day there will be none.

Mr. ANDERSON. On page 5 of your statement, you indicate that there is a need for increased screening at foreign airports through the sterile concourse system used in the United States. Can you give us a rough idea of which major airports do and do not use that concept today?

Mr. LANDRY. Mr. Chairman, I would like our director of security, Mr. Murphy, to answer that question.

Mr. MURPHY. Some of the foreign airports use the sterile concourse system; some use a modified sterile concourse system, and some do not use it at all. There has developed more of a willingness on the part of the security directors of the foreign airlines and the security managers of the foreign airports to use the sterile concourse system.

In some instances, the configuration of the airport itself precludes the use of the sterile concourse system. In fact, we have two airports here in the United States that were not really built with security in mind and, as a result, it is very difficult to use the sterile concourse system. At one of these airports, one of our carriers is making modifications, closing many of the entrance doors to the airport in order to be able to use it, and they are spending in the neighborhood of a million dollars to do this.

Mr. ANDERSON. What are the two airports?

Mr. MURPHY. I would rather mention that in executive session. But at the other airport which is one of these two, I think we probably have one of the three best police departments in the United States that is servicing that particular airport.

Mr. ANDERSON. In your prepared statement, you refer to the October 1977 ICAO Assembly Resolution on security. What, if anything, has happened in that arena since October? Do you hold out any near term hope for an upgrading of international standards?

Mr. LANDRY. Well, Mr. Chairman, I believe that coincidentally, actually, the process of upgrading annex 17 to the Chicago Convention, the security annex, is now underway. I believe that the Interagency Group on International Aviation here in the U.S. Government has out for comment by interested parties right now that upgrading of annex 17 and, indeed, again coincidentally, I believe our comments are due on that tomorrow.

So, I would expect the U.S. Government will be supporting that upgrading, the improvement of annex 17, and one would hope that a good many of the recommended practices are raised to standards, so that they will be more in the nature of mandatory practices of other governments.

Aside from that, I believe there has been a fair amount of, more or less, behind the scenes activity within ICAO and through diplomatic channels to bring increasing pressures on other nations to adhere to the trilogy of conventions that deal with crimes aboard aircraft, hijacking and sabotage. And one would hope, again, with the added spur of what just happened at the economic summit, that more and more nations will line up with those three important treaties.

Mr. ANDERSON. In your statement, you indicate that our carriers have, in some instances, taken it upon themselves to provide personnel

and equipment to enhance security at some foreign airports. Can you give us more examples of this?

Mr. LANDRY. Mr. Chairman, this has taken place in at least two Mediterranean airports, to my knowledge. I think perhaps, in line with what Mr. Murphy said, it would be better to name the airports in executive session where the carriers felt those steps should be taken, but it has been done, I can assure you.

Mr. ANDERSON. What steps did they take?

Mr. LANDRY. They have brought over personnel. In one case, I believe, the FAA has cooperated and brought over dog teams, or a dog team. And I believe that some more sophisticated equipment has been brought to these two airports.

Perhaps Mr. Murphy would want to expand on that.

Mr. MURPHY. Yes; there was a dog team brought to one of the airports by FAA at the request of one of our carriers because of a contingency situation that existed at that airport, and they were there for, I believe, 6 weeks. We were most appreciative of the cooperation of FAA in this regard. They brought both the dogs and their handlers over.

And at the other airport, one of our carriers was really not satisfied with the screening at that airport, so they undertook themselves to provide additional screening, plus insuring that there was adequate law enforcement support of that screening.

Mr. ANDERSON. Are you relatively up-to-date on FAA research and development efforts concerning detection taggants? What are their current programs, and in your opinion, is the FAA doing enough in this area?

Mr. LANDRY. Well, perhaps Mr. Murphy should answer that one as well, Mr. Chairman.

Mr. MURPHY. The taggant program, per se, is under the jurisdiction of the Alcohol, Tobacco and Firearms Unit of the Treasury Department. The FAA has a program embracing all aspects of explosives detection. This is not only vapor detection, but other aspects, such as some rather exotic ways, and one is called nuclear resonance, another method of determining if there is an explosive in a given bag.

The FAA has tested at their laboratory, at the DOT laboratory in Cambridge, Mass. all of the vapor detection items, and they are preparing a report on this. The results to date have not been that heartening. Insofar as being satisfied with the FAA effort, it is hard for a carrier ever to be satisfied, and we would like to see that top priority be given to this effort because of the importance of it. And as Captain Ashwood testified yesterday, we would like to see the day when a captain would know whether to go or not go by flicking a switch. We may be overly optimistic in this regard.

One thing, I think, that probably is being done, but I would like to make sure it was being done, and that is that the FAA take advantage of all the research and development efforts of the intelligence community to make sure that there may not be something that has been developed or is being developed that could have, if not a direct, at least a tangential effect on FAA explosives detection.

Mr. ANDERSON. In your prepared statement you make reference to seeking cooperation of the news media concerning the reporting of terrorist activities. Can you expand on that brief statement?

Mr. LANDRY. Well, Mr. Chairman, what gave rise to that statement was the accepted fact that what terrorists really hope to achieve is a great deal of publicity, in part for themselves, but mostly for their cause. And the more spectacular publicity that is given to the terrorists and their cause, and the success they achieve in getting that spectacular publicity, we feel invites further attempts of terrorism for that cause or other causes.

We are very conscious, obviously, of the sensitivities of the first amendment. What we would wish, though, is that perhaps the American Newspaper Publishers Association or the National Association of Broadcasters, or both, might perhaps consider at their annual meetings what could be done within the bounds of the first amendment, but at least not to glorify these terrorist acts.

Mr. ANDERSON. Are there any further questions?

[No response.]

Mr. ANDERSON. Mr. Landry, did you have a comment?

Mr. LANDRY. Mr. Chairman, I wonder if I could add just one comment in light of a question that, I believe, Mr. Hammerschmidt posed to the Justice Department witnesses, and that is, that as to the Warsaw regime which the Justice Department witness alluded to, virtually all of the aviation nations of the world are parties to that convention; it is the most widely adopted treaty in private international law in the history of the world.

As a companion piece to that treaty, there is an agreement among all the carriers of every flag which serve the United States which provides for absolute liability by the carriers for any damage, injury, or death that occurs in international air transportation to and from the countries that are parties to the treaty. So that, there really is no out for the carriers, so long as the passenger is in the act of embarking or disembarking or in flight in international air transportation.

I might say that the treaty itself is now being updated, or is in the process of being updated, and the Senate is focusing upon what are called Montreal protocols 3 and 4, which will introduce absolute liability into the treaty regime as well. I just thought that might be of some assistance to the subcommittee as it considered this.

Mr. ANDERSON. Thank you, Mr. Landry and Mr. Murphy, for an excellent presentation.

Mr. LANDRY. Thank you, Mr. Chairman.

Mr. ANDERSON. Our next meeting will be Tuesday, July 25, at 10 a.m. The witnesses will be primarily considering the taggant sections of the bill.

If there is nothing further, we stand in recess.

[Whereupon, at 11:37 a.m., the hearing was recessed, to reconvene Tuesday, July 25, 1978 at 10 a.m.]

INTERNATIONAL TERRORISM

TUESDAY, JULY 25, 1978

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
OF THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 2167, Rayburn House Office Building, Hon. Glenn M. Anderson (chairman of the subcommittee) presiding.

Mr. ANDERSON. The meeting of the Subcommittee on Aviation will come to order.

Our first witness is Mr. Paul E. Graybeal, president of the Institute of Makers of Explosives, accompanied by Frank Gordon, counsel; Harry Hampton, executive director; Pete Marks, vice president of the Atlas Powder Co. of Dallas, Tex.; Robert Lunn, duPont Co., Wilmington, Del.; Brooke Calder, Austin Powder Co. of Cleveland, Ohio.

We are very happy to have this distinguished delegation with us. We do have their prepared remarks. Mr. Graybeal, your remarks will be made a matter of the record.

[Statement referred to follows:]

STATEMENT OF PAUL GRAYBEAL, PRESIDENT, INSTITUTE OF MAKERS OF EXPLOSIVES
COVERING LEGISLATION REQUIRING THE MANDATORY USE OF TRACING ELEMENTS
IN COMMERCIAL EXPLOSIVES (S. 2013; H.R. 11946; H.R. 12516; H.R. 12517;
H.R. 12947; S. 2236; H.R. 10086; H.R. 10258)

The Institute of Makers of Explosives, known as IME, a trade association of the major commercial explosives manufacturers in the United States is pleased to have the opportunity to present its views on the proposed legislation requiring use of tracing or tagging elements in commercial explosives. It recognizes the importance of action against terrorist misuse of explosives, as well as the substantial impact such legislation would have on the explosives industry in this country.

IME and its member companies strongly support actions to prevent terrorist misuse of commercial explosive materials. Instances of criminal misuse of explosives to kill and to terrorize communities, and the increasing frequency of these events, are facts well known to citizens of this nation and of nations throughout the world. Our society demands and deserves actions by its Government to reduce, if not eliminate, these strains on a civilized community.

Nevertheless, IME believes that if the proposed legislation is enacted it is not likely to achieve the stated and desired goals and there are, in our opinion, other ways to achieve those goals. These alternatives avoid the questions of potential safety hazards to manufacturers and users inherent in legislation requiring the introduction of tagging elements—foreign objects and possible contaminants—into commercial explosives that, by definition, are highly dangerous materials.

As an alternative to the tagging of explosives, IME believes that positive steps can and should be taken, and mandated by changes in Federal laws and regulations, to achieve improved security in the use and storage of commercial explosives, and to eliminate as much as possible access to explosives by persons with criminal designs.

THE INSTITUTE OF MAKERS OF EXPLOSIVES

IME was established in 1913 at the request of the Federal Government to promote safety in the storage of explosives. Today, the Institute has twelve member companies. In some instances, the manufacture and sale of explosives represents all of the member company's business activity. In other instances, explosives represent a small part of the corporation's total business. In all instances, the member company is dedicated to the promotion of safety in the use of explosives.

IME has worked very closely for years with the Departments of Justice, Interior, Labor, and Transportation, as well as state and local agencies, providing technical advice on regulations and safety procedures relating to explosives. The Institute has also worked with the Bureau of Alcohol, Tobacco, and Firearms (BATF) of the Department of the Treasury in the administration of the sections relating to explosives of the Organized Crime Control Act of 1970, Title 18, Chapter 40 of the U.S. Code. IME and its member companies have earned a reputation throughout the Federal Government for technical competence, and as willing partners in the overall effort to provide for the safe use of explosives in this country.

IMPROVEMENT OF EXISTING LAWS TO PREVENT MISUSE OF EXPLOSIVES

The Institute is convinced that the most effective way to combat criminal misuse of explosives is to deal with misuse "before the fact" by keeping commercial explosives out of illicit channels in the first place. This can be achieved by building on the foundation of existing Federal laws and regulations governing use of explosives.

BATF enforcement of the Organized Crime Control Act to keep explosives out of illicit channels has already demonstrated the possibilities for effecting dramatic reductions in the thefts of explosive materials. In 1970, the year of the enactment of this statute, there were slightly over 100 theft incidents reported by IME to the BATF. As a result of improved security instituted under requirements of the Act, the number of theft incidents reported to BATF by IME decreased steadily to 14 in 1977. If certain loopholes in this statute were closed by amendments proposed by IME, we believe that criminal misuse of explosives resulting from unauthorized access could be further reduced.

First, title 18, U.S. Code, chapter 40, should be amended to require every person who purchases any explosive material to obtain and present to the seller a permit or license issued by the Federal Government. Under existing law, a person may purchase explosive materials without a license in the state where he resides, if permitted by the law of his state. He similarly may buy explosives from a licensed seller in a neighboring state under the "contiguous state" exemption in the current law.

IME has long taken the position that a Federal permit or license should be required for makers, sellers, transporters, and users of explosive materials—"from the powder mill to the bore hole." The Institute strongly urges that a Federal permit or license be required for all interstate and intrastate purchasers of explosives and that the "contiguous state" exemption be repealed. To exempt such a large class of persons dealing with explosives from requirements for a license or permit affords terrorists a loophole of apparent legitimate acquisition for illegitimate purposes.

Second, the Organized Crime Control Act should be amended to make it a felony to possess explosives without a permit or other proof of lawful possession, such as a bill of lading during transportation.

Third, the amount of black powder permitted to be stored in an enclosure not approved by BATF should be limited to five pounds. Over the objections of BATF and IME, the limit was raised from five pounds to 50 pounds in 1975 by an amendment to title 18, U.S. Code, chapter 40. There are ways to accommodate the lawful interests and needs of muzzle-loading hunters and history buffs, but permission to store upwards of 50 pounds of black powder in an unapproved facility affords a glaring opportunity for criminal misuse and disregards considerations of public safety voiced by experts. It should be noted that according to BATF's 1977 Annual Report of Explosives Incidents, black powder was used in 20 percent of destructive devices where the filler could be identified.

Further, BATF storage regulations under the Organized Crime Control Act should be more stringently enforced, particularly at the consuming point. Al-

though thefts of explosives in the primary distribution chains have been reduced substantially, this is not so at the point of use, where most thefts and mysterious disappearances occur. Moreover, additional security measures for all magazines should be required in BATF regulations. To this end, IME stands ready to improve magazine security and alarm systems through research and development and cooperation with BATF.

If these amendments to Title 18, U.S. Code, chapter 40 are enacted, and BATF regulations are improved and strictly enforced, IME is confident that the goal of controlling the terrorist use of commercial explosives can be attained.

SHORTCOMINGS OF EXPLOSIVES TAGGING

IME is fully aware of the desire of the Congress, law enforcement agencies, and the public to control terrorist misuse of explosives by the addition of identification tagging materials to explosives products. However, we have sincere reservations that tagging will provide the degree of security that Congress and the American people have the right to expect. Even if all the tagging problems could be solved, and there are many, the ultimate question is: will tagging help BATF reach its stated objective, to apprehend more criminal bombers faster and at less cost? On the known facts, this question has yet to be answered.

What information will tagging of explosives provide? In most instances, like the date-shift code on an undetonated cartridge of explosives, the recovery of tags from a bomb blast will lead law enforcement personnel only to the last lawful purchaser of the explosives. It will not identify the persons responsible for the bomb blast.

To attempt to evaluate the usefulness of tagging, BATF engaged Management Sciences Associates, a California research organization, to conduct under contract a cost-benefit study of its proposed explosives tagging program. IME has reviewed the report of this study and found it to be seriously deficient.

The cardinal defect of the study is that it proceeds from assumptions apparently provided to Management Sciences Associates by BATF. Of greatest significance in this regard is the study's assumption that *only* tagging of explosives will reduce terrorist bombings. There is a complete absence in the report of comparisons to other means to accomplish the same level of reduction in bombings, such as the amendments to existing Federal laws and regulations outlined above. No member of a Committee of the Senate or House should accept the validity of the results of a cost-benefit study whose benefits are assumed rather than based upon available data, or that do not recognize alternate means to accomplish the objectives.

This cost-benefit study is also deficient in that in certain respects it is based on questionable data. For example, the study states that BATF reported that in 1977 dynamite was used in 23.7 percent of all the criminal bombings in which the type of explosives filler was identified. On the other hand, BATF's 1977 Annual Report on Explosives Incidents states that dynamite was used in only 4 percent of the destructive devices where the filler could be identified. Such a wide discrepancy casts doubt on the data of the study.

Finally, in considering the usefulness of explosives tagging, the Congress must face the fact that the technology simply does not exist at this time to institute identification tagging for all commercial explosive materials. Despite years of research, the identification tagging material made by the 3M Company is the only one we are aware of. This material does not survive the blast of some types of explosives. Also, it has not yet been approved by the Mine Safety and Health Administration for use in permissible explosives.

Since BATF has concluded that insufficient tagging material is available for use in all explosive materials, only cap-sensitive cartridge high explosives are included in its proposed tagging program. These explosives account for approximately 450 million pounds, or only 12 percent of the annual commercial explosives domestic market of 3.7 billion pounds. Moreover, the decline in the use of high explosives in bombs indicates that other explosives, for which no tagging program has been developed, are becoming the favored instruments of illegal users.

No tests are currently being conducted on approximately 80 percent of commercial explosive materials sold in the United States—"blasting agents." These explosive materials, a mixture commonly called ANFO, are compounded or prilled ammonium nitrate, readily available on the agricultural market, and fuel oil.

It should be recognized that a terrorist possessing elemental knowledge of explosives can easily transform fertilizer grade ammonium nitrate into a cap-sensitive explosive compound equally as destructive as dynamite.

In lieu of tagging ANFO, BATF has focused on tagging primers or boosters generally used to detonate ANFO. Primers or boosters are high-strength explosives, frequently made from military-type explosives, producing extremely high detonation temperatures. However, up to the present time in pilot tests by the Aerospace Corporation (under contract to BATF), 3M Company tags have not uniformly survived detonation of primers or boosters.

Black powder and smokeless powder, which according to BATF were used in 1977 in 46 percent of destructive devices in which the explosives content could be identified, are also proposed by BATF to be tagged. Again, a complete technology for tagging these materials has not been demonstrated. For example, the 3M tag with a magnetic layer, being evaluated for cap-sensitive explosives, can be readily removed from smokeless powder by a magnet. A different type of tag will be required for smokeless and black powder to prevent removal but preserve recoverability. Moreover, it is questionable whether tagging of smokeless powder would be a benefit to law enforcement, because of the extremely complex distribution pattern in the smokeless powder industry.

We are not aware of any plans to tag military explosives, yet such explosives are available to terrorists in the illicit market.

The Aerospace Corporation has initiated tests to determine the practicability of identification tagging of electric blasting caps. Caps are very sophisticated devices which must function to a high degree of reliability in the interests of user safety. However, Aerospace has developed no viable method to provide an identification tag for caps and preserve their necessary safety factor.

In the development of a detection tagging material for electric blasting caps, significant progress has been made by the Aerospace Corporation. IME believes that detection tagging of caps would be beneficial, and supports the development of such a system. Moreover, since an electric blasting cap generally is an essential part of a bomb, detection tagging of caps may be sufficient and may eliminate any justification for the tagging of explosives.

OBJECTIONS TO PROPOSED TAGGING LEGISLATION

Explosives tagging is the subject of several bills that have been introduced in the Congress. The provisions of this proposed legislation are essentially the same in each of the bills. IME has specific objections to the proposed legislation as presently drafted.

IME has serious reservations about the safety of mandating the addition of tagging materials to commercial explosives within one to three years, as provided by the legislation. As indicated above, the state of the art of tagging is in extremely early stages at the present time. Potential safety hazards to workers making commercial explosives and to legitimate users of commercial explosives are posed by the addition of tagging material—a foreign object and possible contaminant—to these highly sensitive materials.

Although tests have been run by three IME member companies on a candidate 3M tag in certain explosives without safety problems, another member company conducting tests with a different candidate tag reported that the sensitivity of the explosive material there being tested—cast primers or boosters loaded with PETN—doubled upon addition of that tag. The cause of this increased sensitivity has not yet definitely been determined.

The potential hazards associated with the addition of tags to explosives are also reflected by the fact that 3M Company has refused to assume any liability for tagging materials in explosives use, except as might be connected with 3M's gross negligence in tag manufacture. Further, the proposed legislation does not contain any provision for relieving the explosives manufacturer and other downstream purchasers of tagged explosives from product liability damages caused by the addition of tags.

The fact is that the safety of tagging commercial explosives has not been proven over the long term. Tags are foreign matter to be added to explosives. The tags themselves can be contaminated. Although typical safety tests for manufacture undoubtedly will be run for any proposed tagging material, there may be a number of unknown effects of tags on manufacture, transportation, storage, or use not contemplated by anyone at this time.

With this background, IME does not believe that an explosives manufacturer, distributor, or retailer should be held responsible for any unforeseen injuries or damages arising out of the addition of tags to explosives. Accidents do and will occur. Under the doctrine of strict product liability in many states, explosives manufacturers may be held liable for damages attributed to the required presence of tags in their products. We therefore think that an essential provision of any tagging legislation is some form of an indemnification or limitation of liability or damages ceiling for manufacturers required by law to add "foreign materials" or tags to their products for law enforcement purposes.

Further, the legislation as proposed would cause an arbitrary economic imbalance in the commercial explosives industry. Tags would be required for some explosives but not others at least during the first several years after enactment. The added costs of tagging will be passed on to consumers of those explosives required to be tagged. When prices rise for these explosives, demand is likely to shift to other explosives of other manufacturers. The added costs of tagging will favor some product lines and segments of the industry at the expense of others.

Another major problem area of the tagging program is the cost of the tags themselves. BATF will be making all the decisions that affect costs. These decisions include: the selection of the tagging material, the amount of tagging material added per pound of explosives, the quantity of explosives to be identified by a single tagging code, the projected cost of recovery of tagging particles, the projected cost of analyzing the tagging particles, and the projected cost of tracing explosives from manufacturer to user.

The costs attributable to tagging cover 450 million pounds of "cap-sensitive products" only. If other explosive materials such as blasting agents were to be tagged, the costs would escalate by a factor of 8 (3.7 billion lbs./450 million lbs.).

The MSA cost-benefit study assumes a .05 percent tagging level, and a \$25/lb. cost for the tags. IME believes that accepting the low level on both counts is far from conservative. Consider that the tracing studies are very preliminary, and that any future enforcement difficulties will surely increase demand for a higher percentage of tagging material. At the present time, quantities of up to 9.1 percent have been discussed, although pilot scale testing of 0.05 percent have commenced. The batch or lot size to be tagged is not yet firm.

There will likely be pressure to reduce batch size in the future if deterrence and arrests do not increase. The cost of tags increases as batch size decreases. Commercial manufacture of tagging materials has not been established. In fact, quality control specifications are just now being ascertained for the 3M tags. Security costs of tag control have not been established. 3M suggested \$40/lb. as its potential selling price for tags. IME estimates that the costs of tags could triple: 5.6 million dollars to 18 million dollars. If the blasting agents were tagged, the program costs could escalate to 160 million dollars; and if all materials that can readily form blasting agents by mere mixing were tagged, the program costs could escalate to \$600 million per year.

The final decisions on tagging must involve cost trade-offs. The nature of the tagging material will affect the costs of recovery, analysis, and identification, as well as its basic cost. A higher concentration of tagging material in the explosive will no doubt reduce the cost of recovery of particles from the bomb blast debris. A smaller quantity of explosives identified by a single code will reduce the cost of tracing, but it will increase the unit price of the tracer and the cost of record keeping.

Final decisions on costs should optimize overall costs and not necessarily aim for the lowest BATF administrative or enforcement expense. IME submits that BATF cannot evaluate these trade-offs fairly unless the agency includes the cost of the tags in its operating budget.

An added reason for the Government to fund explosives tagging is that 3M is the only supplier of tags at the present time. Unless BATF were to develop its own tagging material with multiple suppliers, a single manufacturer will be selected with a long-term supply commitment of a proprietary, patented tagging material. He will have to make a sizable initial startup manufacturing investment. The explosives industry cannot be asked to underwrite such investment.

Finally, there is the antitrust problem. This issue is one which only the Federal Government can properly handle. The explosives industry or its trade association, IME, cannot take joint action to select one or more suppliers, select one or more acceptable tagging materials, agree to allocate supply from tag manufacturers, or jointly set tag prices. To do so would run afoul of both Federal and

State antitrust laws. Only the Federal Government can resolve these outstanding questions. In short, without a provision for the Federal Government to bear the expense of the tagging material for explosives, the proposed legislation is unworkable.

In light of the developmental state of the art of adding tracing elements to explosive materials whose nature makes foreign objects potential sources of unwanted detonation, IME feels legislation of this novel dimension would be unsound without a built-in termination clause. That is, at the end of five years the requirements should terminate unless BATF can then demonstrate to the Congress: (a) that there have been no accidents, (b) that bombings have been deterred, (c) that terrorists have been identified, apprehended and convicted, and (d) that the magnitude of the cost and its impact on the economy of this industry and the nation generally are fully justified by demonstrable results.

SUMMARY AND CONCLUSIONS

IME share the concern of the Congress and the Federal Government that something must be done to prevent criminal misuse of explosive materials.

To achieve this goal, the Institute proposes that:

(1) Existing Federal laws and regulations governing control of explosives be strengthened by requiring a Federal permit for all purchasers of explosives, and by repealing the current "contiguous state" exemption;

(2) The Organized Crime Control Act of 1970 be amended to require permit to possess explosives;

(3) The five pound limit on the amount of black powder permitted to be stored in an unapproved enclosure be restored;

(4) More stringent enforcement of BATF regulations at the consuming point be provided; and

(5) Magazine security be improved.

IME questions the usefulness of explosives tagging. Tags will, in most instances, only lead to identification of the last legitimate purchaser. The cost-benefit study on explosives tagging commissioned by BATF is deficient as a bootstrapping exercise predicated upon the conclusions desired and inadequate primary data. Existing technology has not developed a viable, effective tagging method for most of the commercial explosives used in the United States.

The Institute is troubled by the proposed legislation principally because it attempts to legislate as a solution for a social problem an unproved process which like any new technology must stand the test of time to prove safety and performance. In addition to other problems, the legislation as presently drafted would create an economic imbalance in favor of untagged explosives, poses complex indemnification, cost and quality control problems which can be equitably solved if borne by the Federal Government, and presents antitrust questions which must be resolved by the Government before any tagging program can lawfully operate within the commercial explosives industry.

Mr. ANDERSON. Please proceed.

TESTIMONY OF PAUL E. GRAYBEAL, PRESIDENT, INSTITUTE OF MAKERS OF EXPLOSIVES, ACCOMPANIED BY FRANK H. GORDON, COUNSEL; HARRY L. HAMPTON, JR., EXECUTIVE DIRECTOR; LEWIS (PETE) T. MARKS, ATLAS POWDER CO., DALLAS, TEX., AND VICE PRESIDENT OF INSTITUTE OF MAKERS OF EXPLOSIVES; ROBERT E. LUNN, DU PONT DE NEMOURS & CO., WILMINGTON, DEL.; AND BROOKE J. CALDER, AUSTIN POWDER CO., CLEVELAND, OHIO

Mr. GRAYBEAL. Mr. Chairman, you have introduced the members of the IME already. I would like to mention that Mr. Robert Lunn of the Du Pont Co., Brooke Calder of Austin Powder Co., and Lewis T. Marks of Atlas Powder Co., are experts in the manufacture of high

explosives, having had many years of experience. Mr. Marks is also the vice president of IME.

I do have here a listing of all the members of the explosives industry, and a summary of the activities of the institute which, since 1914, have been conducted to promote safety in the manufacture, handling, transportation, storage, and use of explosives materials. We believe that IME and its members have earned a good reputation throughout the Government for technical competence and as willing partners with Government in the overall effort to provide for the safe use of explosives in this country.

[List and summary referred to above, follow:]

IME MEMBER-COMPANIES

Apache Powder Co., Benson, Ariz. 85602.	Goex, Inc., Cleburne, Tex. 96031.
Atlas Powder Co., subsidiary of Tyler Corp., Dallas, Tex. 75251.	Hercules Inc., Wilmington, Del. 19899.
Austin Powder Co., Cleveland, Ohio 44122.	Ireco Chemicals, Salt Lake City, Utah 84111.
E. I. Du Pont De Nemours & Co., Inc., Wilmington, Del. 19898.	Monsanto Co., St. Louis, Miss. 63166.
Energy Sciences & Consultants, Inc., Biwabik, Minn. 55708.	Sierra Chemical Co., Reno, Nev. 89502
Ensign Bickford Co., Simsbury, Conn. 06070.	Trojan Division, Inc., IMC Chemical Group, Inc., Des Plains, Ill. 60016.

The Institute of Makers of Explosives (IME) is the safety association of the commercial explosives industry. This non-profit, unincorporated association is concerned primarily with safety in the manufacture, transportation, storage, handling, and use of explosive materials in blasting and other essential applications. Membership in IME is available to any U.S. corporation, firm, or individual engaged in the manufacture of explosives, fuse or blasting detonators.

Founded in 1913, the IME was created to provide technically accurate information and recommendations concerning explosive materials and to serve as a source of reliable data about their use. Committees of qualified representatives from IME member-companies develop this information and a significant portion of their recommendations are embodied in regulations of state and federal agencies.

The Institute's principal committees are: Technical; Transportation & Distribution; Safety Regulations; and Safety Education. The Technical Committee and the Transportation & Distribution Committee are responsible for the development and maintenance of IME's Safety Library Publication series. The Safety Regulations Committee monitors legislation and regulations at all government levels and assesses their effects upon industry operations. It also provides advisory services to duly constituted legislative committees and regulatory bodies engaged in matters related to explosives safety. The Safety Education Committee is recognized for its continuing nationwide blasting cap safety education program.

Mr. GRAYBEAL. I want to emphasize initially that the industry and its members have a constructive attitude toward the problem of bombings and the misuse of commercial explosives. We want to be helpful in any effort to keep explosives out of the hands of terrorists.

The legislation calls for the addition of identification taggants to "all explosives materials." For our industry, that would mean that taggants would be added to about 3.7 billion pounds of products annually.

This is an enormous amount of material and is almost overwhelming as a practical matter to be subjected to the addition of tracing elements and the associated recordkeeping.

In our recent work with BATF, the Bureau of Alcohol, Tobacco and Firearms, on demonstrating the feasibility of tagging explosives for identification, the emphasis has been placed on adding taggants to packaged cap-sensitive explosives which amount to 450 million pounds per year and constitute only 12 percent of the annual commercial explosives production. It should also be noted that in the BATF Report on Explosives Incidents for 1977, that cap-sensitive explosives, commonly called dynamite, were used in only 4 percent of the destructive devices coming to the attention of law enforcement agencies where the filler could be identified.

There are, to our knowledge, no studies being conducted on the addition of taggants to blasting agents, which are mixtures of prilled ammonium nitrate and fuel oil and which account for 80 percent of commercial explosives sold in the United States. Even if tagging were eventually applied to blasting agents, the tagging program will not reach homemade explosives materials. Terrorists will still be able to create homemade explosives, using a mixture of agricultural grade ammonium nitrate with fuel oil or gasoline. This was tragically demonstrated at the University of Wisconsin in 1973, in which the mathematics building was blown up, killing one person, by materials that can be purchased from the farmers co-op and the corner service station.

Since it may not be practical to add identification taggants to all commercial explosives, and since the terrorist has other materials available to him, including military explosives, we in the industry begin to wonder and question whether tagging for identification will be either a deterrent to terrorism or lead to increased arrests. It is indeed questionable whether an investigation of a bombing which may have involved tagged explosives would be beyond the identification of the last legitimate owner of the explosives.

IME and its members believe that other measures should be taken to control the terrorist misuse of explosives materials.

We propose the repeal of the "contiguous State" exemption and the 50-pound exemption for black powder now contained in the Organized Crime Control Act of 1970. Under the contiguous State exemption, a person may purchase any explosives material without a license from a licensed seller in a neighboring State. The exemption on black powder allows possession and storage of quantities up to 50 pounds without any special requirement for its security. Now, here is a readymade source of a popular material for terrorist use.

Moreover, IME has long taken the position that a Federal permit or license should be required for all interstate and intrastate purchases of explosives. IME has supported BATF for many years in efforts to enact such a provision.

Finally, storage regulations for explosives under the Organized Crime Control Act should be strengthened and rigidly enforced. Additional security measures for all magazines for explosives should be developed and adopted for use under new BATF regulations.

In short, IME would require a permit or license for possessing explosives "from the powder mill to the bore hole." Think of the deterrent effect of a possible felony conviction for possession of explosives materials without a license.

IME strongly believes that these proposed changes in the statute and regulations will aid significantly in reducing criminal misuse of explosives.

I would like to return to the question of whether tagging can be a valuable law enforcement tool. A bomb almost always contains a detonator to set off the explosive charge. Except in the most sophisticated of devices, terrorists will use a commercial blasting cap as the detonator. Now, this is especially true of a delayed action bomb, for which an electric cap, a simple battery, and a clock are ideally suited. The blasting cap is therefore the most common ingredient of terrorist bombs which would be tagged and traced.

In a recent study of terrorism the Rand Corp. cited the tagging of blasting caps as a most useful step in the fight against bombings.

The members of the explosives industry are ready and willing to assist the Government in developing an appropriate, safe program for both identification tagging and detection tagging of blasting caps. Indeed, several of IME's member companies are presently working with the Bureau of Alcohol, Tobacco, and Firearms to develop effective detection tags for blasting caps.

We submit that changes in the laws and regulations regarding the possession and security of explosives, coupled with a safe and effective tagging program for blasting caps, will constitute the most comprehensive and effective Federal program that could be enacted by this Congress for control of terrorist activities involving explosives.

Now, I would like to speak briefly on the impact of the proposed legislation on the manufacturers of explosives.

The first problem is the prospect of increased liability due to the addition of taggants to what is already a hazardous product. It is true that the proposed legislation states that :

The taggant shall not impair the safety or quality of explosives materials with respect to their intended use and shall not create any adverse effect on the environment.

During the past 2 to 3 years, some of the IME members have been working with BATF in demonstrating the feasibility of adding taggants to explosives. Although three of our member companies have used tags in their products with satisfactory results, one member company reported that the sensitivity of its explosive material was doubled upon addition of a particular candidate tag. We do not have, at the present time, any data on long-term compatibility between taggants and explosives.

The members of the industry are vitally concerned about potential safety hazards posed by the addition of tags to our highly sensitive products. Before regulatory requirements for tagging should become effective, the industry believes that Congress must be assured, through complete, thorough, and adequate testing, that tagging materials will not cause increased sensitivity of the explosives.

Adequate testing of the taggants for safety prior to their use will not satisfy completely the industry's concern for this problem of liability. Accidents with explosives have occurred in the past and they will occur in the future. When someone is injured in an accident, the manufacturer of explosives is almost invariably named as a defendant in a suit for damages.

This is a risk that we live with in the normal course of business. We do not want that risk to be made greater by the fact that we added tagging materials to our products. We, therefore, believe that Congress should protect the explosive manufacturers against any claim that an

accident or personal injury resulted from his having added taggants to his products.

The second problem with the proposed legislation is that it makes no provision for the supply of the taggant materials. Identification taggants will be unique materials selected to meet the needs of the law enforcement agencies. We regard the tagging program as a law enforcement tool, similar to fingerprint records, and, in fact, all of the decisions affecting the supply of the tagging materials will be made by the U.S. Government agency for the Government's benefit.

The agency will decide the type of taggant to be selected, on the basis of its inertness to the explosives, its survivability in the bomb blast, and the ease with which it can be recovered and identified. To our knowledge, only a proprietary material manufactured by the 3M Co., meets these requirements at the present time.

Second, the agency will determine the concentration of the taggants in the explosive that is necessary to give a reasonable survival rate and make it easy to recover and identify the tags. We are told that this concentration may vary from 0.05 percent to 0.1 percent.

And, next, the agency will decide the quantity of explosives to be identified by a particular taggant code. Now, we understand that that may be in the range of 10,000 pounds of explosives per taggant code up to 20,000 pounds, and this is a range which is thought to keep the tracing problem within reasonable bounds.

In satisfying the requirements of these last two items, concentration and quantity, the taggant codes will be manufactured in batches that may range from 5 pounds to 20 pounds of material. The number of taggant codes for 450 million pounds of explosives would vary from 22,500 to 45,000 per year. These decisions on the batch size and the concentration will have a significant effect on the supply problem.

Finally, the Government agency will be the depository of records. They will have an alpha numeric identification for the code. They will also have the physical chemical identification which lets them recover and identify the materials. They will also have the records as to which explosives company used which codes.

Since all the features of identification taggants are so unique to the requirements of the agency, it is most likely that identification taggants will be supplied by a single manufacturer.

We also believe that a detection taggant may be so unique as to require a single source in order to have security against false alarms.

Only the Federal Government can arrange with that sole source manufacturer for a long range supply of materials that satisfies Government needs under terms that are fair to the manufacturer and to the public. The explosives manufacturers would have an antitrust problem in dealing with a single source for the tagging materials.

We in the industry will not be making any of the decisions that affect the taggant costs, and we cannot predict or control what the costs may be. Besides the uncertainty about the actual cost of the taggants, we expect the regulations will be introduced selectively and any manufacturer whose products are tagged will be at a significant disadvantage if he has to purchase the tagging materials.

We therefore recommend most urgently that the legislation provide for the tagging materials to be furnished to the manufacturers. We be-

lieve any other procedure for assuring an adequate supply and meeting all the requirements of the Government agency will be unworkable.

The operational aspects of adding the tagging materials to the explosives—that is, the mixing at our plants and the associated record keeping—will be a moderate cost burden to the manufacturers. We are prepared to accept the expense and inconvenience of that operational aspect as our contribution to the overall tagging program.

In summary, we have proposed steps: one, to improve security over commercial explosives and to make illegal possession of explosives a felony. These steps should be taken whether or not there is a tagging program. We have urged continued work on the tagging of blasting caps as an alternative to the tagging of selected commercial explosives. We have requested that the legislation include a provision to protect the explosives manufacturers from any increase in product liability. And we have requested that the legislation provide for the government to furnish the tagging materials to the explosives manufacturers.

Finally, we believe that the legislation should be subject to review and reenactment after 5 years to be sure that the benefits from tagging justify the costs.

Our counsel has specific language on our changes, and he would be happy to work with your counsel, and we will answer any questions which you may have.

Mr. ANDERSON. Thank you very much, Mr. Graybeal, for a fine statement.

You indicate that “the decline in the use of high explosives in bombs indicates that other explosives, for which no tagging program has been developed, are becoming the favored instruments of illegal users.” Can you explain that sentence more fully and provide for us any hard evidence you have to back that statement?

Mr. GRAYBEAL. In the BATF report of 1977, on table 13, page 22, there is a listing of the type of fillers used in explosives. And we see there an increase in black powder, from 22 to 29 percent; an increase in the number of smokeless powder bombs, from 108 to 133, a percentage of 18 percent; an increase in the use of military explosives, from 1.8 percent to 2.4 percent; dynamite is the same, at 4 percent; blasting agents have increased from 2½ percent to 3 percent; and others which were not identified, from 1.9 percent to 6½ percent. A second source of information on the use of high explosives is the report by Management Services Associates, page 32, which states that dynamite was used in 48.9 percent of bombs in 1975, 41.5 percent in 1976, 32 percent in 1977.

Mr. HAMMERSCHMIDT. Will the chairman yield?

Mr. ANDERSON. Yes; sure.

Mr. HAMMERSCHMIDT. Are we all looking at the same statement? Do we have the printed statement that was presented to us verbally?

Mr. GRAYBEAL. What I presented this morning was a verbal statement. My prepared statement has been received for the record.

Mr. ANDERSON. It would be in the one that was given to us. That is the one we have perused for the questions.

Mr. HAMMERSCHMIDT. Thank you, Mr. Chairman.

Mr. ANDERSON. You indicate that “it is questionable whether tagging of smokeless powder would be a benefit to law enforcement, because of the extremely complex distribution pattern in the smokeless powder industry.” Could you explain that, please?

Mr. GRAYBEAL. You are going to hear later from the representative of the smokeless powder industry. Some of us are involved in both smokeless powder and explosives, and we did include in our assessment of the tracing problem a reference to smokeless powder and the fact that when smokeless powder leaves a manufacturer's plant in reasonably small lots, it does move across the country and ends up in many, many retail stores and in many, many users' homes. And that was the problems or the circumstance that we referred to in this comment on the difficult problem of tracing a 1-pound canister of explosives from a manufacturer's plant to the ultimate user.

Mr. ANDERSON. Do you have any evidence to substantiate your quote, "serious reservations," unquote, about the safety of mandating the addition of tagging materials to commercial explosives within 1 to 3 years?

Mr. GRAYBEAL. Each individual manufacturer of explosives will have his own special concerns for safety. Some of us have worked with BATF and the Aerospace Corp. in incorporating taggants; some of us have tested the materials to satisfy ourselves whether or not there are any hazards.

I think some of the manufacturers are dealing with materials that are especially sensitive, and one, in particular, had observed a significant increase in sensitivity when he added a particular candidate tag to his product.

We do not have a history of having added the tagging materials, and we do not know what might happen after 1 year or 3 or 4 years—some of these explosives products can lie around for quite some time.

We have put here in our statement a summary of the concerns, which will vary from one manufacturer to another, but we tried to report to you all the concerns of the industry. And we are not aware that there has been adequate testing to satisfy all of the manufacturers, with all of their products, within the timetable that is listed in the legislation.

Mr. ANDERSON. Have any specific safety problems arisen in the current pilot program?

Mr. GRAYBEAL. The only one I am aware of is with another manufacturer, and I cannot speak specifically to his problem; perhaps Mr. Calder can. Can you, Brooke?

Mr. CALDER. As I understand—and it is not my corporation, and we have not had an opportunity to fully understand this area—but it is a case where the protective outer polyethylene coating is being dissolved in long-term association with nitroglycerin. To date, we do not know what this effect is, but we have found that there is a deterioration of that outer coating that is on the tag.

Mr. SNYDER. Will the chairman yield?

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. I do not know that I will ask you to identify the company for the record, because I do not want to have some false accusation—you know.

Mr. CALDER. I can identify the corporation, sir. It is the Trojan Powder Division.

Mr. SNYDER. Well, I just wanted to ask the chairman if we ought not to hear from those people, or at least get some kind of a report for the record, before we make a final determination on this thing. If they are

having some safety problems, and they are not represented here, I think we ought to know about them, and I make that suggestion. Thank you.

Mr. ANDERSON. What evidence do you have to back your claims on page 12 that the "3M Co. has refused to assume liability for tagging materials in explosives use, except as might be connected with 3M's gross negligence in tag manufacture"?

Mr. GRAYBEAL. I do not have the document with me, but it was in the testimony of the 3M Co. before a subcommittee of Senate Judiciary Committee on hearings held in reference to Senate bill 2013.

Mr. ANDERSON. You indicate that proposed legislation, as drafted, "would cause an arbitrary economic imbalance in the commercial explosives industry," because some would be tagged and others would not be. Are you making an argument against the legislation on this basis, or are you arguing that we should include all explosives within the parameters of the legislation, so as to eliminate your claim of economic imbalance?

Mr. GRAYBEAL. From the standpoint of using tagging as a law enforcement tool, we have suggested that there will be selective introduction of the taggants, as the technology is ready to permit the introduction. And from the standpoint of the law enforcement agency, we certainly understand that as soon as development work is completed on a particular type of explosive, tagging would begin.

We pointed out that if the manufacturer must bear all of the costs, including the purchase of the tagging material, he will have, instantly, a disadvantage, and we have recommended in our paper that that problem can be circumvented by having the tagging materials furnished to the manufacturers. And with respect to that furnishing of tagging materials, I would submit that the most important advantage of having that done is that it provides the agency with the opportunity to arrange for the long-term supply of a material that meets the agency's requirements, where the agency is in full control. And we submit that it will be an antitrust problem if the industry tries to get together with the tagging manufacturer and solve all the problems of long-term supply commitment, which manufacturer receives what material and what price the manufacturers will pay for these materials.

Mr. ANDERSON. What evidence do you have to substantiate the statement that "any future enforcement difficulties will surely increase demand for a higher percentage of tagging material"?

Mr. GRAYBEAL. The tagging system starts out with the manufacturer adding this small quantity which is thought to be in the range of 0.05 to 0.1 percent. A concentration of 0.1 percent would be 1 pound of taggant in 1,000 pounds of explosives. The tagging material has to survive the blast and be available for collection by whatever mechanism is used, whether it be a magnet to pick up the particles or whether it be observing them by a special light.

What we have suggested here is that as time passes, there is going to be, we believe, certainly a desire on the part of the law enforcement agencies for that recovery operation to be as easy as possible, and one way to make that easier is to just require putting more taggants into the explosives in the first place so that the chances of survival for easy pick-up are improved.

Mr. ANDERSON. You change your argument against the legislation from one of impracticality and lack of effectiveness, to one of arguing in favor of the Government funding the explosives tagging program. Will you favor this legislation if the Government were to fund the introduction of tagging during the manufacturing process?

Mr. GRAYBEAL. We would have no objections to the legislation.

Mr. ANDERSON. Has the IME as an organization, as opposed to some individual members, publicly endorsed the pilot tagging project now being conducted by the BATF?

Mr. GRAYBEAL. We have certainly participated as individuals and as IME, as an organization. We have one person designated by IME to sit on an advisory committee to the ATF and their program. A number of individual companies have cooperated in pilot tests. I don't believe I can state categorically that we have, as an organization, made a public statement of endorsing the program.

Mr. ANDERSON. It is my understanding some of your individual members have, but that you, as an organization, have not. I was just kind of wondering why you did not endorse it.

Mr. GRAYBEAL. Well, the IME organization represents its members. I cannot confirm that any individual company has endorsed the program. There is a difference, I believe, between endorsing, or advocating and tagging explosives and not objecting.

Mr. SNYDER. What you are saying is, like Alben Barkley used to say, "some of my friends are for it and some are against it, and I am with my friends." That about sizes it up, does it not?

Mr. GRAYBEAL. Yes.

Mr. ANDERSON. I might say that I was rather fortunate to have the ATF do a demonstration in my own district at Fort McArthur, and they blew up an old cottage there, a home—a shack, I guess you would say—and an old automobile. In both cases, there was quite a bit of destruction. It was just a matter of, like, 10, 15 minutes before they went in there and found the identification taggants. It was very, very impressive.

I suppose it does pose problems, but it seemed to me like an awfully good device to try to develop if we can, and that is why we are working on this.

Mr. Gordon?

Mr. GORDON. Did you watch them seed the area with the tracing elements, so that they would be sure to find them afterwards? That is what they did, I am informed. They made sure they would find the tracing elements in the demonstration.

But what did they learn from that? They learned that they could identify the tracing element. They did not identify who set off that explosion. Did the finding of that tracing element tell you the name of BATF employee who detonated the demonstration? It did not.

Mr. ANDERSON. I was the one, in one case, who detonated it. I am shocked if there was seeding. I do not think they had the time on that. The stuff was not easy to find; they did have to go in and dig into the ground where the explosive had gone in or into the wall of the building and find little particles here and particles there. It was not a simple matter, and they had to have experts do it.

Mr. GORDON. Well, I do not think there is any question but what technologically you could develop a tracing element that you could

find; I do not see any problem with that. In this country, we have enough scientists so that we could put a tracing element in an explosive and, hopefully, it would be safe if you could make sure of that, and you could find it.

But there is a grave question in my mind as to whether you have learned anything more than the identity of the owner, the person who initially bought it. And it does give you a place to start, but it is not much of a lead.

As counsel to IME, I have urged upon them, and the Institute members have urged universally for many years, that the safest thing to do is to keep the stuff locked up; to do everything you can to keep it out of the hands of the people who will misuse the product. That preventive measure would be much more effective than this tracing element in the explosive that you search out afterwards, as you saw them do in your demonstration.

Mr. ANDERSON. How do you know that the demonstration was seeded, or how did you come to that conclusion?

Mr. GORDON. Somebody told me that; somebody who was there said they saw them do the seeding. But I do not think that is the important part of it. The important thing is that you do not learn as much that way and be effective in keeping people from being on the business end, the receiving end of a bomb, as you do by keeping it out of the hands of the bomber in the first place.

You are just talking about our product, industrial explosives, not homemade explosives, which are easy to make, as Mr. Graybeal's statement shows. You are just talking about commercial explosives. If you put them under control, the way the druggist keeps control of narcotics, then the commercial explosives will be out of the hands of the bomber and you will have to worry about the others.

Now, if you are going to use tracing, go after the blasting cap, because that can be used to detonate commercial as well as home-made explosives, and it is the one key, common element that would give you the ability to do that tracing. And it also is an instrument that, if you worked it out properly, you would seed the blasting cap, put the tracing element in it, without affecting its performance, because it has got a container.

This is where I think the program ought to go, if it is going to go anywhere.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. Thank you, Mr. Chairman.

Mr. Gordon, your last observations, I think, are very cogent. However, it strikes me that the same observation that you make about the difficulty of the tagging system working also applies to the proposal that Mr. Graybeal testified to in regard to the licensing or permitting of makers, sellers, transporters and users of explosive materials "from the powder mill to the borehole." I think the same problem is in existence in regard to both approaches.

In that connection, Mr. Graybeal, you get right down to reloading your own shotgun shells, is that correct?

Mr. GRAYBEAL. With respect to smokeless powder?

Mr. SNYDER. Well, with regard to whatever; you might be putting black powder in; regardless of what you are reloading them with;

you could be reloading them with either. But a lot of folks out here have reloading equipment and reload their own shells—it is cheaper that way.

Mr. GRAYBEAL. Sir, this reference to “from the powder mill to the borehole” must apply to explosives as manufactured and sold by the members of the IME.

Mr. SNYDER. Now, you address yourself to smokeless and black powder in there, too, and that statement does not exclude black powder or smokeless powder. I take it the borehole is a gun.

Mr. GRAYBEAL. Well, it was intended to mean the borehole in the ground in which the explosives are placed.

Mr. SNYDER. I see. It did not mean a gun?

Mr. GRAYBEAL. Not in this instance, no.

Mr. SNYDER. Well, you also made the point in your statement that you can make explosives—I believe you said commercial fertilizer and gasoline. What good is it going to do to license in your particular area and not license every farmer who has commercial fertilizer and has tractor gasoline around? And the same thing applies to the taggants. I am only using this approach with this question, because this is the approach you take.

Mr. GRAYBEAL. The regulated explosives include the blasting caps, the dynamites, slurry water gels, the ANFO's, and we are now operating under license, but the licensing does not go all the way.

Mr. SNYDER. That does not answer my question. I am saying that you want to license the legitimate operator. I do not really have much argument with it one way or the other. I just do not know how that gets to the problem.

Mr. GRAYBEAL. It does not, sir.

Mr. SNYDER. I think in your testimony, or maybe it is in the BATF testimony—and you quoted from a lot of their statistics—I do not know—something like 20 to 40 percent, or some figure like that, of explosives used—I guess you meant illegally—were of black powder origin.

We want to get to the problem, and the problem, I do not think, is going to be with your manufacturers; it is going to be with the culprits out here who can go to a hardware store and buy saltpeter, sulphur and charcoal, or buy the commercial fertilizer and the gasoline, and make their own explosives.

I do not quite see how taggants are going to solve that, but I also do not see how your licensing procedure is going to solve it. I see the same problem with your approach as I do with the taggant approach, which you are falling on the other side of. I think, probably for economic reasons rather than for a justification that there is some better solution by the licensing permit. And I say that not trying to be critical, but trying to get to the point.

Mr. GRAYBEAL. We certainly agree that neither the tagging nor the licensing “from the powder mill to the bore hole” will prevent somebody from going outside and making his own explosives.

The blasting caps are a common ingredient. We urge that we try to find a way to have detection tagging and identification tagging possible on blasting caps.

Mr. SNYDER. I do not know much about this subject, so I ask this in sincerity: if we had a way to tag or license or regulate the blasting cap, would that then make black powder, smokeless powder and some of these other things not susceptible to the kind of terrorist thing that we are concerned with here? I mean, can you detonate black powder in a pipe bomb without a blasting cap? I do not know.

Mr. GRAYBEAL. I would like to ask Mr. Lunn of the duPont Co. to respond to that question.

Mr. SNYDER. If we could get to the one thing that would make a difference, I think it would be good.

Mr. LUNN. You used the term, "can you detonate black powder with a blasting cap." The answer is, in the case of black powder, it cannot be detonated; it will explode. There is a distinct difference between a detonation and an explosion.

Mr. SNYDER. The use of the term was ignorance on my part.

Mr. LUNN. So, the black powder will explode, and it can be exploded by the mere application of fire, like a spit of the fuse or a rag that is burning. It does not require a blasting cap.

The same thing would be true with smokeless powder in a pipe bomb; it could be ignited without a blasting cap.

Mr. SNYDER. In other words, you could get a piece of fuse and stick it in there, light it and throw it in somewhere, without a blasting cap on the other end, and have roughly the same explosion?

Mr. LUNN. Well, there is a measured difference between the magnitude of an explosion, but it will do the work, yes.

Mr. SNYDER. On an airplane, or some such?

Mr. LUNN. Oh, yes.

Mr. SNYDER. That is what we are, of course, basically concerned with in this subcommittee.

Mr. LUNN. That is correct.

Mr. SNYDER. So, the blasting cap itself, then, by regulating, that really is not going to solve the problem either, is it?

Mr. LUNN. One of the major things that is involved in a lot of the bombings, and certainly some of the major catastrophes, I think most of the records show there is a decided time element, where the people want to have that bomb go off at a specific predetermined time. And generally, these would be done with an electric blasting cap, and these turn into your major catastrophe type of thing.

There is another kind of blasting cap which we call an instantaneous blasting cap, which is initiated by a spit of a fuse. But that would be rather difficult to use in any sophisticated, predetermined time when it might go off.

Mr. SNYDER. Mr. Graybeal, in your testimony, you gave references to percentages of explosions caused by different types of explosives—black powder, and this, that and the other.

Do you have a breakdown, or is it in your statement or do you have a chart that indicates the number that involve blasting caps?

Mr. GRAYBEAL. I do not have any data that would indicate how many of the bombings involved blasting caps, but any that were a delayed type of bomb most likely had a commercial, electric blasting cap.

Mr. SNYDER. In other words, on the time device type, you would have a blasting cap?

Mr. GRAYBEAL. Yes.

Mr. SNYDER. And insofar as we are concerned with our aircraft jurisdiction, one would logically assume that you would be talking about all of them, or very near that.

The chairman asked you some questions, I believe, on pages 14 and 15 about costs, and I know you made reference in there about the costs of the taggants themselves. What does it cost to add taggants to a pound of explosives? Do you have a number on that?

[Pause.]

Mr. SNYDER. You can supply that for the record.

[The following was received for the record:]

AUGUST 18, 1977.

Dr. ROBERT B. MOLER,
Director, Explosives Program,
The Aerospace Corp.,
Washington, D.C.

DEAR DR. MOLER: I enclose for your information copies of the responses received by me to the questionnaire put out to our members by Mr. Graybeal concerning an estimate of the cost of adding tagging elements to explosives.

I received responses in tabulated form from only five of our member companies, but you should understand that some of our members are in the NCN area only, or make such things as cast primers or safety fuze and detonating cord.

One of the responding companies did not use the table. They estimate that it is costing them \$1.20 per 100 lbs. to run the date/shift code numbers. They estimate that to implement the tagging program, apart from the cost of the tagging materials, would be \$1 per hundredweight on a 50,000-lb. tagging level, \$1.50 on a 20,000-lb. tagging level, and \$1.75 per hundred for the 10,000-lb. tagging level. They point out that these costs are for manufacturing only and do not reflect additional field costs at the manufacturer's first level of distribution.

Very truly yours,

FRANK H. GORDON.

Attachment.

ESTIMATED COST OF IMPLEMENTING THE TAGGING PROGRAM COMPARED TO PRESENT PRACTICE

[In thousands of dollars per year]

	Size of the tagged explosive unit (pounds)		
	10,000	20,000	50,000
I Costs based on all cap sensitive commercial explosives:			
(a) Rescind date/shift/plant code	100	80	40
(b) Continue date/shift/plant code	125	100	50
II Costs based on all cap sensitive commercial explosives (same as I) plus non-cap sensitive commercial explosives in packages 2 inches in diameter or smaller:			
(a) Rescind date/shift/plant code	100	80	40
(b) Continue date/shift/plant code	125	100	50

ESTIMATED COST OF IMPLEMENTING THE TAGGING PROGRAM COMPARED TO PRESENT PRACTICE

[In thousands of dollars per year]

	Size of the tagged explosive unit (pounds)		
	10,000	20,000	50,000
I Costs based on all cap sensitive commercial explosives:			
(a) Rescind date/shift/plant code	320	257	98
(b) Continue date/shift/plant code	320	257	98
II Costs based on all cap sensitive commercial explosives (same as I) plus non-cap sensitive commercial explosives in packages 2 inches in diameter or smaller:			
(a) Rescind date/shift/plant code	320	257	98
(b) Continue date/shift/plant code	320	257	98

Estimated costs added to production costs to put taggants into cap sensitive products is:

	<i>Per 100 pounds</i>
1. Forf N.G. dynamites.....	\$0.18
2. For slurries.....	.13
3. One-time startup cost applies to first-year use.....	.05

These costs are exclusive of costs of the taggants themselves.

ESTIMATED COST OF IMPLEMENTING THE TAGGING PROGRAM COMPARED TO PRESENT PRACTICE
[In thousands of dollars per year]

	Size of the tagged explosive unit (pounds)		
	10,000	20,000	50,000
I Costs based on all cap sensitive commercial explosives:			
(a) Rescind date/shift/plant code.....	13.4	8.5	2.9
(b) Continue date/shift/plant code.....	15.7	10.8	4.4
II Costs based on all cap sensitive commercial explosives (same as I) plus non-cap sensitive commercial explosives in packages 2 inches in diameter or smaller:			
(a) Rescind date/shift/plant code.....	13.4	8.5	2.9
(b) Continue date/shift/plant code.....	15.7	10.8	4.4

Mr. LUNN. The costs for adding taggants, plus the attendant recordkeeping is going to depend on what type of explosive is being tagged in the first place; the costs on dynamite will be one thing, and water gels and slurry explosives, another.

As indicated in here, we feel that the cost of recordkeeping is a moderate one, and it will vary between the different explosive companies, depending on the circumstance. So I could give you what I thought it would be in our particular line of explosives, and I will respond to that. It will vary, but we feel it is a moderate cost, and that could be borne by the industry without a problem.

Mr. SNYDER. The figure was used in there, "could escalate to \$600 million."

Mr. LUNN. Well, the major cost in this is going to be the cost of the tag, and the \$600 million figure had reference basically to the tag itself, as against the recordkeeping.

Mr. SNYDER. Now, that is industry cost, right?

Mr. LUNN. That would be the cost that would start with the basic material from the taggant manufacturer, yes.

Mr. SNYDER. Now, that is the cost of the tag that could escalate to \$600 million, and in addition thereto, you would have in industry the recordkeeping costs?

Mr. LUNN. That would be in addition to this amount of money.

Mr. SNYDER. And in addition thereto, there would be costs not borne by the industry, but Government costs in enforcing, regulating, supervising, and so forth?

Mr. LUNN. Plus the customers, the distributors, and everybody down the line.

Mr. SNYDER. You would have no estimate of that, I take it.

Mr. LUNN. No, I would not, sir.

Mr. SNYDER. Would you use the word "insignificant" or "substantial" or something in between?

Mr. LUNN. Moderate.

Mr. SNYDER. I see. What is the chemical composition of a tag?

Mr. GRAYBEAL. Sir, I cannot give you a precise answer to that. You may hear later from the other persons giving testimony. I can say that it is our understanding that the 3M Co.'s tag is built up from layers of melamine resin, each layer having a different color.

The particle, looking at it on the edge, has a series of colors stacked one on top of the other, and the code is determined by the sequence of those colors. One side of this little sandwich will respond to ultraviolet light; another side will respond to a magnet to help in the identification.

But the code is in the sequence of colors which has to be determined by somebody, oriented properly under a microscope, reading off the colors; that going to a computer translation, into an alphanumeric number.

Mr. SNYDER. I understand it has sulfur on one side for showing ultraviolet light, and a magnetic substance on the other. Of course, what you understand it is made of, that did not mean much to me.

Was the safety problem that was alluded to here today as a result of any chemical reaction between the tags and the explosive substance itself? Maybe you can respond to that, Mr. Calder.

Mr. CALDER. To my knowledge, sir, the long-range testing program is still continuing, and that has not been determined, whether there has been a chemical reaction yet. The problem, if I might, sir, is that there has been a very limited supply of these taggants, and it has only been put into the commercial explosives for a relatively short period of time.

Typically, new products by the industry are looked at for storage compatibility up to about 3 or 4 years to make sure that there is not some sort of instability that comes on further. This product has not had the opportunity to go through that discipline yet.

Mr. SNYDER. It is a very interesting subject. I am not going to belabor it any further, Mr. Chairman; I do have some problems with it.

I might say, in passing, to Mr. Gordon that your observation about BATF seeding the experiment is of particular concern to me, coming from a bourbon State where they are often confiscating some of our good products, claiming they have foreign material in them. That causes me to have more concern about that than I have had in the past. Thank you very much.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. No questions.

Mr. ANDERSON. Mr. Hammerschmidt.

Mr. HAMMERSCHMIDT. I have no questions, Mr. Chairman.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. No questions.

Mr. ANDERSON. Gentlemen, thank you very, very much for an excellent presentation.

Mr. GRAYBEAL. Thank you, sir.

Mr. ANDERSON. Our next witness is Mr. Neal Knox, executive director, Institute for Legislative Action, National Rifle Association of America.

Mr. Knox, we do have your prepared statement and it will be made a matter of the record at this point.

[Statement referred to follows:]

STATEMENT OF NEAL KNOX, EXECUTIVE DIRECTOR, INSTITUTE FOR LEGISLATIVE ACTION, NATIONAL RIFLE ASSOCIATION OF AMERICA

Mr. Chairman, I am Neal Knox, Executive Director of the National Rifle Association Institute For Legislative Action. It is a pleasure to be able to appear before you today to express our concerns on the anti-terrorism bills before both Houses of Congress, particularly as these bills relate to the issue of explosives tagging.

It may surprise Members of the Subcommittee to have the NRA testify on the explosives tagging provisions of H.R. 13261. However, these tagging provisions would affect not only high explosives but propellant powders used by the million members of the National Rifle Association and millions of other sportsmen throughout the country. It would affect black powder used by antique and reproduction firearms enthusiasts, and smokeless powder used in modern firearms ammunition and by shooters who reload their own ammunition.

The tagging sections of H.R. 13261 and the numerous similar bills introduced in this Congress do not define nor refer to any existing statutory definition of the term "explosive material." Since there are several definition levels of explosives within Title 18, the Treasury Department could presumably construe the applicability of the tagging requirement however it saw fit. Since the Treasury Department has already stated, during the Senate Governmental Affairs Committee markup of S. 2236, that the definition of explosive does cover both black and smokeless powders, we may assume that the inclusive definition of explosive is operative, and that unless black and smokeless propellant powders are specifically exempted, they will probably be tagged.

The National Rifle Association does not take an official position concerning the licensing, manufacture, and restrictions placed upon commercial high explosives, for that is not an area within our field of interest. But I am here today, on behalf of sportsmen across the country, in order to ask that the Subcommittee specifically exempt smokeless and black powder from the explosive tagging provisions of the anti-terrorism bill.

Inclusion of those propellants in the bill would result not only in an explosives control program but also in an ammunition control program that would have a serious detrimental effect on firearms owners.

Technology for detection tagging has not yet been developed. Tests on identification tagging are nowhere near complete, except for some high explosives. No reliable method for tagging smokeless powder has been developed, and black powder tagging has only been tested with regard to its effects on the grade of black powder used for blasting. Not a single round of tagged sporting grade powder has been fired from a muzzleloading firearm.

Based on the information brought to light in the hearings before the Senate Subcommittee on Criminal Laws and Procedures and on the nature of black and smokeless powder as explosives, we can only conclude that the effect of such provisions would be to greatly increase the paperwork required by manufacturers and dealers of propellants without achieving any appreciable gain in solving criminal bombings.

According to Bureau of Alcohol, Tobacco and Firearms' figures, black and smokeless powders were only involved in 9.3 and 13.9 percent of criminal bombings in 1977. In BATF's own testimony before the Senate Judiciary Subcommittee on September 12, 1977, Mr. Atley Peterson, Special Assistant to the Director for Research and Development of BATF, stated, and I quote, "Because they (black and smokeless powders) produce a low-order explosion, loss of life, injuries and property damage are small."

I do not deny that a bomb of sorts may be fashioned using either smokeless or black powder propellant. However, to make an effective bomb with propellant powder is expensive, and requires considerable knowledge; enough to insure that anyone possessing such knowledge could with equal ease make a cheaper, far more deadly bomb from other substances.

For instance, this bill would not attempt to tag prilled ammonium nitrate, the principal explosive used today, because there is no difference between commercial ammonium nitrate used for blasting and the far greater amounts of ammonium nitrate used as a fertilizer.

BATF's justification for not recommending the tagging of ammonium nitrate is that the standard ammonium nitrate/fuel oil mix requires a booster charge of high explosive for it to be reliably detonated; and by BATF's theory, that booster charge would be tagged. However, ammonium nitrate may be illegally mixed with a fuel which is itself an explosive, such as gasoline or nitromethane, the hot-rodder's "speed fuel," both of which are technically classified as explosives in standard reference books. If ammonium nitrate and gasoline are combined, the result is an explosive both more powerful and far more easily detonated than standard ammonium nitrate/fuel oil mix.

Ammonium nitrate and gasoline may be easily and reliably detonated by a booster charge consisting of the same combination of ingredients inserted in a pipe or similar container and initiated by nothing more exotic than a conventional firecracker.

Such a homemade explosive was used with deadly effect when the Mathematics Research Center at the University of Wisconsin was bombed in 1970, killing one student. The explosive charge was approximately 1,700 pounds of ammonium nitrate fertilizer mixed with gasoline, placed in a rented van, and parked in front of the building. The destructive force was so great that the building was destroyed by that blast from the street.

The list of materials which may be easily and quickly fashioned into deadly bombs is endless. An explosive consists merely of a fuel and an oxidizer, which may either be simply oxygen from the air or a chemical which during burning produces large amounts of oxygen.

As a case in point, a standard U.S. Army manual lists as a special charge for use in flattening large buildings an explosive fuel which every Member of this Subcommittee has in his home—household flour. Reprints of that Army manual are widely circulated in the underground press. I have obtained a copy. Other pamphlets and brochures with such titles as "The Militant's Formulary," and "The Anarchist's Cookbook" are widely available to terrorist groups and contain an endless list of simply made heinous devices. Just last week we received in the mail two issues of "The Urban Guerilla" magazine, put out by the New World Liberation Front. In their "Manual of Warfare" they explain how to make ammonium nitrate fertilizer explosives, "kitchen napalm" using soap flakes, and initiators, detonators and timing devices from firecrackers, cigarettes, mouse-traps and wristwatches.

A month or two ago, there was a great furor in the press concerning a study by a graduate student, who from information available in libraries, had designed what was said to be a crude but workable nuclear weapon. Much was said about what terrorist groups could do with such a device. That discussion underscores the fact that terrorists are not uneducated street criminals. On the contrary, many are intellectuals familiar with both chemistry courses and libraries.

Among the commonly available explosive substances not covered in this tagging bill—substances not capable of being tagged for identification—are flammable liquids. I had been aware that an increasing number of "gas bombs" were being used by terrorist and criminal bombers, but until I read BATF's statistics, I had not been aware that these account for some 25 percent of "criminal bombings"—not just "explosives incidents." Such gas bombs and "Molotov cocktails" are now more frequently used than smokeless and black powder bombs.

If we accept BATF's statistics, it is apparent that black and smokeless powder are a comparatively small part of the bombing problem. And in the case of black powder, it is unlikely that all incidents involve commercially manufactured sporting grade black powder. Undoubtedly, many black powder incidents involve homemade powder or nonsporting grade powder such as fireworks or blasting powder. Any youngster with a hobby store chemistry set and a simple three-part formula can produce black powder. I, with a group of other youngsters, made some crude but effective black powder when I was 12 years old.

There are two basic classifications of explosives: high explosives and low explosives. The delineation between the two is not always clear, for various references do not agree. However, should this committee decide to tag explosives, those should only be high explosives, unless it intends to tag all equally hazardous low explosives.

For this Subcommittee to require an expensive, untested, and unproved tagging system for smokeless propellant and black powder, without placing similar restrictions upon all equally hazardous low explosives, would be discriminatory against handloaders and muzzleloaders as classes of citizens.

I feel certain that there is no intent by the authors of this bill or the Members of this Subcommittee to work a hardship upon shooters and handloaders,

but that would be the effect. In order to trace half-pound or one pound cans of propellant used by handloaders and muzzleloaders, which are often sold to dealers only two or four cans at a time—records must be kept on every can. Members of industry have estimated that the additional cost due to increased record-keeping will average 80 cents per can before it reaches the dealer.

It can be reasonably assumed that the total amount of time spent by the dealer or his clerk in entering receipt of the propellant, and entering the disposition into his sales records, plus the time spent going over those records periodically with BATF agents, will be at least 5 minutes per can. Conservatively, the cost of an employee's time is about 15 cents per minute, which will add another 75 cents to the cost of a single can of powder.

Without considering the cost of the taggant material to the manufacturer, or the far greater cost of blending the taggant in small quantities of propellant, the cost to a consumer will be increased by at least \$1.55. The effect of this legislation would be to increase the cost of propellant by as much as 30 percent.

And what would be accomplished?

If we take the largest of BATF's figures concerning the number of bombing "incidents"—which include not only exploded bombs, but duds, thefts of explosives, accidents involving adolescents making explosive "toys", and undercover purchases by BATF agents—there are perhaps 220 "incidents" involving smokeless and black powder propellants each year. If taggants were a factor in the investigation of a full half of those incidents—which is being highly optimistic—we are talking about some sort of presumed benefit in 110 "incidents."

Since an estimated 5 million pounds of smokeless and black powder propellant are sold to shooters each year, representing perhaps six million individual cans of powder, we are talking about at most eighteen ten-thousandths of one percent of smokeless and black powder made each year being involved in an "explosives incident" in which tagging might be of some benefit to the investigators.

This extremely optimistic presumed benefit will cost consumers—handloaders and shooters, our NRA members—almost \$10 million per year. That does not include what it will cost other taxpayers.

Currently arrests are made in only 8% of explosives cases. BATF's own highly speculative cost/benefit analysis projects a 50% increase in that figure; in other words, the arrest rate would go from 8% to 12%. That figure is the most optimistic estimate, and actual figures may be much lower.

An 8% arrest rate prorated for the 220 "incidents" involving black or smokeless powder would indicate approximately 18 cases. The projected increase would mean 9 more arrests per year, and this is based on the most optimistic estimates.

Mr. Chairman, the records required by a tagging program that would have to be kept by dealers in black powder would have to be correlated with existing records, the statement of intended use forms required at purchase. This added paperwork would require clerical resources not within the reach of most powder dealers. Ultimately, it would drive many, if not most black powder dealers out of business.

The situation with smokeless powder dealers is no different. They would be required to keep the same volume of records and correlate them to existing records. They would also probably have to cross-reference tagging records with sales records now required to be kept on pistol ammunition and interchangeable calibers. Every round of ammunition would have to be recorded if smokeless powder is to be tagged—and more than 6 billion rounds of ammunition are made each year. Again, referring to BATF's Atley Peterson's testimony, and I quote: "The Board of Governors of the American Society of Crime Laboratory Directors, Inc. (ASCLD) determined that its number one research and development priority was the tagging of ammunition. If we are successful in tagging smokeless and black powders, we will be able to tag ammunition and shall have satisfied this objective."

Ammunition tagging and the attendant recordkeeping runs counter to the prevailing trend in Congress toward exempting the same sort of ammunition record-keeping from the 1968 Gun Control Act. In 1970, the House of Representatives voted 246 to 59 to exempt .22 caliber ammunition. And the Department of Justice and Treasury have testified that ammunition recordkeeping is a waste of resources—the volume is just too great. To the best of my knowledge, ammunition tracing has never solved a crime.

If propellant powders are tagged, every packaged quantity, no matter how small, whether one can of black or smokeless powder, or one box of ammunition, would

have to be referenced by manufacturer and lot number. But this recordkeeping would do no good at all. One numbered lot of powder would yield several hundred cans of powder and literally thousands of boxes of ammunition. Tracing via these kinds of records would be like looking for the proverbial "needle in a haystack."

The Management Science Associates Study commissioned by BATF projects the annual taxpayer cost of tagging at 199.4 million dollars. When the estimated 10 million dollar consumer cost is figured into the equation, total program costs are in the 30 million dollar range. And what is the benefit to be derived from this expenditure? A hypothesized four percentage point increase in arrests—all the way up to 12 percent costing perhaps as much as \$1 million per arrest.

Mr. Chairman, I suggest that even in this era of a public conditioned to accepting monumental bureaucratic waste of the tax payers' dollars, such a horrendous expenditure for such a small hoped-for result is utterly ridiculous. I further suggest that it is programs and expenditures like these that have triggered the wrath of the taxpayers across the country.

BATF's own cost/benefit analysis indicates that this program cannot be justified. On page two it states, with reference to the detection tagging program, "At present it is impossible to estimate the effectiveness of tagged or untagged detection with any degree of accuracy. Within this large uncertainty, both tagged and untagged detection appear to be, at best, of borderline economic viability." They aren't even near the border.

The study's determination in favor of identification tagging is based upon mere hypothesis, nothing more. Quite simply, they do not know whether it will be effective in apprehending or deterring bombers. They are trying to get us to buy a "pig in a poke." And the price of that "pig" is astronomical, not only in tax dollars and increased costs, but more importantly, in the damage it will do to the small businessmen and law-abiding gun owners if propellant powders are tagged.

The BATF-commissioned study by Management Science Associates states BATF's goal rather succinctly, "Ideally, the problem of control would be greatly simplified if every ounce of explosive, legally manufactured and legally used, could be completely accounted for." That ignores the basic fact that we are equally concerned, if not more concerned, about illegally made explosives. However, in order to trace every ounce of legal explosives to the purchaser, minutely detailed records will have to be kept by manufacturers, distributors, wholesalers and retailers.

If propellant powders are tagged, this will drastically increase and in many cases duplicate the records already being kept by Federal firearms licensees. And how are they going to trace explosives beyond the first non-dealer purchaser? Will they later propose a system of propellant registration? The more you think about explosive tagging as it relates to the powders and the records system it will mandate, the more it begins to parallel gun control measures. And it is not surprising since the administering agency, the agency advocating the explosive tagging bill, is the same—the Treasury Department's Bureau of Alcohol, Tobacco and Firearms. And their record is clear on the firearms control issue.

A case in point is S. 1083, the black powder relief bill, passed by the Senate in 1973 by a decisive margin of 78-8, and passed by the House on voice vote. The next year it became Public Law 93-639. This act increased from five to fifty pounds the amount of sporting grade black powder an individual could purchase exempt from regulation.

The Bureau of Alcohol, Tobacco and Firearms vociferously opposed this bill. After it was signed into law, BATF promulgated regulations which imposed stricter controls than existed prior to passage of the liberalizing legislation. The statutory exemption reads, "commercially manufactured black powder in quantities not to exceed fifty pounds intended for sporting, cultural, and recreational use." The sporting, recreational and cultural use provision was meant to limit the exemption to the type of powder manufactured with the intent that it be used for those purposes.

However, BATF's regulations stretched the word "intended" into a loophole, requiring that each purchaser of powder fill out a form swearing that they "intended" to use the powder for sporting, recreational or cultural purposes. Dealers are required to keep these forms on hand at all times, for inspections by BATF agents.

These forms are very similar to the Form 4473 which firearms purchasers are required to fill out, with one major difference: the firearms purchase records are

required by law. The black powder purchase forms were imposed by regulatory fiat.

Violations of the explosives tagging requirements or subsequent regulations promulgated under this bill would carry a penalty of up to ten years and/or \$10,000, creating an inequity such as exists with the Gun Control Act. Dealers who commit minor recordkeeping violations could be punished just as severely as bombers. While ten years imprisonment is not sufficient punishment for a terrorist or criminal bomber, it is Draconian in the case of mere technical violations.

Obviously, what the Congress and the American people want is a decrease in the number of bombings. An explosives taggant program is expected to accomplish this objective by adding a detection taggant to commercial explosives. But no such detection taggant has yet been invented. Not even the most optimistic supporter of this program claims that there ever will be any device which will "sniff out" all explosive substances—such as home-made bombs. Therefore, that portion of the program will not achieve the desired result.

The second part of the program calls for the addition of identification tags so that the source of the explosive could be determined after an explosion—but again it will fail to have any substantive effect, for none of the easily home-made explosives will be so tagged, and only 20 percent of the commercial explosives will be covered, based on the language of the explosives materials taggant bill, S. 2013, and the antiterrorism bill, and S. 2236. Yet to achieve even that limited coverage, the scheme would impose a horribly expensive system of recordkeeping upon manufacturers, dealers, consumers and the taxpayers.

By the BATF's consultant's best guess, there would only be a 5% deterrent effect upon criminal bombers—and deterrence is that which all of us would most like to achieve.

There is only one type of deterrent which really works—the promise of swift, certain and severe punishment.

If this Committee would add a penalty provision to the explosives section, promising severe punishment through a mandatory sentencing requirement for criminal bombers, it alone will have more of a deterrent effect than any of the restraints which would be placed upon the lawful buyers and users of propellants.

And, Mr. Chairman, the NRA is very much concerned over the possibility of Congress mandating an explosives tagging program for smokeless and black powder while lacking concrete technological data, particularly the undetermined shelf life and ballistic effect on propellant powders. In fact, the only thing that seems sure about such a program is that a mammoth recordkeeping burden will be imposed on small businessmen, and it will dry up supplies for sportsmen.

Ten months of hearings have recently been concluded by the Senate Judiciary Subcommittee on Criminal Laws and Procedures, the only hearings which have been held to examine the concept of a tagging program. Based on the wealth of information that has been collected and on the fact that the Subcommittee has not yet marked up a bill, NRA would prefer that this particular subject be held in abeyance until the Senate Subcommittee reports a bill.

As I stated earlier, NRA is not taking a position on the general issue of tagging. However, Mr. Chairman, we strongly urge that smokeless and black powders be exempted from any tagging language that you might report from your Subcommittee.

The "benefits" of doing otherwise are dubious at best, but the costs, not only in dollars, but the social costs of small businessmen lost to a jungle of redtape, and sportsmen who can no longer find ammunition or powder—far outweigh any other consideration.

I thank you for the opportunity to testify before this Subcommittee.

TESTIMONY OF NEAL KNOX, EXECUTIVE DIRECTOR, INSTITUTE FOR LEGISLATIVE ACTION, NATIONAL RIFLE ASSOCIATION OF AMERICA

Mr. Knox. Thank you, Mr. Chairman.

I am particularly interested in the subject today, and the members of NRA are, concerning the addition of these taggants to smokeless propellant and black powder which are used by hand loaders and by shooters of muzzle loading arms.

Before taking this post, I was the editor of Hand Loader magazine, and accordingly we looked at this entire question in some depth and we know the concern to our members and to the individual hand loaders who will be affected.

The NRA does not take a position on taggants in commercial explosives. Commercial explosives are not our field. However, I would comment that historically it has been shown that you cannot control illegal users by attempting to regulate legal users.

I testified in 1970 concerning the Explosives Control Act, and at that time did a lot of research into an area which I had previously known nothing about. I testified at that time that we could not control terrorists by attempting to control legal users of explosives, and I believe that the evidence since then has shown that position to be correct.

What concerns us in this bill is that 80 percent of the commercial explosives are not covered by this bill. Yet, smokeless and black powder used by individual hand loaders are covered. Further, if this taggant program proves to be extremely successful, we can anticipate that there will be one certain result, and that result will be not necessarily a decrease in explosives' misuse, but rather an increase in the use of explosives which are not covered, and which cannot be covered.

Ammonium nitrate fertilizer and gasoline were mentioned earlier. This makes a bomb that can be easily detonated; in fact, ammonium nitrate and nitromethane speed fuel, used by the hot-rodders, was at one time made into dynamite by Hercules—ammonium nitrate, nitromethane, and a small percentage of coal dust, which was a very effective explosive.

The ammonium nitrate used by commercial blasters is precisely the same ammonium nitrate used by hundreds of thousands of farmers. It is not possible to do what was suggested a little while ago, put taggants in everything, because it simply cannot be done. It is very easy to make explosives out of an endless variety of materials. I did not realize that until I began researching this in early 1970, and what I learned in about 3 months gave me enough knowledge to go from one end of this country to the other end of the country, spreading havoc wherever and however, without ever using any commercial device.

So when that situation exists, I become very concerned when we take a very small segment, the black powder and smokeless powder, and insert that into this scheme of control. To give you just a little idea, I would like to go off the record, with the chairman's permission.

The problems that a terrorist bomber has are these: He must have a timing device, as has been mentioned. He must have a device that if he is caught with it, he is not going to spend several years in jail. A perfect device exists in the form of butane cans that all of you are familiar with; you use it in camping torches and lights and stoves for camping. I use one as a little portable torch.

Now, these butane cans are readily available and they are not controllable without controlling everyone. You cannot tag one, but if you took one of these cans and went into any small room, particularly an enclosed room inside a building near the structure, and over in one corner you place the other key ingredient of this bomb, a candle—there are no controls upon candles—you ignite the candle and go over—

into the other part of the room and pop open the butane bottle; you close the door and you leave.

Well, after you have left, there will be an explosion—a severe explosion, tremendously powerful. Those are the types of things that can be done by anyone with just a slight amount of knowledge and a little bit of imagination. But they do not have to rely upon imagination, because how to do these things is told to them in various and sundry publications designed to reach the terrorist.

Going back on the record, with the chairman's permission, a few weeks ago I received a copy of the *Urban Guerrilla*, which is some type of periodical with all kinds of dandy things to do; how to go out and blow things up without using commercial explosives, without using commercial caps, and without using commercial timers. The publication is available on certain newsstands; it costs \$1.

We see ads for a publication called the *Anarchist's Cookbook* or the *Militant's Formulary*. I would remind the committee that all of the information about how to make explosives is available in any library, and we simply cannot repeal knowledge.

In attempting to register explosives, those advocating this program are taking the same approach as those who attempt to register guns. They try to put a number on it so we can find out at least who the commercial, legal buyer was.

Now, we are going beyond that; they want to register ammunition. But we have ammunition controls under the Gun Control Act of 1968, and we have even had BATF testify that those records do not add in any way to crime control. The reason is that there is too much ammunition; some 6 billion rounds a year, with another billion rounds a year loaded by hand loaders.

Now, if we translate what is being done and if we move away from relatively large case quantities of commercial explosives and go to individual 1-pound cans purchased by hand loaders, we find that we must have a trail through a complex network, as was mentioned earlier, from the manufacturer to a distributor, maybe to a subdistributor, to a jobber, to various wholesalers, and scattered around until it finally reaches the dealer, and then it is sold to the individual.

A record must be kept on every one of those transactions. Industry has estimated that it will cost approximately, on the average, 80¢ per 1-pound can in order to just keep up with the recordkeeping.

In addition, it will cost the dealer the time of making his separate entry, plus going over the records that he must keep in accordance with the rules and regulations. He goes over it with BATF, which gives BATF some more agents and gives them something to do.

The total cost, as best as we can estimate it, is generally around \$1.55 per 1-pound of smokeless powder. There are about 5 million pounds of smokeless powder sold each year. So this means that the cost to the consumer is going to be some \$10 million, minimum, and possibly as much as \$15 million.

If we look at BATF's statistics, which are very difficult to look at and interpret, we see that they estimate, by the most optimistic estimate, that there would be a 50 percent increase in arrests. At the present time, again going to their figures, we can determine that there are about 18 arrests of persons using smokeless or black.

A 50-percent increase means that there will be an increase of nine arrests. The costs to consumers alone will be more than \$1 million per those arrests, if those figures are correct. We have some rather horrendous problems with costs, not even considering what it is going to cost the manufacturer, and there are great problems there at that level in putting the taggants in.

The tags themselves are relatively inexpensive; the expense comes in trying to tag just exactly so many in a certain quantity lot, one lot of which will make no telling how many hundreds or thousands—it should be thousands or tens of thousands—of rounds of ammunition.

Yet, from their testimony at earlier times, BATF has stated that ideally what they want is not only to tag the explosives, but ammunition itself, so they could fire a gun and determine who bought that round of ammunition. I suggest that in every problem we face, we must look at cost effectiveness.

In my testimony, there is a statement by BATF's own consultants that says that this program is, at best, of borderline economic viability; I believe that is a correct quote. Mr. Chairman and members of the committee, I suggest that this program does not approach the border. It is not near being economically sound, particularly when applied to the matter of particular concern to the NRA and its membership; that is, the tagging of smokeless and black.

Accordingly, we request that there be an exemption for smokeless and black, and we also ask that you immediately address the problem; the problem is the misuser, and I suggest the way to address that is to promise him that if he commits the heinous crime of exploding a bomb in a way that would injure someone, that we would put him away so that he could not do it again. That is the only thing that directly addresses the problem.

Thank you, Mr. Chairman and members of the committee.

Mr. ANDERSON. Thank you, Mr. Knox, for your presentation.

In our hearings last week, the FBI witness testified that in 1977, 90 percent of the terrorist incidents in the United States were bombings. In these cases, he further testified that 52 percent of the bombs were made with black or smokeless powder.

Mr. KNOX. What was the percentage again, Mr. Chairman?

Mr. ANDERSON. Fifty-two percent of the bombs were made with black or smokeless powder.

Mr. KNOX. That does not agree with published figures of BATF. There is some conflict of authority in this area. BATF has authority to control terrorists bombing up until the time of explosion; after the explosion, the FBI has it.

I could not comment on it; I have not seen those figures. All I know is that they disagree with BATF's.

Mr. ANDERSON. Well, in light of these FBI statistics that I just read, what statistics do you offer in support of your statement that it is apparent that black and smokeless powder are comparatively small parts of the bombing problem?

Mr. KNOX. I believe that I happen to have a pie-type graph, again from BATF. It shows the bombing casualties as a function of explosives used. Of total injuries, dynamite was 42 percent; unknown, 22 percent; other, 15.7 percent; black powder, 11.1; smokeless powder 7.7.

Of fatalities, smokeless powder shrinks to 2.6 percent.

Mr. ANDERSON. Your comment was "all bombings," and we are talking about terrorist bombings.

Mr. KNOX. This says "bombing casualties." I am reminded, Mr. Chairman, that the most destructive terrorist blast in this country was with ammonium nitrate and gasoline; 1700 pounds of ammonium nitrate, which is about \$80 worth, and 100 gallons of gasoline. It can be set off with nothing more than the same material inserted in a pipe; put a firecracker in there with it and it will go.

Now, that killed one student at the University of Wisconsin and destroyed that building. It was the most destructive blast we have ever had; others have been more deadly.

Mr. ANDERSON. You refer to the ATF figures indicating that the arrest rate with tagging in explosive cases has gone from 8 percent to 12 percent. Assuming those projections to be corrected, I would consider that to be a 50 percent increase in the arrest rate and, to me, that is significant.

Why, then, do you belittle the projected increase on page 10 by referring to it as a few percentage point increase in arrests?

Mr. KNOX. You know, percentages are things you play games with, but if you increase the arrest rate by 50 percent, and at the present time it is only 8 percent, which translates to only 18 people, and you have nine people arrested additionally as a result of this program, you have got nine people arrested at a cost to the consumers, only, not counting Government costs and not counting the miscellaneous other costs, of \$10 million to arrest those nine.

I think that in this time of people being concerned about the expenditures of Government, that that certainly would fall into that category. One million dollars per arrest is rather high, and that is what those figures translate to.

Mr. ANDERSON. Is that not what you want to do, arrest more people and put them away?

Mr. KNOX. Yes, sir, particularly when you say "put them away." But it has to be taken in conjunction with what we can afford to spend and what we can afford to tolerate. When I say "tolerate," I am thinking there in term of civil liberties. We could do a tremendous job of controlling terrorists if we suddenly became a police state.

I do not think we want to spend that social cost, neither do we want to spend an inordinate amount for a program that will have very little cost effectiveness. There are tremendous problems here, Mr. Chairman, in costs.

Mr. ANDERSON. Mr. Knox, you spent a great deal of your time in your testimony arguing that the legislation would increase recordkeeping, and you use that argument to project a rather astronomical cost to be occasioned by this proposed recordkeeping.

You even go so far as to indicate that every round of ammunition would have to be recorded. You then state that the recordkeeping, not the tagging itself, would drive many, if not most, of the black powder dealers out of the business.

Where in this legislation do you find reference to new recordkeeping, and would you be more inclined to support this legislation if you were assured that there would be no increase in recordkeeping as a result of this legislation?

Mr. KNOX. Well, Mr. Chairman, it would not be possible to implement this without increased recordkeeping. A normal lot of powder at the present time will have a few thousand pounds in it; perhaps that would be reduced to a few hundred. But, now, it does no good to know that this tag number—yellow, blue, green, or whatever, or this alphanumeric code that they are going to use—it does no good to know that, gee whiz, this is the one we picked up here, unless we track it back, and the only way to track it back is to have very small quantities in each lot and to have every transaction, down to the 1-pound can level, recorded. There is no way to eliminate this increased recordkeeping.

Mr. ANDERSON. You state in your prepared statement that the ATF record is clear on the firearms control issue. What do you mean by that sentence?

Mr. KNOX. Their approach to the problem, Mr. Chairman. One of the problems in this proposed bill is that, just as with the Gun Control Act, there is no such thing as a misdemeanor for a recordkeeping violation; everything is a felony offense. We have cases that I am aware of from my personal knowledge.

BATF agents spend their time with a dealer writing up a warning for using ditto marks to indicate bolt action in his record, down on the line, "bolt action, bolt action." In the next State over, that does not apply; ditto marks are OK over there.

We see that this agency, which can increase the size of its agency by promoting various and sundry registration schemes, wants to increase the regulatory aspects of anything that it regulates. I suggest that BATF is not a law enforcement agency in the same sense that the Justice Department and the FBI are law enforcement agencies.

A law enforcement officer wants to detect a crime, or the possibility of a crime, and track back up to where that illegal device came from. BATF wants to go to all the legal users first. The best analogy of this—a friend of mine, who was a rather high level official in Treasury, made this analogy: He said, if we gave the BATF the responsibility of controlling counterfeiting in the U.S., their approach would be to license all printing presses, and then inspect all printing presses, in hopes of finding one which is producing counterfeit.

I suggest that is not the proper law enforcement method, and it is, further, the most expensive method to the Government.

Mr. ANDERSON. You refer to Public Law 93-639 as an example of the ATF promulgating regulations which were unintended by the Congress. Is that a fair characterization of that portion of your testimony?

Mr. KNOX. Sir, I did not catch your comment.

Mr. ANDERSON. Is that a fair characterization of that portion of your testimony?

Mr. KNOX. No, that was a different matter. This was a case where Congress saw the wisdom of increasing the amount of black powder exempt from regulation, and Congress having liberalized the law, BATF made it more restrictive through its own action and regulations, in direct contravention of the wishes of Congress, I might suggest.

That is the type of attitude of this Agency to which I object, Mr. Chairman, and that was the particular thing there. They now require everyone to sign a statement that they are using that black powder for cultural or sporting use, I believe is the phrase.

Mr. ANDERSON. How did the ATF go beyond Congress wishes?

Mr. KNOX. The Congress had very clearly intended to get rid of the requirement for recordkeeping and signing of users for black powder in quantities up to 50 pounds; that was the intent. BATF, through the statement in the law that says if it is going to be used for sporting or cultural purposes, they said, "Okay, we will just make everybody sign a statement that it is going to be used for cultural or sporting purposes," and that is something else the dealer has got to keep a record of.

Mr. ANDERSON. How does that square with the House Judiciary Committee's report, 93-1570, on that legislation, which states on page 5 as follows:

The Committee also wishes to stress that the bill will not unduly disrupt the regulatory scheme established under regulations by the ATF. The regulations need only to be modified so that the retailers will be required to keep records of their sales of black powder under the exemptions—

Mr. KNOX. I did not quite catch the tail end of your statement, Mr. Chairman. I think the best summation that I could give of my position—Senator Birch Bayh made the statement that they had circumvented intent; he made that statement on numerous occasions. Since he was the principal sponsor, as I recall, of that particular provision, I figured he knew what he was talking about.

Mr. ANDERSON [continuing].

Moreover, then, it is the expectation of the committee that ATF will promulgate regulations and establish forms to require sporting users to identify themselves on the purchase of black powder.

Moreover, such ATF regulations could require that a purchaser-sportsman certify by affidavit that he intends to use the black powder for sporting, recreational, or cultural purposes. Such a regulatory scheme would identify the purchasers of black powder and would aid in the enforcement of the law and prosecution of violators.

Mr. KNOX. I am not familiar with that particular committee report. If that was the intent of the committee, then obviously BATF did comply with the wishes of Congress. However, I will again say that if it was the principal sponsor's opinion that they had exceeded their authority in that area. Colonel Goodwin is here, and he could perhaps comment more on that than I, because he is more expert in this area.

Mr. ANDERSON. Will you publicly encourage the participation of the pilot tests to factually determine what the true economic and technological impact of tagging will be?

Mr. KNOX. Will I encourage it?

Mr. ANDERSON. Yes; would you publicly encourage participation of your members in a pilot test to factually determine what the true economic and technological impact of tagging will be?

Mr. KNOX. I would have no objection to determining that, because I believe it would show the fact that it is economically unsound.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. Mr. KNOX, on that last question, how—

Mr. KNOX. Since you mentioned that last question, there is one thing here that I would have to throw a caveat into. The question arises as to safety, and the point was made that there is a possible deterioration of the coating compound in proximity with nitroglycerin, and

a large percentage of smokeless powder is made with a nitroglycerin content.

So, accordingly, I would have to discuss that with some chemists, because I do not want to get some of our people hurt. Excuse me, Mr. Snyder.

Mr. SNYDER. That is all right; I appreciate the reservation. I just would hesitate to see you publicly encourage anything which cannot be humanly done, and it strikes me from the testimony we have heard, including yours, that you are going to have to be involved in tagging every gallon of gas that is pumped into every automobile and every tractor and every motorboat in the United States, and every gallon of diesel oil that goes into every tractor, every bag of fertilizer that is delivered either in bulk or in bags to every farm.

Now, I am not trying to direct the National Rifle Association; I happen not to be a member. But I am concerned about the human feasibility of doing something like this.

Mr. KNOX. The validity of the task would be doubtful because, again, we can only control—even if we tested it, we would be testing in a very small area, and we cannot control all those other areas where equally hazardous materials are available; it simply cannot be done. So I do not know that a test such as that would accomplish a blessed thing.

Mr. SNYDER. I am not really disagreeing with you on that, but I just question whether it is humanly possible. Now, if it is humanly possible to find some way to keep terrorists from blowing up places, I think maybe you are a little light on your punishment. I think maybe if we convicted them and executed them with a firing squad on television, it probably would have a little more deterrent effect than putting these taggants in black powder or gasoline or fertilizer.

Mr. KNOX. One fellow suggested that proper punishment might be to strap some dynamite to them and let them rip on television; that that might be very effective. I can imagine the public reaction to that.

Mr. SNYDER. There would be a few environmentalists that would fuss over it.

You made reference in one of your responses to the chairman's questions to a chart entitled "Bombing Casualties as a Function of Explosive Used," and that chart indicates, as I believe you testified, that of the total injuries—388 total injuries—11.1 of those were black powder, and 7.7 percent by smokeless powder.

And then on the fatalities, you made reference to 16.7 percent being from black powder, and 2.6 percent of the fatalities were from smokeless powder. That is a total of 78 in the fatality category.

Do you have or could you acquire a breakdown of what percent of these injuries or fatalities were sustained by the criminal who actually attempted to, or did successfully, explode his bomb?

Mr. KNOX. No, sir, I honestly do not have any figures on that. I do know that in a considerable number of cases of fatalities with bombs, the person killed or injured is the potential bomber. These things are deadly and people can get hurt if they get a little careless.

Although it is very easy to formulate the explosive mixture itself, and easy to put it into the package that is hazardous, these people have

not been trained in how to handle it. We have frequent instances like what happened a few years ago in a townhouse in New York, where several people were killed; the bombers blew themselves up.

I remember another one where two guys were killed; apparently driving somewhere to plant a bomb and it went off in their own car. So, consider that 78 fatalities is a lot, particularly to the families involved; on the other hand, consider how many cases we hear of like that. There has to be a fair percentage where the bomber himself did himself in. I do not know what those numbers are, though.

Mr. SNYDER. Would those figures reflect injuries or fatalities by school children who brought the chemicals home from their high school class and had an injury?

Mr. KNOX. I am sure it would, because these are bombing casualties. I mentioned earlier that BATF's statistics are a little difficult to follow, because they use some rather strange definitions. For instance, a bombing incident, as I understand it, is where they find a dud, or where they have made a buy of illegal explosives, or where anything connected with explosives gets thrown into bombing incidents. That inflates the figures very nicely.

Mr. SNYDER. How many sportsmen reload their own ammunition?

Mr. KNOX. In 1972, I did a rather thorough study of the size of the reloading component market, and on the basis of sales of presses and other equipment, figuring a probable attrition rate, and also based on the number of reloading manuals sold, it was my best guesstimate that there were more than 3 million at that time.

Since then, I think we have seen a growth rate of anywhere from 10 to 15 percent per year. So we are talking, certainly, well above 3 million people, out of 65 million households in the United States.

Mr. SNYDER. How many rounds of ammunition are bought and sold every year?

Mr. KNOX. The last figures I saw were in excess of 6 billion rounds of factory-loaded ammunition. In 1972, I determined then that there were at that time more than 1 billion rounds of hand loads, and I think that that is around 1.3 billion rounds of hand-loaded ammunition right now.

Mr. SNYDER. Well, if the proposal of the Institute of Makers of Explosives, the panel who testified just before you, were implemented on licensing all of the users, all of these people would have to have a license to buy their 12-gauge shotgun shells.

Mr. KNOX. That was discussed in 1970, and, thankfully, shot down.

Mr. SNYDER. It looks to me like the compliance with that would be just an impossible task. We have about as much chance of enforcing that as I have making out with Farrah Fawcett-Majors.

Mr. KNOX. I will not comment on the latter part, sir.

Mr. SNYDER. When I bought ammunition for a handgun, I noticed they made certain records. Is that a big problem?

Mr. KNOX. Well, it is an expensive problem. It is costly to dealers to maintain it, and therefore that cost is transferred on to consumers. Here again we have the same problem of those records being kept right down the distribution chain, and it adds a certain percentage—I do not know the exact percentage—and yet it serves absolutely no purpose whatsoever.

It is a paperwork burden that costs the consumers. It has no effect; I know of no instance of any crime ever having been solved or any court case having been supported as a result of that section of law. I submit that time is overdue to withdraw that section of law.

Mr. SNYDER. Congress has shot down several times gun control. We have had some right decisive votes on it in the House. It looks to me like—and I think you alluded to it—that this ammunition control situation is the same thing as the gun control, only much more complicated and a lot less feasible to accomplish, because people can make their own weapons.

I was at a county fair one time where a boy had a .22 go in through his eye; it was lodged up there and they did not know whether he was going to live or die, depending on which way it went. It was fired out of a homemade weapon, and I think that since you can make black powder out of—what were the ingredients again—saltpeter, charcoal and sulfur—that it is just an impossible thing to do.

Mr. KNOX. Yes, sir. There was a group a few years ago, as you may recall, established in Chicago, making the argument that, do not fool with gun control; control ammunition. Those people had no earthly idea of the impossibility of what they were talking about.

Yet, we have very definite elements of that in this plan and in BATF's suggestion in other places, that they would really like to see every round of ammunition tagged, but without giving any thought to the impossibility of keeping up with all those records.

Mr. SNYDER. If they tagged all kinds of ammunitions, would they not have to have an agent? In a distillery, they have an alcohol tax agent. Would they not have to have one there on the spot all the time?

Mr. KNOX. I do not know that they would have to, but if the agent were not there, someone would have to be there to keep up with the number for this particular lot, and I suggest that it would not be very long until they ran out of codes, and when we are talking about these huge numbers of rounds of ammunition.

After all, a minute fraction is used wrongfully, either in crime or in terrorist bombing. If we were talking about 10 percent of smokeless powder winding up being used in bombs or 10 percent of black powder being used in bombs, then we would have a problem.

But I think I figured it out somewhere in here; it is a one-hundredth of one-thousandth of 1 percent that actually winds up being used in bombs. That is the scope of the problem. It sounds big when you say that of all the bombs, "*x*" number are smokeless or black. But from the other direction, of all the powder, this tiny percentage here is what we are trying to control.

You know, Ivory Soap was 99.44 percent pure.

Mr. SNYDER. Pure what?

Mr. KNOX. I never figured that out, but it was pure something. Guns are actually purer than that, as far as the number of handguns there are, and we are talking about a fraction of a fraction of a percent of the total amount of powder made that we are trying to regulate, and in some way hope to accomplish something.

Mr. SNYDER. How many reloaders are there in the country right now?

Mr. KNOX. More than 3 million; I would say around 3½ million.

Mr. SNYDER. I remember when I first came to Congress back in the early 1960's, Paul Findley offered an amendment to an agricultural bill that never should there be more employees in the Department of Agriculture than there were farmers. It strikes me that maybe when this one gets on the floor, I may want to offer one that never shall there be more agents at BATF than there are gun loaders. I thank you very much.

Mr. KNOX. Thank you, sir.

Mr. ANDERSON. Mr. Stump.

Mr. STUMP. Thank you, Mr. Chairman. What questions I had have already been answered, but I would like to commend the gentleman for his very excellent testimony, and say that I do concur in almost everything you have said here today.

Mr. KNOX. Thank you, sir.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. Thank you, Mr. Chairman.

Mr. Knox, in your testimony, you expressed concern about the projected recordkeeping requirements that would be imposed upon the dealers. Let me ask you, do you believe that the problems that now exist under the present law lend credence to your concern about the expansion of this?

Mr. KNOX. Would you repeat your question, Mr. Taylor?

Mr. TAYLOR. Are there recordkeeping problems that now exist which cause you concern about additional requirements? In other words, do the requirements that are now on the books and the laws that now require recordkeeping, cause you concern for expansion of further requirements?

Mr. KNOX. Yes, sir, the dealers who supply our members have great problems with what they have to record right now.

Mr. TAYLOR. Would you expand on that a little, Mr. Knox? What are the requirements now as far as recordkeeping for dealers that sell ammunition and guns? What are they required to do?

Mr. KNOX. Well, any dealer in firearms or ammunition must be licensed as such by the Federal Government. If this dealer desires to receive either firearms or ammunition from a supplier above him in a chain—and, normally, there are five or six levels in the chain—each one must send a certified copy of his license, individually signed, to that supplier.

It is not at all unusual for one dealer to have a copy out to 20 or 30 suppliers for different products. Now, each of those licenses is valid for only 12 months, and so he has to go through the same routine each time. On the other hand, the guy that is doing the supplying to him has to check his records and be sure, and if he gets up close to the expiration date, he has to write down to him and say, "I need your current license before I can ship, because it might arrive after the expiration of your license." So we have got this great problem here.

Then, in the case of firearms, each serial number—make, model, action type, et cetera—is recorded down the chain as it goes to the dealer. What would occur is here that the same thing would happen to every package or container of powder.

I do not know the total firearms sales figures in any one year, but they are a fraction of the number of ammunition sales, as they are

powder sales. So we would be multiplying the total recordkeeping by a factor of 10 or 20, perhaps. And each of those entries, when you get below a certain level in the distribution chain, are made by hand, because these are small businesses that do not have fancy computers. So it would be a horrendous problem.

Mr. TAYLOR. Well, on ammunition, if at the present time you go in and buy a box of shells, is that required to be recorded?

Mr. KNOX. If it is handgun ammunition, the sale must be recorded; name and address of the person buying.

Mr. TAYLOR. What if you go in to buy a box of .22 shells; how do they know if it is going to be shot through a rifle or through a handgun?

Mr. KNOX. Well, that was one of the problems, and they had to modify the act in 1970. At the current time, .22 ammunition is not exempt. The biggest thing that gets to be a problem here is beyond .22 ammunition. Most people are not aware of it, but there is no such thing as pistol ammunition, only, because rifles use pistol ammunition.

The 30-30 Winchester cartridge is chambered in a certain pistol. Therefore, by BATF's wisdom, every round of 30-30 ammunition technically could be considered pistol ammunition and, in the same way, all the components could be considered pistol ammunition; any .30 caliber bullet could be considered as such.

Now, we are going beyond where they are, but there was discussion of doing just this back in 1969 and 1970. I talked to them about it and asked them what they were going to do when they got to that point.

Mr. TAYLOR. But under present law, any ammunition that could be used in a pistol is recorded, is that not true?

Mr. KNOX. It must be recorded, yes, sir.

Mr. TAYLOR. What do they do with those?

Mr. KNOX. Well, they must keep it forever and ever, amen.

Mr. TAYLOR. I see.

Mr. KNOX. The one exception to that is if a guy goes out of business, then all his records are sent to Washington.

Mr. TAYLOR. I am sure they are perused very thoroughly.

Mr. KNOX. That bothers us.

Mr. TAYLOR. NRA takes the position that black and smokeless powder should be exempt from the tagging program. If a law were passed creating this exemption, Mr. Knox, would this cause the criminal element to switch from those explosives which were tagged to those that were not?

Mr. KNOX. Frankly, I doubt it, because of the matters of cost and efficiency. If we are talking about the terrorist—and that is the topic under discussion—we are a long ways away from the typical street criminal; we are talking about, for the most part, a better educated person, person familiar with libraries. If he wants to set a bomb, he wants that bomb to do something.

It is very difficult to make a smokeless powder bomb; you really have to know what you are doing. It can be done, but in most cases, a smokeless powder bomb is a dud, because they do not know what it takes to make it go. It can be made to go, but you have to really know what you are doing.

In studying this, I think that any self-respecting terrorist would figure out some smarter way of making his bomb. You remember the

yellow-handled screwdrivers that used to be real good screwdrivers; those handles were pure nitrocellulose. You could shave it, and you had exactly the same thing for practical purposes, chemically, as a single-based propellant or smokeless powder.

So you can make an equivalent of a smokeless propellant bomb just by shaving one of those screwdriver handles or shredding celluloid. But the best indication of how stable the material is is that you can hammer it; they make chisels the same way. You can hammer it and it would never blow or burn, or anything.

But you can, if you want to apply your knowledge, make a bomb out of the stuff. It is just a whole lot easier to do it with other things.

Mr. TAYLOR. Did I understand you to say that it is your estimate that it would cost 80¢ for a can of black powder before it reaches the dealer just to take care of the paperwork and so forth?

Mr. KNOX. That was an estimate that was given to me by a member of industry. They had tracked down and determined the probable number of transactions, how many would be computer, and whatever, and they came up with this 80¢ per can.

Mr. TAYLOR. How big is a can of black powder?

Mr. KNOX. Black powder?

Mr. TAYLOR. Yes.

Mr. KNOX. Generally, black powder will be either 1 pound—1 and 25 now. In smokeless, it will run—well, it depends on the manufacturer—either 8 ounces, 11 or 12 ounces; 1 pound; 3 pounds; 8 pounds; and I do not think they make the 25 pound anymore.

Mr. TAYLOR. Do reloaders use black powder or smokeless powder.

Mr. KNOX. Generally, for the most part, the reloader uses smokeless powder; the muzzle loader uses black powder. You can use black powder in hand loads with fixed ammunition, and I have done it, but that is not a very big percentage of it.

Mr. TAYLOR. Well, Mr. Knox, I want to thank you very much for your testimony. I think you have brought forth some good points and I appreciate very much your being here. Thank you.

Mr. KNOX. Thank you, sir.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. I just want to observe that you put black powder in those old cartridges or old shells when you want to use them in a coil.

Mr. KNOX. Yes, sir, a Damascus barrel.

Mr. SNYDER. That is right. I have one of those. Thank you.

Mr. ANDERSON. We want to recess and come back at 2:00 this afternoon, but we will try to get in one more witness this morning here, Mr. Vaughn K. Goodwin, legislative director and past president of the National Muzzle Loading Rifle Association.

TESTIMONY OF VAUGHN K. GOODWIN, PAST PRESIDENT AND LEGISLATIVE DIRECTOR, NATIONAL MUZZLE LOADING RIFLE ASSOCIATION

Mr. GOODWIN. Mr. Chairman and members of the subcommittee, I am Lt. Col. Vaughn K. Goodwin, U.S. Air Force retired. I am the past president and present legislative director of the National Muzzle Loading Rifle Association.

My education, profession and military career has been spent in research and development of explosives and ordnance. Until I retired a year ago, I was responsible for the Air Forces exploratory development program for conventional munitions, including development and testing of explosives.

I also served as the Air Force member of the Joint Service R. & D. Commander's Explosive Panel. I am also a black powder shooter sportsman who has been active in muzzle loading shooting for over 30 years. Our association appreciates the opportunity to submit our comments on the proposed tagging of explosives, as spelled out in House bills H.R. 10250, 13261, and 13283.

I will first tell you something about the National Muzzle Loading Rifle Association, and the concerns of our association about the proposed legislation. I will conclude by making a recommendation regarding the proposed legislation.

The National Muzzle Loading Rifle Association is an American Heritage shooter-sportsmen organization with over 23,000 members and 300 charter clubs throughout the United States. Our headquarters and national range is in Friendship, Ind.

We are a nonprofit organization dedicated to the development of skills and marksmanship and rifle-making craftsmanship of early American muzzle loading firearms, and to furthering the heritage on which this country was founded.

The NMLRA is the primary organization representing black powder shooting in this country. Our organization is an independent, family-oriented group not affiliated with any other national organization.

We had our beginning in 1933 when a handful of sportsmen gathered in Portsmouth, Ohio to shoot original muzzle loading rifles of our forefathers. From the lowly beginning, we have grown to our present size, with our membership having tripled since 1963 and doubled since 1971. Today, our sport of muzzle loading shooting has grown to the point where it is heralded as the fastest growing shooting sport in the United States. I have attached a brochure which describes better in both word and picture our organization.

Mr. ANDERSON. It will be received for the file.

Mr. GOODWIN. In order to shoot muzzle loading firearms, you must, for reasons of safety, use only black powder propellant. We cannot use manufactured fixed ammunition, but must load both flintlock and percussion firearms from powder horns and bullet pouch. Most of our match rifles are custom made to exacting standards and are quite expensive. In our 45 years of existence, we have fired and handled many tons of propellant black powder with a safety record unmatched by any outdoor sport.

You will note I keep referring to black powder propellant. This powder is refined and manufactured for propellant use to give even and safe pressures for shooting muzzle loading firearms and not for blasting or explosive use.

I refer at this point—and it is not in my testimony—to Mr. Graybeal, president of the Institute of Makers of Explosives' statement that anybody can go out and buy 50 pounds of black powder. Gentlemen, I would say this: This bill that passed, this black powder relief bill,

allowed the purchase of up to 50 pounds of powder. But the forms that you fill out, including everything else which must be kept for at least 5 years, every pound of powder is recorded on it, and the seller's driver's license, and everything else, is recorded on this form. Further, the distributor himself and the dealer have records that they must keep, including a daily inventory of every pound in there, and if he finds any discrepancy, he is required by BATF regulation to report this as a theft.

So there are records, and nobody can just go out and buy 50 pounds of black powder. As to storage, each State has its specific requirements for storage, and also, many of them, for selling, which differ from the Federal. Every one of them has to have a proper storage place, and these are in State laws; it was not in the other one. Well, that was just about all I wanted to say about what Mr. Graybeal had brought up, which I thought might give you a wrong impression about black powder and its purchase.

We are seriously concerned over the proposed explosive tagging program spelled out in H.R. 13261 and H.R. 10258, since sporting black powder propellant which we must use is classified as a low explosive, and unless specifically excluded, as it has been in the Senate companion anti-terrorism bills, this legislation would greatly impair or even destroy this truly American heritage shooting sport. No taggant is needed for black powder to identify it once deflagrated. Notice I mention "deflagrate" and not "explode," because black powder does not explode; it deflagrates. It also leaves its own signature and needs no identification taggant.

To add a taggant to this sporting propellant for identification would require that it be subjected to many months and possibly years of experimentation and testing before a taggant might be found that would not affect the ballistics, barrel erosion and storage life of the propellant, as well as any impairment to the health of the shooter from breathing the reactive gases.

During the 35 years of my career as a Mechanical Engineer Ordnance with the Army Ordnance and Air Force, the three military services have tried many times to put additives in propellant powders to obtain more desirable characteristics, such as reduction of smoke, lower burning temperature and pressures for reduction of barrel erosion and increased rates of fire, and reduction of flash. The attainment of these improvements was to be accomplished without causing detrimental effects to the ballistics, storage life, cost of manufacture, and physical and medical effects on the shooter and environment. These experiments and tests have required many years of costly Government expenditures with very minimal success.

Experimentation with taggants for propellants would parallel these past examples, and would require that sporting black powder be subjected to many months and even years of costly testing. In this regard, I understand that the BATF has been hastily trying to have their contractor, Aerospace, run tests with taggants. Neither the BATF, Aerospace or any backyard ballistic group, like they are trying to locate, have the ballistics expertise, facilities or equipment to conduct the required evaluation, and any hurried attempt to convince you that there is no problem should be subjected to close scrutiny by those having the technical knowledge and expertise to evaluate the results.

Even if successful, would the cost of accomplishing this be worth the effort? Even if a successful taggant for black powder were developed, the additional cost to the manufacturer would be passed on to the muzzle loading shooter sportsmen who are already subjected to the exorbitant price of sporting black powder propellant caused by recent regulations and restrictions placed on them by the Treasury Department to implement what was supposed to be a black powder relief law. This law was passed unanimously by the Senate and House to reduce the restrictions imposed on the black powder shooter, distributor and manufacturer by the Organized Crimes Control Act of 1970. However, when the regulations were published by the Treasury Department, the will of Congress was circumvented, and users of sporting grades of black powder propellant are subjected to additional record keeping and harrassment.

Likewise, black powder propellant dealers, distributors and the sole manufacturer remaining in North America are subject to additional expense and recordkeeping, which has driven black powder prices to their present high levels. Coupled with this, we have seen the demise of many of the dealers because of the confusion caused by a lack of understanding of the regulations as interpreted by the BATF agents throughout the country. Consequently, we have seen retail prices to the shooter-user of black powder propellant rise from 85 cents per pound in 1969 to \$7 per pound in many localities, when it can be found.

The development and proof of a tagging material would price black powder propellant out of the reach of most of us. And to what purpose? Consider that about 20 percent of the total black powder manufactured today goes to muzzle loading shooting. The remainder, which is not suitable for sporting purposes, is purchased by the military for munitions use.

A small amount of blasting black powder which is different from propellant black powder, is still being manufactured for quarrying, although the slurry explosives have largely replaced it for this purpose. If we put the added cost of providing a taggant on the only propellant black powder manufacturer remaining in North America, he could ill afford to continue to make such a small amount of sporting black powder propellant, since his primary customer is the military, and as spelled out in the House bills, explosives developed for the military would require no taggant.

It should also be remembered that sporting black powder is a low explosive and is not the criminal bomber's choice. The BATF, by their own statistics—and these were the statistics used by Mr. Peterson last fall. I am not up on the new FBI ones, but they are like any statistics; you can take them and compare apples and oranges and come up with all kinds of things.

By their own statistics, they state that less than 7 percent of the incidents reported by the BATF involve black powder, and these are minor incidents. Personal injury and property damage from black powder bombings are minimal.

BATF's 7-percent estimate of these incidents is a low figure in itself, but the testimony of Mr. A. Atley Peterson, in September last year, indicates that even this small estimate may be a bit padded. He

gives an example of an incident in which "Red Dot" black powder manufactured by the Hercules Powder Co. was used. Red Dot powder is not black powder, even though it is black in color. It is a modern, progressive burning, smokeless powder used in shotgun shell target loads and some light pistol loads. Hercules has not made black powder for almost 15 years.

Even if a criminal does decide to use black powder, he is not likely to go through the redtape and filling out forms to get sporting black powder. He will most likely make up his own using charcoal briquets, or other readily available commercial charcoal, sodium nitrate fertilizer, and sulfur, all of which can be readily obtained from any farm supply store. His other alternative would be to steal commercial black powder, which he would not be likely to do as he would prefer to steal high explosives. Propane, gasoline, and commercial fertilizer would be much more likely explosive candidates for the bombers' purposes than sporting black powder, and no taggant is proposed for these substances.

In closing, we ask that you consider the testimony I have presented here. We do not question the intent of the tagging program or its application to high explosives. Above all, we do not question the importance of the antiterrorism bills. We do ask on behalf of the muzzle loading shooter sportsmen that you exempt sporting grades of black powder propellant from the provision of H.R. 10258, H.R. 13261, and any other proposed tagging bill. We fully support in all respects H.R. 13283 proposed by your colleague, Representative Clausen.

We thank you for the opportunity to present our views today.

I would like to say one other thing, if I may, while I am on the record, and that is that we are a national organization, and in order for people to shoot and come to our national matches, they naturally must have a source of powder. What was put in the bill, and what was passed, was that if you are an out-of-State shooter, you can come and you can buy powder within the State. If that does not remain in effect, we no longer have a capability of conducting our matches.

Thank you.

Mr. ANDERSON. Thank you, Mr. Goodwin, for a very excellent statement.

Mr. Snyder?

Mr. SNYDER. Thank you, Mr. Chairman.

Colonel Goodwin, I appreciate your comments and I am impressed with your credentials; until you retired, you were responsible for the Air Force exploratory program in conventional munitions, including the development and testing of explosives. You also served on the Joint Service Research and Development Commander's Explosive Panel.

You indicated that in your work there—35 years as a mechanical engineer ordnance with the Army ordnance and Air Force—they had tried to put additives in to accomplish certain things which you enumerate on page 3.

Were any tests done or any experiments done while you were there in regard to taggants?

Mr. GOODWIN. Not on explosives, sir. During Nam, we did try to identify the unknown by spraying and that type of thing, but not in explosives.

Mr. SNYDER. Your basic concern, of course, is the black powder shooters that you represent in your capacity as legislative director of the National Muzzle Loading Rifle Association. How many black powder shooters do you estimate there are in the United States?

Mr. GOODWIN. I would say right now, probably in the neighborhood of 2 million.

Mr. SNYDER. Is it a sport that is declining or growing?

Mr. GOODWIN. Well, as I said in my testimony, it is the fastest growing shooting sport today.

Mr. SNYDER. Is there any ingredient that can be added to either black or smokeless powder that might be detectable, other than taggants?

Mr. GOODWIN. As a taggant for identification or for what was used in the bombing?

Mr. SNYDER. Well, for identification as to source of manufacturer.

Mr. GOODWIN. I know of nothing that could be added that would be part of the taggant program; absolutely nothing.

Mr. SNYDER. The thrust of your statement, aside from the protection of your membership and the people engaged in the sport, is that, really, the art has not been perfected at this point in time. You make reference to what could even be considered a charge that BATF is hastily trying to get their contractors in the aerospace industry to test.

Is that the thrust of your statement?

Mr. GOODWIN. That is correct.

Mr. SNYDER. I have no further questions, Mr. Chairman.

Mr. ANDERSON. Mr. Fary.

Mr. FARY. No questions.

Mr. ANDERSON. Mr. Taylor.

Mr. TAYLOR. Colonel Goodwin, you state that black powder is a low explosive and not one that the criminal prefers. Is smokeless powder in the same category?

Mr. GOODWIN. Well, smokeless powder is not classified as an explosive; it is a propellant. Why make the differentiation here—and I hope I answer your question—is that black powder, by definition, is classified as a low explosive.

Therefore, when you say “explosives,” without exempting that, you include it.

Mr. TAYLOR. Did I understand your statement that 20 percent of the total manufactured black powder is used by the muzzle loaders?

Mr. GOODWIN. Yes. When du Pont's plant blew up, it was the only plant left in the United States. Our powder at that time was coming from England until the plant was rebuilt and sold to Goex about 6 or 7 years ago. At that time, only about 2 percent of the powder that they manufactured at du Pont went to shooters; the rest went to the Government and to quarrying.

That has risen now, since Goex bought the plant out; it is the only plant and it is in Oberlin; Pa., up by Harrisburg; 20 percent of what they are manufacturing does go to the shooter.

Mr. TAYLOR. Thank you very much, Colonel; we appreciate your testimony.

Mr. ANDERSON. Mr. Snyder.

Mr. SNYDER. And then are you saying that the other 80 percent basically goes to Government and quarrying?

Mr. GOODWIN. It goes to Government use, that is correct.

Mr. SNYDER. And quarry operators?

Mr. GOODWIN. I do not know. Very little goes to quarrying, as I have said. I believe most of it has been replaced by slurry explosives.

Mr. ANDERSON. If there are no further questions, we will stand in recess, then, until 2 this afternoon.

[Whereupon, at 12:13 p.m., a luncheon recess was taken.]

AFTERNOON SESSION

[Whereupon, at 2:35 p.m., the subcommittee reconvened, Hon. Robert A. Young, presiding.]

Mr. YOUNG. We probably can start. I imagine everybody has had a chance to vote.

I would like to proceed with this afternoon's session, and I understand that Mr. Davis, Assistant Secretary for Enforcement and Operations of the Department of Treasury is the next witness. Would you like to proceed, Mr. Davis?

TESTIMONY OF RICHARD J. DAVIS, ASSISTANT SECRETARY FOR ENFORCEMENT AND OPERATIONS, DEPARTMENT OF TREASURY; ACCOMPANIED BY A. ATLEY PETERSON, PROGRAM DIRECTOR, BUREAU OF ALCOHOL, TOBACCO, AND FIREARMS; J. ROBERT MCBRIEN, SPECIAL ASSISTANT TO MR. DAVIS

Mr. DAVIS. Thank you, Mr. Chairman.

With the subcommittee's permission, and in the interest of time, I think what I would like to do is summarize my statement.

Mr. YOUNG. The full text of your prepared statement will appear in the record at this point.

[Statement referred to follows:]

STATEMENT OF HON. RICHARD J. DAVIS, ASSISTANT SECRETARY OF THE TREASURY

I very much appreciate the opportunity to appear before this Subcommittee in order to discuss the explosives tagging provisions of H.R. 13261 an "Act to Combat International Terrorism." With me today are Mr. J. Robert McBrien, my special assistant for matters involving terrorism and intelligence, and Mr. A. Atley Peterson, Special Assistant to the Director of ATF for Research and Development. Mr. Peterson, who has served as Chairman of the Advisory Committee on Explosives Tagging since 1973, will present more specific testimony on how tagging works.

If adopted, this legislation would provide Treasury with the necessary authority to require that all nonmilitary explosives carry unique elements—taggants—which permit identification and detection. Identification taggants would remain intact after a bomb explodes and enable the type of explosive used to be identified and traced. Detection taggants would enable the presence of a bomb to be established before it exploded.

While we have proposed certain modifications to the provisions of H.R. 13261, the Treasury Department strongly urges the adoption of explosives tagging legislation. It would provide us with critical tools in the battle against terrorists and others who use explosives illegally: it would help us apprehend the bomber, and it would help save lives and preserve property by preventing explosions from taking place. Our proposed changes, however, would explicitly require that taggants be safe, available and technologically acceptable before we may require them to be inserted in explosives.

Bombing is a particularly vicious and indiscriminate crime, and it is a clearly deliberate act of violence. One does not, in a moment of intense anger, grab his bomb from a closet and blow up his spouse or neighbor. The bomber actively has to acquire the knowledge of how to make a bomb; he has to fabricate the explosive device; and he has to plant it. This is a calculated, planned and indisputably intentional process. At the same time the consequences of the bomber's action are severe: death, injury and the destruction of property. For these reasons we believe that we should do all that we legitimately can to meet this problem.

The Treasury has therefore been working in recent years to determine whether explosives taggants could be developed to assist in the investigation and prevention of bombings. A technical advisory committee, including all Federal agencies interested in explosives control and the Institute of Makers of Explosives, the Sporting Arms and Ammunition Manufacturers' Institute, the International Association of Bomb Technicians and Investigators, the American Society of Industrial Security, the Airlines Pilots Association and representatives from various universities was created in 1973. In addition, because of the importance of technical expertise in this area, Aerospace Corporation was retained in order to provide technical systems management. While Mr. Peterson's statement includes more detail on the technical status of the program; as a general matter we are ready to tag the cap-sensitive explosives—that is, the dynamites, water-gels and slurries—for identification. If the facility for manufacturing those taggants was built, we could begin the identification tagging today. But it will not be constructed until the taggant manufacturer knows that it will have customers, and the explosives manufacturers will become customers only by Congress passing legislation which requires that they use taggants. We believe that the production facility will be finished and producing taggants within 12 to 18 months after the law is enacted. It also appears that the availability of sufficient numbers of taggants is the only technical constraint on identification tagging of most high explosives.

If this legislation were to pass, the expected implementation date for identification tagging of other explosives is: Black and Smokeless Powder, June 1980; Detonators, September 1980; Cast boosters, September 1980, and Fuse and Detonator cord, January 1981.

Progress is also being made in the detection tagging area. Our experts believe that pilot detection tagging can begin in late 1979 for dynamites, water gels and slurries. Testing should have been completed by then since much of the applied research and advanced development are already in process.

For other detection tagging we have projected the practical readiness for national implementation as follows: Black and Smokeless Powder, March 1980; High Explosives and Detonators, April 1980, and Fuse and Detonator cord, September 1981.

It is clear that the addition of identification taggants to commercial explosive materials or their boosters will better enable law enforcement authorities to trace the explosive material from a bomb scene to its last recorded owner and, hopefully, to its ultimate user. The chances of solving more bombing crimes will be improved when identification tagging is introduced. In addition many valuable investigative hours now necessarily spent attempting to identify the last legal owner of the explosives involved can be saved.

From Treasury's perspective, the vital issue as to identification tagging is whether the crimes solved and the deterrence established will be worth the effort and costs of requiring the identification taggants. In order to assess this as objectively as possible, Management Science Associates was asked to study this question. While acknowledging the difficulty in assessing the impact of any program before it begins, the study concludes, and we believe, that the value and cost effectiveness of identification tagging is clear.

With tagging, bombers can only lose. And we believe the costs for the manufacturers, dealers and users of explosive materials will be entirely reasonable. An inflation impact study was conducted by Aerospace Corporation in March 1977. It found that the tagging program would not have a major inflationary impact.

The possible price increases in explosives as a result of tagging for identification were estimated at merely one-and-quarter cents per pound of explosive; and while research on detection tagging is still continuing, we believe it will be less. Ultimately, when identification and detection taggants are combined into one micro-unit, there should be more cost reduction.

If identification tagging is a real benefit to law enforcement, a successful detection tagging program is critical. The bomb is intrinsically a weapon of terror. Bombing is a crime that is carried out secretly and without warning. A bomb is small and lightweight. It can be hidden easily. Through a time delay mechanism or a motion-activated detonator, it can be concealed (or mailed) and then abandoned by its creator. The bomber can choose his explosive device, select his target, and plant his bomb. But once he has left it, every passerby becomes a random target as it explodes without warning.

The need, therefore, is to develop the ability to detect the presence of a bomb before it explodes. Substantial progress in developing a working capability to tag explosives so that they may be detected before exploding has recently been made. And it is this part of the tagging program from which the greatest direct benefits to the public safety can be expected. With detection taggants added to explosive materials and with detection devices placed at high target value locations, we can go beyond solving bombing crimes only after the destruction has happened and begin, through pre-detonation discovery, to prevent bombings from occurring. The MSA study suggests that the cost-benefit of this form of tagging is less certain than that for identification tagging. Its analysis makes clear, however, that if one considers just the high risk, potential targets—airports, planes, public buildings—then the benefits are clear. In addition, when one considers what detection tagging can do—save life and limb—the essentiality of going forward with this program becomes clearer.

I would now like to discuss some of the points that have been raised during hearings. Initially, it has been suggested by some industry representatives that the Federal government should buy the tagging materials and distribute them to the explosives manufacturers. There has also been a suggestion that the Government should bear the liability for any adverse results of explosive tagging.

It is the Treasury Department's belief that the Federal government should not interpose itself in the commercial chain and create an artificial and unnecessary "middleman" between the producers of taggants and their customers, the manufacturers of explosive materials. The function of the Treasury's Bureau of Alcohol, Tobacco and Firearms with respect to the explosives industry should be to develop the requirements and to monitor the execution of the taggant programs. The BATF function clearly should not be that of an unnecessary, bureaucratic intruder in the marketplace. We believe either role—that of distributor of taggants or insurer of manufacturers—should be reserved for private enterprise where it will be accomplished as guided by normal market forces and business management interests. Any involvement of the Federal government in this "middleman" role is unnecessary and would create an unfortunate precedent. In addition, the problem of administering a program in which the government is liable for a defective explosive caused by a taggant only, cannot be overestimated. Establishing this casual connection would be extremely difficult and accomplish little other than increased legal fees for attorneys. We sincerely hope the Subcommittee will not add any requirements of this sort to H.R. 13261.

In hearings on this issue certain groups have sought to eliminate black and smokeless powders from the coverage of the tagging program. Mr. Chairman, we believe that this attempt should be strongly resisted. The issues raised are not real; they are based on fancy, not fact. As discussed below, black and smokeless powders are used in a substantial percentage of bombings. When so used they kill; they injure; they destroy property. The failure of the Congress to include these two forms of explosives would serve as an invitation to the terrorist and the criminal to rely more and more on these unexplainably excluded powders. The entire intent of the tagging program would be undermined.

Those urging this exception have raised two principal arguments opposing the use of taggants on black and smokeless powders. First, it has been argued that we are seeking to impose tagging requirements for black and smokeless powders before it is safe and feasible to do so. That is not true.

The Senate antiterrorism bill, S. 2236, contains language to ensure that tagging will be safe to users and weapons alike and will not be imposed prematurely. That is in subsection 12(t) of S. 2236. We drafted that language for the Senate bill, and it is the amendment which we most strongly urge be adopted for H.R. 13261. We are committed to the standards set by that provision; we will adhere to them; and even if they were not in the legislation, they would still be applied. Taggants for each class of explosives should not be required until the all around safety, performance quality and environmental impact of the tagged explosive are established through rigorous research and testing. In

addition, a tagging requirement should only be imposed if the taggant itself has the requisite longevity, survivability, and uniqueness to accomplish its task. The tests conducted to date—which have been carried out by the explosives manufacturers themselves—have established that the identification taggants will be safe indefinitely.

It is because tagging technology and the readiness and adequacy for implementation varies according to the type of explosive, that we have recommended in all Treasury testimony that tagging legislation should include greater discretionary authority and flexibility for the Secretary in determining what explosive materials should be tagged and when. But as soon as these conditions are met for each class of explosives, it is important that we have the authority to require the inclusion of these taggants as soon as possible. Maximizing the safety of our people requires no less.

The second major aspect of this false issue regarding black and smokeless powders is the charge that Treasury is seeking to achieve gun control through ammunition control. Again, that is not true. We are well aware of the controversy the notion of gun control generates. This is not a gun control issue, and you should not allow yourselves to be deceived into believing it is.

We stated during our Senate testimony, and reaffirm today, that we are not seeking to require the introduction of taggants into small caliber, commercially produced, fixed ammunition. The contents of commercially manufactured fixed ammunition are rarely found in bombs and are generally impractical for the bomber to use.

It is not appropriate, as some have done, simply to refer to black and smokeless powders as "propellant powders." The impression conveyed by this expression is that black and smokeless powders are used only to fire bullets and that somehow they lose their character as a favorite implement of bombers and acquire innocence by being used to propel ammunition. That is not true.

The fact is that the same type of 1, 2 and 5 pound cans of black and smokeless powders used by some sportsmen and musketry enthusiasts are the sources of the second most commonly used explosive fillers in bombs. Black and smokeless powders are explosives; they blow up.

Let us examine the facts. We have prepared brief comparison tables in order to demonstrate clearly that our information on the use of black and smokeless powders in bombs is not mere conjecture; and indeed, agrees conservatively with information developed by the FBI.

The incidence of black and smokeless powder bombs in 1977 has been monitored by BATF and the FBI separately. Since the reporting of bombing crimes on a nationwide basis is not perfect, there are some differences in their final data and the FBI reports a higher percentage of incidents involving black or smokeless powder bombings. If all reported bombings are used as a basis, including incendiary devices and the unidentified explosives, BATF reports show black powder use at 12.4 percent and smokeless at 7.4 percent—a 19.8 percent total. FBI data reports 15.6 percent for black powder, 17.8 percent for smokeless, to equal a total of 33.4 percent of bombings.

If we calculate the percentages for reported bombings only when the explosive is identified, we find: black powder equals 18.2 percent (FBI) to 22.5 percent (BATF) and smokeless powders account for 13.5 percent (BATF) to 20.5 percent (FBI); these total to 36.0 percent (BATF) and 38.7 percent (FBI). If we exclude incendiary devices from these data and use only "explosive bombs," we have BATF reporting 31.3 percent for black powder, and 18.7 percent for smokeless powder, a total occurrence in 1977 bombings of 50 percent. The comparable FBI statistics are: 24.2 percent, 27.3 percent, and a total of 51.5 percent.

The incidence of death and injury from bombings was calculated on the basis of BATF data by MSA for the period April 1975 through July of 1977. In that study, black and smokeless powders accounted for 18.8 percent of the 388 recorded injuries. That equals 73 injuries.

Among the 78 fatalities, black and smokeless powders were responsible for 19.3 percent of the deaths, that is, for 8 deaths. BATF's latest statistics, covering January 1976 to May 1978, show that black and smokeless powders are responsible for 12 percent of the bomb deaths in that time and 20 percent of the bomb injuries.

The MSA study also examined the types of targets of bombings and the explosives used against them. Black powder accounted for, among other bombings, 27.2 percent against schools, 12.9 percent against private residences, 8.5 percent against vehicles, 6.4 percent against transportation facilities, and 10.4 percent

against Federal, State and local government. Smokeless powder accounted for: Schools, 14.7 percent; Private residences, 10.3 percent; Vehicles, 10.4 percent; Transportation facilities, 6.4 percent, and Federal, State, local government 13.3 percent.

Black powder was not used against law enforcement agencies but smokeless powder was used in 12.5 percent of those bombings.

As these various figures show, the truth about black and smokeless powders is that they constitute a very major part of the bombing crime problem. While they certainly do not carry the explosive force of dynamite and other high explosives, they are a significant part of the bombing problem. Black and smokeless powders are found, along with other explosives, in the bomb factories of domestic terrorists and other criminals. FBI figures reflect that in 1977, 90 percent of the domestic terrorist incidents in the United States took the form of bombings. BATF investigators believe that every known terrorist group in this country has, at some time or another, used black and smokeless powders. Just recently an Associated Press story of July 13 described a case in which New York Police uncovered what was reported to be a FLAN—the Puerto Rican terrorist group—bomb factory. Among the explosives found on the scene was black powder.

The proportionate use of black and smokeless powder in bombs is very significant. Only 400,000 pounds of black powder are commercially available to the public each year out of 600 million pounds of cap-sensitive explosives. The mathematics are simple: black powder represents only 0.067 percent of the total available commercial explosives, but it is used in 12 to 16 percent of the bombings. Thus, its use in crime is several hundred times greater than its proportional availability.

Smokeless powder is very similar. It represents only 0.83 percent of the total cap-sensitive commercial explosives available (5 million pounds out of 600 million pounds). Yet smokeless powder is used in 7.4 (BATF) to 17.8 (FBI) percent of bombing crimes. Again, its criminal use is very many times greater than its proportional availability.

Mr. Chairman, as I said above, if black and smokeless powders are not included within the taggant program, if, as in subsection 12(u) of H.R. 13283, a nearly identical bill, they are excluded from tagging, then the explosive materials used in a major proportion of current bombings will not only escape these safeguards, but the criminal-terrorist will also be provided with an obvious alternative to those explosives which can be traced or detected through taggants. We do not believe this result can be justified to the American people.

It is our view that this legislation should require the insertion of taggants in all types of cap-sensitive commercially available explosive materials which are used in crimes. The Secretary would then have the authority, applying the standards in the proposed language, to impose the specific requirement for each class of explosives within a reasonable time after the taggant for that class has been successfully tested and is available. The Secretary would exempt those classes of explosives not yet ready for tagging.

Mr. Chairman, the benefits of tagging are clear. It will not, however, provide a panacea, instantly solving the problem of explosives crime. Identification tagging will help solve some bombings, not all. Detection tagging does not mean that all bombs will immediately be detected. Together, however, they will meaningfully advance our ability to deal with the bombing problem, and may deter some from using this deadly instrument. Those would be major advances.

One thing is clear, however: the extent to which tagging will help counter bombing crimes will be largely influenced by how quickly and how many forms of explosives are tagged. It is critical, therefore, that as soon as technology allows, the requirement that a particular class of explosives be tagged should go into effect. One class of explosives is ready to be tagged now; others will be shortly. We, therefore, urge that this legislation be passed during this session. We can then minimize the delay in getting tagged explosives into the marketplace and maximize our ability to apprehend those who use bombs and to save the lives of their intended victims at the earliest possible time.

The Treasury Department deeply appreciates the attention which the Subcommittee and you, Mr. Chairman, are giving to the problems of bombings by terrorists and other criminals and the tagging of explosives to help fight this severe crime problem. We believe that all responsible Americans share a desire for all explosive materials commonly used in criminal and terrorist bombings, when operationally feasible, to be required to contain both identification and detection taggants.

We will gladly work with the Subcommittee to achieve a final version of H.R. 13261 which will accomplish our mutual goal of a workable scheme for requiring the tagging of explosives materials for identification and for detection.

That concludes my statement, Mr. Chairman; I will be happy to answer any questions the Subcommittee may have.

Mr. STUMP. Please proceed.

Mr. DAVIS. Mr. Chairman, Mr. Stump, it is a pleasure for me to appear in front of you today, and testify on the subject of explosive tagging, which is part of the antiterrorism legislation which is being considered by this subcommittee.

With me is Mr. A. Atley Peterson, Assistant to the Director of the ATF, who has also submitted a statement to the subcommittee. He has served as Chairman of the Advisory Committee on Explosive Tagging for the Bureau.

With me also is Mr. J. Robert McBrien, who is my Special Assistant, dealing with matters relating to terrorism, intelligence and special projects.

Mr. Chairman, we come here today to testify on what we view as a very important bill, in connection with our attempt to try to do the best job we can do on a very serious problem.

The very serious problem is that of crime involving bombing, the crime committed by the terrorists, because bombing is a very special kind of crime. It is a crime that is frequently committed in the utmost of secrecy. It is a crime that is committed as a result of a great deal of planning, usually. It is a crime that is committed with a great deal of intended and deliberate violence, that when it happens, produces death, injuries, and destruction to property.

It is the kind of crime we believe that it is our obligation to do everything we legitimately can do to try to prevent. And when it appears, to try to catch those who do it.

It is for that reason that we are here to support that portion of the proposed legislation relating to explosive tagging.

Now, tagging would have two purposes. One, for identification, and the second, for detection. Identification tagging would involve the preservation of a taggant, after the explosion of a bomb, so that we can trace it, as part of our investigation, back as far as we possibly can, to find the last legal owner of that explosive.

Right now, in many cases, we are unable to do that. We are forced to conduct numerous investigations, spend many, many, hours, days, and longer in terms of people and their time, in an attempt to begin to get the first lead.

This would provide that on a much more effective basis, and would help us catch those who commit this kind of crime.

The second kind of tagging relates to detection, and detection tagging we view in a way as maybe more important, because what that does is that it would enable the presence of an explosive to be detected before it goes off, so that the lives can be saved, so that the injuries and the hurt can be avoided.

ATF has, for a number of years now, been working on developing this program. It has an advisory committee which is involved with other Government agencies and with members of industry, which has a very important and cooperative group working together in this effort.

There is also a technical subcontractor, because we think this is the kind of subject in which it is important not just to rely on our own knowledge. That may not be sufficient in this kind of a technical area.

We have had the Aerospace Corp., to provide technical assistance. We have also had another contractor, Management Science Associates, to do the necessary vigorous studies as to whether this kind of program would be cost-effective and beneficial.

We did not think we just wanted to come out here and assert this, and we wanted somebody from the outside to look at this kind of a program.

The result of all this is that we are really ready to go. Now, when I say we are ready to go, Mr. Peterson will give more details as to the status of the various types of taggants.

But as for tagging for identification, that is ready for dynamites and some of the other high explosives. And we are ready to start.

Other identification taggants are in various stages of development—for the black and smokeless powders, for the detonators, and for the boosters.

In tagging for detection, great progress has recently been made, and we are also well on the way towards developing those taggants which will be ready for black and smokeless powders, detonators, cast boosters, fuse and detonator cords.

Now, I say we are ready to go. I think that is important to state, because I know that some have some questions, "Well, if all technology is not done for every kind, why have this legislation now?"

Well, we think it is because this legislation is what is necessary to get us from here to there as soon as possible.

First of all, until the legislation is passed requiring these taggants, it is very difficult for a manufacturer of taggants to justify the capital investment involved in trying to mass produce this kind of product. It would take the known reality, the reality, knowledge that there will be a program, so that even when we are ready, there will be the ability to produce on a mass basis necessary to get these into the commerce.

This is not the kind of program, that the date it starts, it solves your problem. It is a kind of program that requires time in operation to begin to get success, and that is because one of the basic realities is that what we need for success is as much tagged explosives in the marketplace as possible, and that takes time.

So if this program is going to be successful, and if it is going to be successful in anything approaching the near future, it requires action as soon as possible. It requires an ability to proceed, almost instantly, where we are ready technologically. It requires an ability to proceed instantly, as soon as the next level of taggant, for the next kind of explosive, is ready technologically. Because if for each stage you go back for legislation, and if for each stage it requires a new act of Congress, and a new signature by the President, we are talking about a program that may well be defeated before it starts.

The benefits of tagging, as I said, were the subject of a study done by Management Science Associates, which we have submitted to this committee for its reviews, and that study established that, plainly, tagging for identification is cost-beneficial.

It does so in the most exacting way, because if you read that report, it is plainly not a report that wanted to come out a certain way. It is a report that at every point took the most conservative approach, and every point said "we will count that against the Government program," and still came out that it is cost-beneficial. In terms of detection tagging, it also found that it is cost-beneficial, but over a much longer range.

But detection tagging is cost-beneficial, and this is shown in the report. If you look at the high risk areas—if you look at the airports, the public buildings—what detection tagging could do is forecast in those areas. The cost-benefits become enormous, because an explosion, a bombing, in those areas, is a catastrophe.

I just briefly would like to turn to some of the issues raised in earlier testimony before this committee, and before the Senate Judiciary Committee. It has also held hearings on this subject.

First, it had been suggested that perhaps the Government should buy these taggants for industry, and insure the explosives industry against any dangers which might come about from this taggant.

We do not think that is a good idea. We think it would be a dangerous precedent. We think that would put this agency, the Bureau of Alcohol, Tobacco, and Firearms, as a bureaucratic middleman in the free market. It would create, especially in the insurance clause, a lot of work for lawyers.

Because I am a lawyer, I hesitate to say anything critical of lawyers, but it would be in a posture where if an explosion, or defective explosive was caused, on the one hand, by the presence of taggants, the Government paid. If it was caused by something else, the private insurer paid.

We suggest that would be right for the lawyer's business, but would not serve the public interest, and that this kind of program should be treated as other programs, and that the Government should not pick up the tab.

The second area, and the one that I know this morning evoked a certain amount of testimony, involves the question as to whether black and smokeless powders should be excluded—I almost hesitate to get involved in an issue which some have characterized as ammunition control, or gun control, but I think it is important, because I think what should be realized is that this is not what we are talking about. We are not talking about what we want to do with ammunition.

We are not talking about what we want to do with guns. What this is recognizing that it is not an accurate statement to just say something is a propellant powder, because in fact these powders are also used by the criminal, as parts of bombs. They are also used by the terrorist.

I mean, just last week—if we needed a further reminder, we read in the newspaper of a bomb factory discovered, maintained by FAIRN, a notorious terrorist group. What was on their premises? Black powder.

And we look at the statistics, and the statistics show in a very large percentage of bombings, where black and smokeless powders are used.

Now, in my testimony, I have set these out from all the sources, because the question is—"Whose statistics are they?"

Well, we have given the statistics that ATF has accumulated, based on matters reported to it, and given you statistics maintained by the Federal Bureau of Investigation, based on its National Bomb Center. And you also have the statistics which are the product of work of the MSA in its study.

And they all point in the same direction. That is, that black and smokeless powders are part of our bombing problem.

Of course, they are used—I wish they were not. We all wish they were not, but they are. We believe that if we try to do something about the problem of terrorism, and we believe it is our obligation to do so, that we cannot be in a position of legislating, or recommending legislation, which leaves the easiest possible out for the terrorists and the bombers to use. And we suggest that eliminating black and smokeless powder would do just that.

Now, that is not to say that we want to go into a project willy-nilly, or we want to go into a project without care or concern. We have suggested amendments to this very legislation, amendments which were adopted in the Senate, which would require showings of the establishment of safety; that the taggants were in fact safe, that they did not cause any unsafe condition in the explosive material. That would include these powders.

We think that even without that in the legislation that it would be our obligation. But we want it in the legislation. We want that to be the test, because we do not want to be in a position of requiring something before it is safe. That should be what we are legally accountable for; and we urge the introduction, or the inclusion of that language in this legislation.

I also gather that there is some discussion about the fact that we are not tagging ammonium nitrates and gasolines, and those make bombs. Yes; those do make bombs. But I must say that I have done a little research, and it looks like some bombs—and I am not an expert—there are some books, like the Anarchist's Cookbook, which tell people how to make bombs; and if you look through that, you find a very interesting fact; that is, that that kind of explosive is very dangerous if the person trying to set it off is not using some form of detonator to set it off, a fuse, or something of that sort.

Well, those things are going to be tagged. Fuses are going to be tagged. Detonators are going to be tagged. Caps are going to be tagged.

One of these bombs, you set it off with dynamite. Well, they are going to be tagged. So there we have, I think, very successfully covered that program, recognizing that you cannot require taggants in gasoline. It would not be very successful. But that because of the inconvenience and danger to the person trying to set off the bomb, we think we have done the best we can in meeting that.

In sum, we think that the hearings held by this committee on this entire bill have been very beneficial. We think that they recognize—and this committee recognizes—that the problem of terrorism, and the problem that the terrorists can create for us and for those in Western Europe and elsewhere, is a very real one and is one that we should try our best to deal with.

And I think, when all is said and done, what this legislation would do, in terms of tagging, is try and do the best we can and would give

important tools to investigators—State, Federal and local—to help meet the problem created by the bomber, whether it would be the bomber-terrorist, or the bomber for other criminal purposes.

And we urge that this legislation, without excepting any specific class of explosives, be passed as soon as possible. And I think Mr. Peterson may have a few comments to summarize from his statement.

Thank you.

Mr. YOUNG. Thank you very much, Mr. Davis.

Do you have any questions of Mr. Davis at this time?

We will proceed with Mr. Peterson's testimony first.

Mr. PETERSON. Thank you, Mr. Chairman.

I am A. Atley Peterson, Assistant to the Director for Research & Development of the Bureau of Alcohol, Tobacco and Firearms. Since 1973, I have also served as chairman of the Advisory Committee on Explosives Tagging.

I would like to give a little bit of the history and the status of where we stand. I have submitted my complete testimony, and I will just summarize it here, if I may.

Mr. YOUNG. The full text of your prepared statement will appear in the record at this point.

[Statement referred to follows:]

STATEMENT OF A. ATLEY PETERSON, SPECIAL ASSISTANT TO THE DIRECTOR FOR RESEARCH AND DEVELOPMENT OF THE BUREAU OF ALCOHOL, TOBACCO AND FIREARMS, DEPARTMENT OF THE TREASURY

Good morning, Mr. Chairman and members of the Subcommittee. I am A. Atley Peterson, Special Assistant to the Director for Research and Development of the Bureau of Alcohol, Tobacco and Firearms. Since 1973 I have also served as Chairman of the Advisory Committee on Explosives Tagging.

HISTORY

For many years, people involved in the suppression of crimes with explosives have hoped that some day a means would be found to detect concealed explosives and to provide some clue after an explosion which would lead the investigator to the criminal. In 1972 ATF, with a group of interested people, discussed this problem and determined that the time was ripe to enlist the support of science and technology to assist in controlling the use of explosives in crime. In 1973 the Bureau of Alcohol, Tobacco and Firearms assumed leadership of this project.

In 1974 we requested and were granted charters for an Advisory Committee on Explosives Tagging and a Technical Subcommittee to the Advisory Committee. ATF was first funded in 1976, with fiscal year 1977 funds for this program. At that time the program was put into high gear. Prior to that, funding had been provided by others. These efforts did establish the scientific confidence that we could tag explosives for identification after detonation, and for detection prior to detonation. Through the Advisory Committee on Explosives Tagging, we achieved a sense of common purpose toward a national objective and excellent coordination.

We received outstanding cooperation and technical advice from industry.

METHODOLOGY

The attack on this program has been developed with the advice, guidance and technical expertise offered by the individuals on the Advisory Committee on Explosives Tagging and its Technical Subcommittee. The Advisory Committee representatives are from all of the agencies of the Federal Government interested in explosives control. They include ATF, the Federal Aviation Administration, the U.S. Secret Service, the U.S. Postal Service, the Bureau of Mines, the De-

partment of Defense, the Department of Transportation, the Environmental Protection Agency, the Law Enforcement Assistance Administration, the Federal Bureau of Investigation, and the U.S. Customs Service. In addition, we have representatives from the Institute of Makers of Explosives, the Sporting Arms and Ammunition Manufacturers' Institute, the International Association of Bomb Technicians and Investigators, the American Society of Industrial Security, the Air Line Pilots Association, and academia. This group has provided a very effective interchange, and at our meetings the manufacturing companies are invited to send representatives as observers.

The Technical Subcommittee consists of five individuals, carefully selected for their scientific expertise in the explosive fields. The Chairman is ATF's Assistant Director for Technical and Scientific Services, in which organization the techniques for the analysis of bomb crimes are perfected, many of which are adopted by crime laboratories throughout the country. The Bureau of Mines is represented because it has done a great deal of research and development in control of the permissible and impermissible explosives used in the mining industry. The Sandia Laboratories of Albuquerque, New Mexico, provide a highly qualified individual as does the Institute for Defense Analyses. The U.S. Postal Service, which has been very concerned with the letter bomb problem for some years, provides the fifth representative from its research and development organization.

This small group is able to make tough, hard decisions and make them fast. The task of the Technical Subcommittee is to determine which technology should be pursued and which probably does not have the promise that its promoters allege.

In addition, as soon as this program was funded, ATF negotiated a contract with Aerospace Corporation to provide technical systems management. The Aerospace Corporation has been systems managers on many of the military's highly scientific programs and is now, in addition, devoting its efforts to non-military national programs as well. We are pleased to have the support from Aerospace.

An additional contract was negotiated with Management Science Associates of Los Altos, California, to study the cost benefits of the program. We are frequently asked what is the value of our program. Those of us working in the control of explosives crimes feel very strongly that it is of value, but we realize the need to be more precise in describing its value to society. The results of this study are available in this report which I have for the Committee.

OBJECTIVES

The major objective is to reduce and suppress crimes with explosives. Detection will prevent the introduction of an explosive into an area for illegal use. Identification will enable us to apprehend more criminal bombers, faster and at less cost.

There are also associated objectives. One is to reduce thefts. If we are able to trace explosives used in crime to the last legal possessor, that person or organization, we believe, will tend to improve his security measures. He will want to avoid the surprise and embarrassment of being confronted with the fact that the explosive used in crime came from his magazine.

Another related objective is to provide a more certain means of determining whether an explosion was accidental. Such as from a leaking gas main, or intentionally set off by explosive materials set in place by some person. This capability would tend to simplify litigation in insurance claims, as well as eliminate pointless criminal investigation.

This program is also designed to assist the Bureau of Mines in assuring that only certain safe or permissible explosives are used in underground mining operations.

PROGRAM

The Explosives Tagging Program has four parts, the first two of which involve this legislation:

1. Tagging for Identification
2. Tagging for Detection
3. Detection without Tagging
4. Identification without Tagging

The first two require the addition of some chemical material, which we call taggants, to the explosives to enable us to identify and detect. The identifica-

tion is to tell us the information we need about the explosive after detonation which would enable us to trace it through its course in commerce to the point at which a criminal may have procured it. The tagging for detection is designed to detect the presence of concealed explosives.

TAGGING FOR IDENTIFICATION

Tagging for identification will give us essentially the same information that is now printed on the outside wrapper of all explosives in accordance with ATF regulations. This information is commonly called the date/shift code and identifies the manufacturer, the plant at which it was manufactured, the date, and the production unit in which it was manufactured. By this information, we are able to trace explosives from the manufacturer through the distributor to a legal user. This is possible because the recordkeeping requirements are in existence now that will provide us this pathway. We now do such traces from data on undetonated explosives in our National Explosives Tracing Center. ATF provides this service to all law enforcement organizations and now is requested to trace approximately 100 explosives each month. When the explosive goes off, it usually destroys all evidence, and consequently, the trace to the criminal is extremely difficult.

In tagging for identification, our first efforts were to tag the cap-sensitive explosives generally known as dynamites, water gels and slurries. Cap-sensitive explosives are those than can be detonated by either an electric or non-electric blasting cap. They are therefore sensitive as compared to blasting agents which require a booster to be activated. Water gels and slurries are explosive materials with characteristics similar to dynamites. They are conveniently packaged in sausage-like plastic tubes. They are generally accepted as modern improved explosives to replace dynamites.

This category of explosives is identified as being used in about 30% of the criminal bombings. However, they account for a major portion of deaths, injuries, and property damage in explosives crimes. We have determined that about 55%-70% of deaths, 70% of injuries, and 80% of property damage are due to this family of explosives. We have proved we can tag this family of explosives in a national pilot test. We now seek legislation to put our technology to use.

The next family most frequently used in crime is the powders—black and smokeless. They are used in about 20%-40% of the crimes, depending on which data base and which year one analyzes. Because they generally produce a lower-order explosion, loss of life, injuries and property damage are usually, but not always, less than the higher-order explosives. Unfortunately, the powders are the favorite material for bombers to put in pipe bombs, and our records show the use of pipe bombs was 37.4% in 1976 and 39.3% in 1977.

The next family, not used in general crime very frequently, but often in letter bombs, is plastic or plastic-bonded explosives. We are working in this area, and believe there will be no insurmountable problems to adding taggants to these plastic explosives.

Another family comprises the military explosives such as RDX, HMX, tetryl, etc. These appear in crime less than 5 percent but due to the high energy of the explosion, they cause considerable damage, loss of life and injury. Most of these explosives used in crime are stolen from the military.

Periodically, the military declares some of these explosives as surplus, and they are then purchased by licensed manufacturers or dealers for re-work into commercial explosives products. Manufacturers, as they re-work the military explosives, can add identification tags to their final products.

Finally, we come to the family of blasting agents. These are non-cap-sensitive explosives and are generally produced by combining an oxidizer and a fuel oil. The best known is ammonium nitrate and fuel oil, commonly referred to as ANFO. Ammonium nitrate is commonly used as a fertilizer. Therefore, these two components are widely available. Separated, the components are not classed as explosives; mixed, they become explosive materials.

Under existing laws there is no authority to tag the components, although once combined, the mixture does fall under the regulations governing explosives. Of the three billion pounds of explosive materials used each year, blasting agents represent about 80 percent of the total. Their use in bombings is low—less than 1 percent, probably because of inconvenience for handling surreptitiously. If we move to tag this quantity, we do not believe we could produce enough taggants for several years. Therefore, we have taken another approach.

To be reliably detonated, a blasting agent requires a booster. A 1-pound booster charge could set off 500 to 5,000 pounds of blasting agent. Research is going on now to tag boosters. In addition, the booster needs a detonator and we plan to tag detonators.

Lastly, we are investigating ways to tag the supporting elements for identification. These include the electric and non-electric detonators, boosters, detonating cord, safety fuzes, etc. Tagging the electric detonators for identification is highly desirable because they are made by only three companies in the United States, and they are used in a majority of the crimes resulting in death, injuries or property damage. Recently the Aerospace Corporation and its subcontractors have achieved some substantial results to enable us to tag the detonators.

TAGGING FOR DETECTION

Turning from identification to tagging for detection, we envision a system involving a detector which in the presence of a tagged explosive would provide a signal that an explosive was present. Our goal is to enable a detector to be built into doorways, into the circulating systems of buildings or aircraft, or mounted in portable units with which a search of an area would be accomplished.

Our first objective is to tag electric detonators. With the recent remarkable breakthroughs on adding taggants to the detonators and the discovery of a family of suitable chemical compounds for detection taggants, tagging the detonators for both detection and identification will move quickly.

Our objectives in detection tagging are to provide a vapor which will remain in the explosive for at least five years, give a very distinctive vapor which can be detected conveniently by moderate or low-cost detection instruments, does not exist normally in nature, disintegrates soon after it is released into the air, has no undesirable impact on the environment, and is reasonable in cost. We are close to achieving these objectives.

We shall begin a national pilot test on tagging for detection in late 1978 and be ready for implementation in 1980. In the future, we look forward to combining it with the taggant for identification. At that time the tagging program will be mature.

DETECTION WITHOUT TAGGING

Research in detection without tagging is also a current phase of the tagging program. The Federal Aviation Administration is interested in detecting explosives without tagging at airports, and therefore is devoting its effort in this direction. The representatives of ATF and FAA work very closely together to ensure no duplication and a complementary attack on the program.

Under our own program of detection without tagging, we are pursuing four promising areas of research. These are dual-energy computerized tomography, dielectric discontinuity, ion-mobility spectrometry, and animal olfaction. While these efforts are directed at detection without tagging, ion-mobility spectrometry and the use of animals could also serve as detectors of taggants.

IDENTIFICATION WITHOUT TAGGING

In identification without tagging, we have only a minor monitoring effort of the scientific developments.

Identification without tagging is a low-level effort because we have as yet seen no promising technological potential which can respond to this requirement to identify all the elements we need to know concerning the explosive after it has been detonated.

CURRENT STATUS

We are very proud of the record of scientific accomplishments reported to date. These achievements could never have been so rapidly accomplished without the excellent cooperation and scientific advice of the individual manufacturers of explosives, the associations such as the Institute of Makers of Explosives (IME), and the Sporting Arms and Ammunition Manufacturers' Institute (SAAMI). Many police officers and the International Association of Bomb Technicians and Investigators (IABTI) have given invaluable street-wise advice to the scientists working on the program.

The Aerospace Corporation is now administering 30 subcontractors throughout the United States. We in ATF are trying to visit each subcontractor to let its researchers know that the U.S. Government through ATF is intensely interested in a successful outcome of the efforts of each organization.

We are fully aware that the manufacturers of explosives do not view with pleasure more government participation in their business functions, but they are pitching in for the common and greater good of reducing the explosives crimes.

Your Committee has heard, I believe, a unanimous record of support from the law enforcement representatives, as well as from the Air Line Pilots Association and the Air Transport Association. Working with the FBI, state, and local police organizations, we have provided training courses, three large demonstrations, and many small ones around the country. We have also developed a field kit for the recovery and decoding of the identification taggants.

BENEFIT/COST ANALYSIS

Now let me turn to the benefit/cost analysis. Management Science Associates (MSA) did its work in a scholarly, conservative manner. Based on interviews with many people involved in controlling explosives crimes, from security officers of large corporations to police officers on the street, experiences, judgments, and opinions were gathered. Statistics on bombing crimes were collected from the FBI's National Bomb Data Center, ATF's Explosives Incidents Reports, and the records of the California Department of Criminal Justice. Drawing on other studies, such as the value of injuries and death and economic analyses of property damage, and secondary costs, such as loss of productivity, dollar values were established. Costs were based on the Economic Inflationary Impact Study done by the Aerospace Corporation. To get a realistic quantification, the analysis covered a 20-year period because almost no program of this nature would become cost-beneficial in the first few years.

The conclusions were that tagging for identification would definitely be cost-beneficial, wherein benefits would exceed costs between the 8th and 12th years. Tagging for detection is much more complex. Nevertheless, MSA concluded it, too, would probably be cost-beneficial, although less markedly than identification tagging. The benefits of tagging for detection would exceed monetary costs in between 14 to 19 years. However, we believe that the savings in human lives and suffering will be a nearly immediate benefit.

In analyzing the benefits of identification tagging, the analysis deals with the increased arrest rate and an estimate of deterrence. The increased arrest rate selected is extremely conservative. The arrest rate in explosives crimes for ATF has hovered around 8%, the figure used in the MSA study. This is very low because there are so few clues. When we are lucky enough to recover an unexploded packaged explosive with the date/shift code intact, we can trace the explosive. With this information, our investigations will be more likely to have a successful conclusion.

After analyzing the possible change in arrest rates, the MSA study states:

Thus, we can set one-third (33.3%) as a high upper limit for the arrest rate . . . for bombing incidents after the identification tagging program is implemented.

On the other hand, the MSA researchers decided to use an improvement in the arrest rate of from 8% to only 12%.

In firearms crimes our arrest rate runs about 26%, and in alcohol crimes about 35%. Once an arrest is made, however, our conviction rate approaches 90%. Some of us believe that with identification tagging the arrest rate would be considerably improved.

Thank you.

Mr. YOUNG. Please proceed.

Mr. PETERSON. In 1972, ATF, with a group of interested people, discussed this problem and determined that the time was ripe to enlist the support of science and technology to assist in controlling the use of explosives in crime.

In 1973, the Bureau of Alcohol, Tobacco and Firearms assumed leadership of this project.

In 1974, we requested and were granted charters for an Advisory committee. The Advisory Committee representatives are from all of the Advisory Committee. ATF was first funded in 1976, with FY '77 funds for this program. At that time, the program was put into high gear.

The attack on this program has been developed with the advice, guidance and technical expertise offered by the individuals on the Advisory Committee on Explosives Tagging and its Technical Subcommittee. The Advisory Committee representatives are from all of the agencies of the Federal government and industry interested in explosives control.

As soon as this program was funded, ATF negotiated a contract with Aerospace Corporation to provide technical systems management. The Aerospace Corporation has been systems managers of many of the military's highly scientific programs and is now, in addition, devoting its efforts to non-military national programs as well. We are pleased to have the support from Aerospace.

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There are also associated objectives. One is to reduce thefts. If we are able to trace explosives used in crime to the last legal possessor, that person or organization, we believe, will tend to improve his security measures. He will want to avoid the surprise and embarrassment of being confronted with the fact that the explosive used in crime came from his magazine.

Another related objective is to provide a more certain means of determining whether an explosion was accidental, such as from a leaking gas main, or intentionally set off by explosive materials set in place by some person. This capability would tend to simplify litigation in insurance claims as well as eliminate pointless criminal investigation.

This program is also designed to assist the Bureau of Mines in assuring that only certain safe or permissible explosives are used in underground mining operations.

The explosives tagging program has four parts, the first two of which involve this legislation:

- First, tagging for identification;
- Second, tagging for detection;
- Third, detection without tagging; and
- Fourth, identification without tagging.

The first two require the addition of some chemical material, which we call taggants, to the explosives to enable us to identify and detect. The identification is to tell us the information we need about the explosive after detonation which would enable us to trace it through its course in commerce to the point at which a criminal may have procured it. The tagging for detection is designed to detect the presence of concealed explosives.

In tagging for identification, our first efforts were to tag the cap-sensitive explosives generally known as dynamites, water gels, and slurries. Cap-sensitive explosives are those that can be detonated by either an electric or nonelectric blasting cap. They are therefore sensitive as compared to blasting agents which require a booster to be

activated. Water gels and slurries are explosive materials with characteristics similar to dynamites.

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The next family, not used in general crime very frequently, but often in letter bombs, is plastic or plastic bonded explosives, the semi-gelatinous materials.

Another family comprises the military explosives such as RDX, HMX, and Teteryl. These appear in crime less than 5 percent, but due to the high energy of the explosion, they cause considerable damage, loss of life, and injury. Most of these explosives used in crime are stolen from the military.

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Turning from identification to tagging for detection, we envision a system involving a detector which in the presence of a tagged explosive would provide a signal that an explosive was present. Our goal is to enable a detector to be built into doorways, into the circulating systems of buildings or aircraft, or mounted in portable units with which a search of an area would be accomplished.

Our first objective is to tag electric detonators. With the recent remarkable breakthroughs on adding taggants to the detonators and the discovery of a family of suitable chemical compounds for detection taggants, tagging the detonators for both detection and identification will move quickly.

We shall begin a national pilot test on tagging for detection in late 1978 and be ready for implementation in 1980. In the future, we look forward to combining it with the taggant for identification. At that time, the tagging program will be mature.

Research in detection without tagging is also a current phase of the tagging program. The Federal Aviation Administration is interested in detecting explosives without tagging at airports, and therefore is devoting its effort in this direction. The representatives at ATF and FAA work very closely together to insure no duplication and a complementary attack on the program.

Under our own program of detection without tagging, we are pursuing four promising areas of research. These are dual-energy computerized tomography, dielectric discontinuity, ionmobility spectrometry, and animal olfaction. While these efforts are directed at detection without tagging, ionmobility spectrometry and the use of animals could also serve as detectors of taggants.

In identification without tagging, we have only a minor monitoring effort of the scientific developments. Identification without tagging is a low-level effort because we have as yet seen no promising technological potential which can respond to this requirement to identify all the elements we need to know concerning the explosive after it has detonated.

We are very proud of the record of scientific accomplishments reported to date. These achievements could never have been so rapidly accomplished without the really excellent cooperation and scientific advice of the individual manufacturers of explosives, the associations such as the Institute of Makers of Explosives, IME, and the Sporting Arms and Ammunition Manufacturers' Institute, SAAMI. Many police officers and the International Association of Bomb Technicians and Investigators, IABTI, have given invaluable streetwise advice to the scientists working on the program.

The Aerospace Corp. is now administering 30 subcontractors throughout the United States.

We are fully aware that the manufacturers of explosives do not view with pleasure more Government participation in their business functions, but they are pitching in for the common and greater good of reducing the explosives crimes.

Your committee has heard, I believe, a unanimous record of support from the law enforcement representatives, as well as the Airline

Pilots Association and the Air Transport Association. Working with the FBI, State, and local police organizations, we have provided training courses, three large demonstrations, and many small ones around the country. We have also developed a field kit for the recovery and decoding of the identification taggants.

Now, let me turn to the benefit-cost analysis.

Management Science Associates, MSA, did its work in a scholarly, conservative manner. Based on interviews with many people involved in controlling explosive crimes, from security officers of large corporations to police officers on the street, experiences, judgments, and opinions were gathered.

Statistics on bombing crimes were collected from the FBI's National Bomb Data Center, ATF's Explosives Incidents Reports, and the records of the California Department of Justice.

Drawing on other studies, such as the value of injuries and death and economic analyses of property damage, and secondary costs, such as loss of productivity, dollar values were established. Costs were based on the Economic Inflationary Impact Study done by the Aerospace Corporation. To get a realistic quantification, the analysis covered a 20-year period because almost no program of this nature would become cost-beneficial in the first few years.

The conclusions were that tagging for identification would definitely be cost-beneficial, wherein benefits would exceed costs between the eighth and twelfth years. Tagging for detection is much more complex.

Nevertheless, MSA concluded it, too, would probably be cost-beneficial, although less markedly than identification tagging. The benefits of tagging for detection would exceed costs in between 14 and 19 years. However, we believe that the savings in human lives and suffering will be a nearly immediate benefit.

Mr. Chairman, our success in tagging for identification was proved at our demonstration at Fort McArthur, Calif. Soon we will have demonstrations of tagging for detection. We invite all interested members of Congress to see for themselves what achievements in research and development are being accomplished to help reduce terrorism with bombs.

Now, at this time, I would like to invite you to see a short film, if you would care to, on the technique of handling taggants for identification. Then we would be happy to answer any questions we can.

Mr. YOUNG. Thank you very much, Mr. Peterson.

Would Mr. McBrien care to make any sort of statement at this time?

Mr. MCBRIEN. I have no statement to make, Mr. Chairman.

Mr. YOUNG. Thank you very much.

[Whereupon, a film was shown.]

Mr. YOUNG. Why do we not try to move ahead with a few questions? This morning there were several witnesses who appeared to oppose the bill in its printed form, and I just wonder if you could comment and review some of the arguments they made?

The first one would be that the bill does not solve the terrorist problem.

Would you care to comment on that particular issue?

whether you had some gas main explosion or you had a criminal explosion, as an example.

Second, that it would enable us to start the process back at the manufacturer and work our way down. Now, I think it is true that you will reach a point with black and smokeless powders and with other explosives, although the point for other explosives will be further down on the chain, before the last individual, when your next level will not be one company, one person, one business. It may be many more. It may be that you will learn that this lot went to three or four or five retailers and that therefore your investigation should now focus on three, four, or five retailers.

That may tell you that you have to look in this part of the country, even—I mean, that bomb may have gone off in New York and you now can identify that this found its way into the distribution chain down in Indiana or down in Missouri or down in California—

Mr. TAYLOR. That concerns me.

Mr. DAVIS. I am sorry. I was trying to remember the States, and I think I picked them instead of avoiding them.

But in terms of some other part of the country—I mean, you may get down to three, four, five retailers. Then you can go to those retailers and find out what records they already have containing persons who purchased from them, once you know that it is in that group.

Mr. TAYLOR. Do you think it could get down to two, three or four, five retailers?

Mr. DAVIS. I think it probably depends. In some cases, yes; in some cases, no. In some cases, it may be—right now, in various investigations, they are really going to many, many, many, many—almost, you know, an unknown number.

Mr. TAYLOR. The testimony that will be presented, in which I have read some of these summations supporting arms and ammunition manufacturers, says, and I quote, "The last recorded purchases of the given lot of powder would frequently number close to 10,000. The given lot could be sold to 20,000 or more handloaders. These legal purchases would most likely be spread throughout the United States.

And it is difficult to conceive what benefit law-enforcement personnel could obtain from expending the resources necessary merely to compose a list of 10,000 to 20,000 purchasers, much less to conduct a meaningful investigation and determine which canister so purchased was misused. A large number of ultimate purchasers greatly enhances the possibility of harrassment, unintention or not, of law-abiding dealers and handloaders."

Would you care to comment on that statement?

Mr. DAVIS. Is it ever possible that when you find a taggant in a particular bomb, that you will have—I do not know about the number 10,000—thousands of possible purchasers; in a specific case, that is possible. Which may say that the typical—we have been able to establish that in a particular instance that it is black powder, which may be helpful in terms of trying to associate this with other bombings. You may be able to get into a geographic region, and in other cases, in smaller areas.

So in other situation you will be able to get—I am told—down to many fewer. But I do not think, you know—sometimes what we will save is through the knowledge that, you know, there is no point in going further in this area; that this is not going to be profitable right now. When you have a major one of these bombings—basically, the investigators would know that these leads are really going to in the area that they were involved in, to hit all types of explosives dealers, to check on a much more random basis.

This at least lets you know that this particular area is not going to be productive, or it may give you a lead, or some lead, in this particular case. And we think that would be available.

Mr. McBRIEN. I can expand on that just slightly.

We can take for an example—it is a hypothetical—the recent New York situation, where a FALN bomb factory had an explosion and black powder was discovered on the premises. If that black powder had been tagged, and there had been any other bombings by that organization in the United States, that had used that powder, or if we had other factories and discovered that they contained black powder or had even detonated it by being tagged we could link those together.

We could look for connections, possibly between one factory in the bombings that occurred and one factory in other places where this indeed is used.

Secondly, there was another side of the question with regard to whether or not dealers are going to be harassed by investigators. The fact is that investigators currently, without tagging, may have to go nationwide to dealers and manufacturers without harassment to try to make detections and identification of what the explosives were.

Mr. TAYLOR. Well, I can understand that you will be able to identify whether or not it was black powder. I am still not convinced as to whether you are going to be able to be very specific about the distribution of the powder, or whether or not you can nail it down to any particular individual.

I would say it looks to me as if it would be very, very difficult. Of course, I assume you would be able to tell by comparison all black powders made in the same places, and if they were used in another incident somewhere.

At least one of the things unresolved in my mind is how in the world you could even be specific enough to be able to make an arrest based upon one individual, and upon positive identification, with the distribution system unless there is a tremendous effort going into book-keeping on the thing, and a very sophisticated method of tagging.

Mr. DAVIS. First of all, I think one of the things that really is of value, because in many situations, especially in the terrorist side—talking about multiple bombings—the ability to be able to determine common sources or, as you get down into that chain, common buyers—it is going to be able to enable you to get some evidence that could be very important evidence; that one bombing is in fact connected with another bombing.

Mr. Peterson had something he wanted to add in response to your last comment.

Mr. PETERSON. Assuming that you have 20,000 different destinations for a unit tag, there are 5 million pounds of smokeless powder

produced annually in the United States, or thereabouts. That means if there are 20,000 units of 1 tag, there are only 250 tags for the whole area, for different companies. That is 62½ tags per year per company. That is almost one a week—I rather think that our tagging will be in much smaller units of production.

I also think that the distribution of smokeless powder will not always be in 1-pound cans.

So while it is true that it could be going to 20,000 different destinations for buyers, it seems very unlikely, in accordance with this mathematics—I just do not think it would happen very often, maybe once in 10 years.

Mr. TAYLOR. You referred to the Management Science Associates report that did a management cost analysis on the cost benefits.

Mr. DAVIS. Yes.

Mr. TAYLOR. Is that report available? Could it be submitted for the record?

Mr. PETERSON. We have left it for the committee. [See page 207].

Mr. DAVIS. That had previously been submitted in a Senate hearing.

Mr. TAYLOR. There is some disagreement between the previous witnesses we had, I believe, and your testimony in relation to the frequency of the use of black and smokeless powder in bombings.

Now, what percent do you say was used in—

Mr. DAVIS. The statistics are set out on pages 8 and 9 of my statement, and as we said at the outset, there are different groups within the Federal Government that collect statistics; and sometimes they have different things reported.

So we supplied the committee with both, because ATF, it turns out, its statistics are a little on the low side.

And we also gave the committee these statistics in as many ways as you could want, in terms of all bombings, including incendiary devices; but sometimes you do not want to include incendiary devices because they tend to be arsons. And in all bombings, if you include incendiaries as well as unidentified explosives in your category, you are talking about the ATF report showed black powder at 12.4 percent and smokeless at 7.4 percent, of those bombings, close to 20 percent between them.

The FBI combined percentage is a little over a third.

To go to the other extreme, if you cut out incendiary devices, because you say that is really a different kind of problem and if you only talk about those bombings and explosives where we know what the explosion was—because in many of these explosions, we do not know which it was—but if you cut those out, according to FBI statistics, the combined percentage is that approximately 51½ percent would be black and smokeless powder.

Mr. TAYLOR. What is the other principal explosive that is used?

Mr. McBRIEN. Dynamites, water gels and slurries are the first most common.

Mr. TAYLOR. The testimony we have had previously also said, I believe, that 20 percent of the black powder manufactured in this country is used by the people who load ammunition, and so forth—80 percent, I believe, they said was principally used by the military.

Did the Defense Department request the Treasury to exempt from tagging an explosive manufactured for the military?

Mr. DAVIS. The Defense Department did make that request, not restricted to black powder, but to all military explosives.

Mr. TAYLOR. Why did they ask for some of them to be exempted?

Mr. DAVIS. Well, there are some reasons which I can go into here and some reason which I think might be classified, which I would prefer to submit in writing to the committee. I would be happy to do that, to give a complete response. Some of the reasons are classified.

Mr. TAYLOR. I see.

Mr. DAVIS. But I would be happy to submit that to the committee in classified form.

Mr. TAYLOR. I would be interested in knowing why they would not be cooperative in this unless it was going to somehow affect the quality of the explosive.

Mr. DAVIS. One thing on the detection tagging, which is not classified, it is obvious that they were concerned about putting the tag which would enable their explosives to be detected.

Mr. TAYLOR. Mr. Chairman, I will not take up any more time. I would like to have an opportunity, if I might, to submit further questions, if you would be—

Mr. DAVIS. I would be happy to respond to any additional questions that you or any other member may ask.

Mr. TAYLOR. Thank you, Mr. Davis and Mr. Peterson.

Mr. YOUNG. Mr. Fary, any questions?

Mr. FARY. No questions.

Mr. YOUNG. The next question would be on the testimony that black and smokeless powder should be specifically exempted. I do not mean the last question. I think probably we should go over and see if there are others.

Could you answer that question?

Mr. DAVIS. Well, it is our view that black and smokeless powders should not be exempt. I referred to that in my opening statement and said it in some detail, that we believe very strongly that to exempt a particular class of explosives invites the terrorist to rely on that.

I must say we are in a situation where there are good guys and there are bad guys. And basically this is a situation where I suppose—and I agree it is unfortunate—that both the good guys and the bad guys want the same product. And all we are trying to do is be in a position that when the bad guys use it in a bomb, that we have the ability to get some edge, to try and find who they were.

Mr. YOUNG. Fine.

Any other questions?

We are going to go over and vote, and we want to thank you very much, Mr. Davis, and Mr. Peterson, and Mr. McBrien, for your testimony here this afternoon.

If there are no other questions, when we come back, Mr. Turner—

Mr. DAVIS. Fine. Thank you very much, Mr. Chairman.

Mr. YOUNG. We would like to continue the hearing this afternoon. Our final witness will be Mr. Charles F. Turner, technical adviser, Sporting Arms and Ammunition Manufacturers' Institute.

Mr. Turner, would you like to identify yourself for the committee?

TESTIMONY OF CHARLES F. TURNER, TECHNICAL ADVISER, SPORT-
ING ARMS AND AMMUNITION MANUFACTURERS' INSTITUTE;
ACCOMPANIED BY RICHARD DOWNING, MANAGER, du PONT
POTOMAC RIVER WORKS, MARTINSBURG, W. VA.; AND PRICE
O. GIELEN, SAAMI COUNSEL

Mr. TURNER. Thank you, Mr. Chairman.

I am Charles Turner, technical adviser for the Sporting Arms and Ammunition Manufacturers, usually referred to as SAAMI. I am also a member of the ATF Advisory Committee on Explosives Tagging.

With me today is Richard Downing, of du Pont's River Works in Martinsburg, W. Va.; and Price Gielen, counsel, SAAMI.

For the record, we have submitted a 24-page, detailed statement, with several exhibits.

[Statement referred to follows:]

STATEMENT OF CHARLES F. TURNER ON BEHALF OF THE
SPORTING ARMS AND AMMUNITION MANUFACTURERS' INSTITUTE (SAAMI)

My name is Charles Turner. I am a Technical Advisor for the Sporting Arms and Ammunition Manufacturers' Institute, usually referred to as SAAMI. I am also a member of ATF's Advisory Committee on Explosives Tagging. SAAMI is a non-profit trade association composed of 11 producers of sporting firearms and ammunition and smokeless propellant powders. The central purpose of SAAMI is to provide a forum for the industry to consider technical matters that bear upon the safety of firearms and smokeless propellant powders.

With me today is Richard Downing, Manager of DuPont's Potomac River Works in Martinsburg, West Virginia and Price O. Gielen, SAAMI counsel.

I. INTRODUCTION

The prevention of bombings and the apprehension of criminals who use explosives or smokeless powder in acts of terrorism and destruction is supported by all law-abiding Americans. As producers of smokeless powder, SAAMI members are particularly concerned about the illegal diversion of their product from its intended use in ammunition for hunting and target shooting.

H.R. 13261, as introduced, does not include smokeless powder. Smokeless powder, as a component of ammunition, is exempt from Title XI of the Omnibus Crime Control Act of 1970. 18 U.S.C. § 845(a)(4). However, the issue of whether detection

or identification taggants should be required for smokeless powder sold in cannisters to handloaders of ammunition has been raised by testimony before and information submitted to the Subcommittee.

SAAMI will present information on the effects such a requirement would have upon the manufacture and distribution of smokeless powder. Such information will better enable the Subcommittee to consider whether there would be any benefit to law enforcement agencies sufficient to justify the attendant problems and costs.

A. Differences Between Smokeless Powder and Explosives

The significant differences between blasting explosives and smokeless powder must be recognized. The differences lie in the nature of the products, their distribution and their use.

Blasting explosives are used for their explosive qualities for blasting operations in mining, quarrying, construction and other commercial activities. In contrast, the purpose of smokeless powder is to propel projectiles from firearms.^{1/}

The significant differences in the marketing and distribution of explosives and smokeless powder are a result of their respective natures and uses. Blasting explosives are sold in

^{1/} There are many different smokeless powders. To achieve ballistic specifications tailored to propelling over 1000 different shotgun, rifle, revolver and pistol loads, the grains of smokeless powders are formed in a large number of sizes and shapes and bulk densities.

large quantities to a relatively few persons. The total market for cap-sensitive explosives is approximately 600 million pounds, while the total market for all high explosives is 3.7 billion pounds per year.

Smokeless powders are sold in bulk to commercial loaders of ammunition. Smokeless powders also are sold through a complex distribution chain in small amounts to firearms owners, to gun clubs and to police departments. These individuals, gun clubs and police departments form what is known as the handloading trade. The National Reloading Manufacturers' Association estimates there are three and one-half million handloaders. The total market for smokeless powder sold to the handloading trade is only 4-to-4.5 million pounds per year. The issue raised before the Subcommittee is whether the smokeless powder sold to the handloading trade should be subject to tagging under the proposed legislation.

Typically an individual handloader will purchase a 1/2 pound or 1 pound cannister of smokeless powder. With new or used cartridge cases, he will load his own ammunition. Handloading ammunition is less expensive than purchasing factory loaded ammunition. Handloaded ammunition can be tailored to provide the specific charge desired by the individual for hunting or target shooting.

Handloading is of great importance to the nation's sportsmen and hunters. The National Reloading Manufacturers'

Association estimates that 1.4 billion centerfire, metallic and shotshell loads and 4.2 billion rimfire cartridges were hand-loaded in 1977.

Consequently, it must be recognized that the regulation of smokeless powders is not regulation of commercial explosives. It is regulation of ammunition powder purchased by law-abiding firearms owners.

B. Adding Taggants to Smokeless Powder

With that background in mind, the issue can be placed in a better perspective. The basic differences in the nature and uses of explosives and smokeless powder appear to explain the different incidence and impacts of criminal bombings using these materials. ATF has testified before the Subcommittee on Criminal Laws and Procedures of the Senate Judiciary Committee that the explosives "known as dynamites, water gels and slurries" are responsible for a great majority of the deaths, injuries and property damage caused by such bombings. In contrast, ATF testified that because bombs made of smokeless and black powders, "produce a low-order explosion, loss of life, injuries, and property damage are small."^{1/} In fact, ATF statistics demonstrate that bombs made of smokeless powder cause 2.6 percent of the fatalities from bombings (based upon figures for April 1975 through July 1977). The FBI reports that all bombings in 1977 resulted in 22 fatalities.

^{1/} Testimony of A. Atley Peterson of ATF before the Subcommittee on Criminal Law and Procedures of the Senate Committee on Judiciary, September 14, 1977.

The use of smokeless powder in criminal activities should be of concern to the Subcommittee, our industry and the public. However, ATF's past testimony suggests that the benefits of tagging smokeless powder may be quite limited. The Subcommittee should carefully weigh those benefits against the problems and adverse consequences of tagging smokeless powder.

Mr. Rex Davis, while Director of ATF, testified before the House Appropriation Committee on the relative value of detection tagging and identification tagging. He stated that "the ability to detect the presence of explosives prior to detonation offers the higher degree of protection to life and property." The utility of identification tagging is limited to "the ability to trace the source of explosives."^{1/}

The addition of identification taggants to smokeless powders sold in cannisters for reloading raises the following problems:

(1) It will be at least 18-to-36 months before preliminary tests with the only identification taggant currently available will provide information as to whether taggants may cause fouling, ignition or other operational problems with firearms.

(2) Identification taggants cannot be added to smokeless powder during the normal manufacturing process without a significant proportion of powder being rendered unmarketable.

^{1/} Treasury, Postal Service, and General Government Appropriations for Fiscal Year 1978: Hearings Before the Subcommittee on the Treasury, Postal Service, and General Government Appropriations of the House Committee on Appropriations, 95th Cong., 1st Sess. 321 (1977) (statement of Rex D. Davis, Director of ATF).

(3) It is unknown whether a sufficient variety of identification taggants can be developed to match the numerous different grain size and shapes and densities of smokeless powders such that taggants will not stratify in shipping or be easily separated from the powder by those inclined to use smokeless powder for criminal purposes.

(4) The monopoly position which would effectively be granted to the producer of the identification taggants could result in exorbitant prices being charged for taggants and in serious disruption of the manufacturing of smokeless powder.

(5) The recordkeeping required of manufacturers, distributors, jobbers and retail outlets for smokeless powder alone would cause a significant increase in the price of smokeless powder. It can be conservatively estimated that recordkeeping requirements only for manufacturers, distributors and jobbers could increase the price of a 1 pound cannister of smokeless powder, currently selling for between \$6 and \$9, by \$.80. We have not been able to quantify the cost of recordkeeping for retailers, but the dealers we have consulted believe it would be significant. There would be additional costs at all levels of distribution which would significantly increase the price of smokeless powder. The additional costs to manufacturers would include the cost of taggants; of storing and inventorying taggants of all different sizes and shapes and densities; of actually physically blending taggants into the powder; and of powder rendered unmarketable by its failure to meet ballistics specifications after the addition of taggants. The additional costs to distributors,

wholesalers and retailers would include the cost of storing powder in such a manner to facilitate recordkeeping and inventorying, and time spent with ATF providing tracing information.

(6) A lot of smokeless powder will typically be distributed to 10,000 to 20,000 sportsmen for handloading. It is questionable whether such a list of ultimate users would be of any benefit to law enforcement agencies investigating the criminal misuse of smokeless powder.

Many of the serious logistic problems which would be encountered in adding identification taggants to smokeless powder would not be involved in adding detection taggants because detection taggants are not uniquely coded. The recordkeeping and storage for the uniquely coded identification tagged powders would not be necessary for detection tagged powders.

However, as Aerospace Corporation testified before the Subcommittee on Criminal Laws and Procedures of the Senate Judiciary Committee, the technology for an effective detection taggant is only in the very early stages of research and development. Neither the technology for detecting the taggants nor suitable substances for the taggants have been developed.

While detection taggants would not pose many of the problems of identification taggants, there are major technical and economic questions yet to be resolved. The nature of these issues can be illustrated by ATF's consideration of aromatic amines as detection taggant material. Amines can decompose into ammonia gases. Ammonia is known to produce stress cracking. A brass cartridge case exposed to ammonia vapors over a period of time could fail upon firing and possibly result in a serious injury to the shooter.

In SAAMI's view, the primary focus of any future development program should be on detection taggants. However, until further research and development programs are completed, there is no basis for legislation requiring the addition of detection taggants to smokeless powders.

SAAMI urges that H.R. 13261 be amended to specifically exclude identification tagging of smokeless powders. There are major questions as to the technical feasibility of adding identification taggants to smokeless powder. The cost of manufacture and distribution of smokeless powder with identification taggants will greatly increase the cost of this important product to sportsmen. The ability of law enforcement agencies to investigate bombing incidents and apprehend criminals will be enhanced, at best, only marginally.

II. TECHNICAL IDENTIFICATION TAGGANT RESEARCH ON BALLISTICS IMPACT

Representatives of SAAMI and its member companies met in January 1978 with Aerospace, to discuss the feasibility of adding identification taggants to smokeless powder sold in cannisters for handloading and to develop the testing program that should be conducted to determine what effects the addition of taggants to smokeless powder would have upon the technical operation of firearms. There was agreement that a great many ballistics characteristics could be influenced by the presence of taggants in smokeless powder and that the effects of taggants could vary by types of powder.

To develop a testing program which could be conducted within a reasonable period of time, it was agreed that the initial testing should be limited to those adverse effects from the presence of taggants in powder which, on the basis of the limited information now available, are judged to be the most likely to occur and to be the most deleterious to proper and safe operation of firearms. The test program, therefore, focuses on fouling of shotguns and centerfire rifles and ignition of ammunition for centerfire pistols and revolvers. From over 50 different smokeless powders available to the handloader, 9 powders were selected for evaluation in this first step test program. To evaluate the possible impact on safe operation of firearms, pressure, velocity and in-barrel-time uniformity will be measured for each test firearm.

The initial test program requires that a total of 249,000 rounds of ammunition be loaded with smokeless powder containing taggants and fired in 7 different types of firearms. Olin Corporation (Winchester-Western Division), Federal Cartridge Corporation and Remington Arms Co., Inc., have each submitted proposals to Aerospace Corporation to participate in the test program but to date have received no response. The test program will be conducted and completed in approximately 18-to-36 months after contracts with Aerospace are executed.^{1/} Both SAAMI and Aerospace recognize that the initial test program may not produce definitive results and that further testing may be required.

^{1/} A detailed explanation of the testing program is set forth in the minutes of the January 19 meeting, which is attached hereto.

III. ADDING IDENTIFICATION TAGGANTS TO SMOKELESS POWDERA. Manufacturing Process

Understanding the effects upon smokeless powder manufacturing which would result from requiring the addition of identification taggants requires some knowledge of the significant elements of the manufacturing process.

Step 1. The component materials for smokeless propellants are measured and physically mixed to give a desired composition. The components are nitrocellulose (nitrated cotton or wood fibers), solvent, nitroglycerine (used in double-base powder), stabilizers and burning rate control agents.

Step 2. The mix is granulated, with both the size and shape of the grain carefully controlled and varying by type of powder.

Step 3. The solvent is removed. (The only function of the solvent is to dissolve the nitrocellulose to facilitate mixing and granulation.)

Step 4. The material is screened to remove fine particles and particles that may have been malformed or which adhered to other particles.

Step 5. The grains are coated with ballistic control agents to ensure a proper burning rate and to act as antifouling and antiflash agents.

Step 6. The grains are dried.

Step 7. The powder is tested for ballistic characteristics. The powder is now considered a preliminary powder or blending

stock powder. Some or all of a preliminary powder may be rejected and recycled for reworking through earlier process steps to modify its ballistic characteristics.

Step 8. The powder is glazed with a graphite coating. The coating eliminates static charge build-up which presents a fire hazard due to the possibility of a spark being generated.

Step 9. The powder is subjected to quality assurance tests to ensure proper physical, chemical and ballistic properties. If specifications are not met, the powder must be reworked.

Step 10. The powder is passed through a screen to remove chips, dust and other impurities.

Step 11. The powder is blended with other powders of known characteristics to obtain a particular powder type.

Step 12. The powder is passed through a screen to remove chips, dust and other impurities.

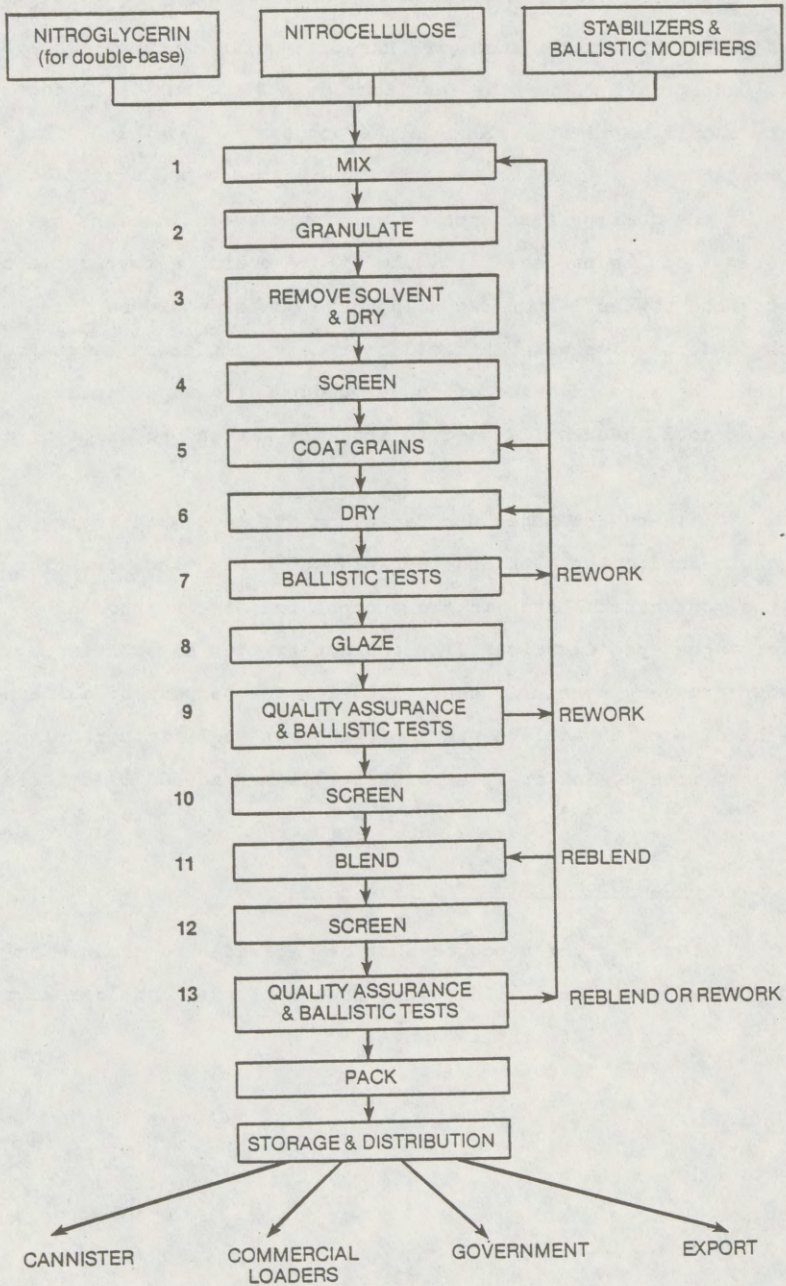
Step 13. The powder is tested to determine if quality assurance and ballistic specifications are met. If such specifications are not met, the powder must be reblended or reworked.

The schematic drawing on the following page illustrates these steps in the manufacturing process for smokeless powder.

B. Point At Which Taggants Could be Added.

For several reasons the only possible point in the normal manufacturing process for the introduction of taggants into the powder is Step 11, the blending operation. First, there would be an extreme hazard of explosion if taggants containing a metallic

SMOKELESS POWDER PROCESS STEPS



substance were introduced into the process prior to Step 6, drying. Second, all machinery through which the powder with taggants passes will be contaminated with the particular taggant. To avoid this contamination, and the resultant mix of taggants, the taggants should be added as late in the process as possible. Third, if taggants were added at an earlier point and a powder failed to meet the quality assurance or ballistic specifications tested at Step 9 of the process, it would not be possible to recycle or rework the powder. Upon recycling, the powder would be mixed with powders which were intended to receive different taggants. Fourth, the size of a lot of powder tagged with a particular taggant could best be limited if taggants were added at Step 11.

There are major manufacturing problems with adding taggants during the blending operation. The blending operation is the most crucial step in the process for meeting product performance specifications. The characteristics of smokeless powder are very carefully controlled for the purpose of allowing the handloader to achieve precisely the same ballistic results time-and-time again for like powder types purchased at different times.

1. Reblending and Reworking Powders.

Quite often a powder must be reblended to produce an acceptable final blend. In such a case reblending could result in a mixture of different taggants.

It is not feasible to plan production in such a way to ensure that a rejected powder can be reblended with a powder containing only identical taggants. Reblending will require lots with specific properties that are compatible with the characteristics of the powder to be reblended. Those lots may have been produced, blended and tagged many months earlier.

Complete or partial reworking of powder upon its failure to meet the Step 13 tests for quality assurance and ballistic characteristics is not unusual. Reworking of rejected powder from different blend lots, often a necessity, would result in a mixture of taggants. Further, reworking tagged powder through the early process steps would raise the same problems as an original addition of taggants at those steps.

If reblending and reworking of tagged powders were not possible, many thousands of pounds of tagged smokeless powder might have to be destroyed annually. The problem could be alleviated if there were a quick and efficient method for removing the taggants from the powder. However, unless this method were a secret process or device which could not be easily duplicated, terrorists also could easily remove the taggants.

Assuming a method of removing taggants during manufacturing were found, manufacturing costs and prices likely would be increased significantly. A production lot of powder typically varies between 10,000 to 20,000 lbs., and ranges from 5,000 to 50,000 lbs. This is a sizeable amount of material to handle

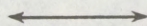
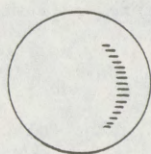
and process for any purpose.

2. Screening and Stratifying of Powders.

The necessary variation in the size and shape of smokeless powder grains results in a serious obstacle to identification tagging. Smokeless propellant powder is used to power well over 1,000 different rifle, pistol and shotgun loads. The required burning characteristics to give proper velocity to the projectile(s) and stay within specified standard pressure levels is controlled by the physical size and shape of the grain, the chemical composition and the surface coatings. Thus, grain size or shape must be precise within a particular production lot of powder, and must be precise from lot to lot for a particular powder type.

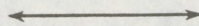
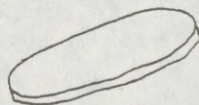
There are approximately 30 different sizes or shapes of powder grains. Powder grains may be spheres, flakes, or perforated cylinders. The spheres can vary in diameter from about $1/100$ to $3/100$ of an inch. The flakes can vary in diameter from about $9/1000$ to $1/10$ of an inch. The thickness of flakes varies from $3/1000$ to $1/10$ of an inch. The cylinders are most always perforated, with one to seven perforations. The cylinder diameter ranges from $2/100$ to $5/100$ of an inch for powder used in small-arms, but can be one inch or more for artillery ammunition. The length is usually three or four times the diameter. Apart from shapes or sizes, there are approximately eight different specified bulk densities for powder grains. The densities range from 0.45 to 1.2 gm/cc.

POWDER GRANULE SHAPE



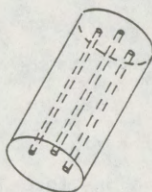
.01"-.03"

SPHERE



.009"-.1"

FLAKE



.02"-.05"

CYLINDER

A vertical double-headed arrow indicating the height of the cylinder.
.003"-.1"

For some powder types, screening of the blended powder, Step 12 of the manufacturing process, would remove any taggants not of the same size or shape as the powder. To prevent removal of taggants by screening, by vibration settling, or by pouring the powder through an airstream, the taggant must be a good match to the size and density of the powder. The total number of combinations formed by the different shapes, sizes and bulk densities would be approximately 200. To adequately match these powders could require as many as sixty to seventy different taggants.

Apart from inviting removal by a terrorist, failure to produce the necessary variety of taggants could result in the use of taggants which are not suitable to the present manufacturing process or which stratify in cannisters during shipping and storage. Stratification of taggants could allow use of powder thought to be tagged without taggants actually being in the powder placed in a particular bomb. Also, a hand loader could suffer a misfire, and possibly a blown-up firearm, by using powder with an extraordinary concentration of taggants.

3. Unknown hazards.

It is not possible at this point in time to assess other hazards or problems which may be created by the introduction of taggants into the blending and packing operations. As an example, airveying (conveying with moving air through tubing) is commonly utilized in packing powder. It simply is not known whether tag-

gant materials would create hazards, such as hot spots, when moving through this type of system.

C. Source of Taggants

1. Production of Taggants.

The only source of identification taggants is currently the 3M Company ("3M"). 3M recently testified before the Subcommittee on Criminal Laws and Procedures of the Senate Judiciary Committee that it would require two years lead time before it could begin production of identification taggants on a regular basis. However, when 3M provided this estimate, it had been focusing on high explosives and did not know the variety of taggants that would be necessary for smokeless powder. Because of the heterogenous nature of the grains composing high explosives, taggants added to explosives need not be any particular size, shape or density. Assuming 3M could develop taggants with the sizes and densities to match the numerous different powder grains found in particular smokeless powders, it would seem that its lead time for production would be significantly greater than recently estimated.

2. Supply of Taggants.

It should be immediately recognized that 3M would hold a monopoly position over the supply of taggants. Although no person would be legally barred from competing with 3M, the practical barriers to entry into the market would be enormous.

The presence of a monopolistic supplier of a product which the law would require smokeless powder manufacturers to

purchase and incorporate into their product creates numerous problems. Any serious disruption to the supply of taggants -- due, for example, to a strike of 3M workers -- could result in a disruption of corresponding length in the manufacture of smokeless powder. Of equal significance, the price charged for the taggants may be exorbitant. The expense of producing the taggants may be high due to the necessity of producing so many different sizes with different bulk densities. Market control by a single producer might well substantially increase that price.

IV. SMOKELESS POWDER DISTRIBUTION

A. The Market Structure

As Aerospace stated in its 1977 Annual Report, "Explosives Tagging and Control", prepared for ATF,

The smokeless powder chain is quite complex. Excluding from consideration sales to the Armed Forces or to commercial ammunition loading companies, and concentrating on smokeless powder sold in cannisters at retail for hand-loading, there is a total market of 4 to 4.5 million pounds per year. Hercules sells to 9 National distributors; Olin sells to 19; and DuPont sells to 9. The distributors sell to hundreds of jobbers and compete with each other on this level. (Aerospace Annual Report at 3-23.)

The nine master or national distributors for Hercules Incorporated sell powders to between 500 and 600 distributors and jobbers. E. I. DuPont de Nemours & Company master distributors sell powders to approximately 500 lesser distributors who, in turn, sell to over 20,000 jobbers. The retail outlets for smokeless powder are the many thousands of federally licensed dealers. The ultimate

consumer, the handloader, normally buys a 1/2 pound or 1 pound cannister of powder.

As noted earlier, a production lot of smokeless powder is typically between 10,000 and 20,000 pounds, with a range of 5,000 to 50,000 pounds. A given lot of powder will normally be distributed by the manufacturer to more than one national or master distributor. The master distributors will sell powder from a particular shipment to numerous lesser distributors and and jobbers.

The jobber normally markets powder in small quantities to retail outlets in his local marketing area, and may ship powder in very small quantities to such outlets throughout the country. A 25 pound case of powder (containing 25 one-pound cannisters) purchased by a jobber might be shipped by the jobber to 25 different dealers. The retail dealer purchases handloading powder at frequent intervals and in small quantities because of prevailing government regulations regarding shipping and storage of powder.

B. Effect on the Usefulness of Taggants

The complex structure of the smokeless powder distribution

system would have a profound effect upon the usefulness of the proposed identification taggants program. Any given lot of smokeless powder sold in cannisters will typically pass through at least four levels of distribution before finally being sold throughout the United States to thousands of individuals buying 1/2 pound and 1 pound cannisters. We question whether in this situation there would be benefit to law enforcement from the presence of identification taggants in smokeless powder which a terrorist uses in a bomb.

The last recorded purchasers of a given lot of powder would frequently number close to 10,000. A given lot could be sold to 20,000 or more handloaders. These legal purchasers would most likely be spread throughout the United States. It is difficult to conceive what benefit law enforcement personnel could obtain from expending the resources necessary merely to compose a list of the 10,000 or 20,000 purchasers, much less to conduct a meaningful investigation to determine which cannister so purchased was misused. The large number of ultimate purchasers greatly enhances the possibility of harassment, intentional or not, of law-abiding dealers and handloaders.

It is particularly difficult to conceive of benefits from identification tagging in light of two elements of the factual situation surrounding past terrorist bombings; factual elements highlighted both in the February 3, 1978 Report of the Subcommittee on Criminal Laws and procedures of the Senate Judiciary Committee "Control of Explosives," and the recent testimony before that Subcommittee of Glen D. King, Executive Director of the International Association of Chiefs of Police. First, terrorists typically use

stolen explosives.^{1/} Second, terrorists often brag about the bombings for which they are responsible. The need to investigate 10,000 to 20,000 or more innocent purchasers of smokeless powder is reduced, if not eliminated, where the field of suspects is narrowed significantly by the guilty parties' own actions.

Apparently the members of the smokeless powder industry are not alone in their inability to foresee tangible benefits from the use of identification taggants. Neither ATF, Aerospace, nor the International Association of Chiefs of Police, have provided a specific explanation of the aid to law enforcement personnel from adding identification taggants to smokeless powder. In addition, the scenarios for benefit to law enforcement personnel from tagging set forth in the cost-benefit study prepared for ATF by Management Sciences Associates are totally inapplicable to smokeless powder. Quite frankly, it appears that the possibility of adding identification taggants to smokeless powder has been raised only because the idea sounds attractive when considered superficially. Its appeal is lost upon evaluation of the realities of the ballistics, manufacturing and distribution of smokeless powder.

V. RECORDKEEPING

A. Manufacturers

The burden of maintaining a recordkeeping system sufficient to allow law enforcement personnel to trace a lot of tagged powder would fall most heavily upon distributors, jobbers and re-

^{1/} Although the Subcommittee's Report and Mr. King's testimony report incidents of stolen explosives, as opposed to smokeless powder, presumably the terrorists who choose to produce bombs from smokeless powder operate in a similar manner.

tailers of smokeless powder. A manufacturer only deals with its own powder. A majority of master distributors and most jobbers and retailers purchase and sell more than one manufacturer's powder. The manufacturers have automated recordkeeping systems. A large majority of distributors and most jobbers and retailers do not.

The precise cost of recordkeeping for a particular manufacturer to allow tracing of a tagged lot of powder would depend upon the information currently placed in the manufacturer's recordkeeping system. We have estimated that the recordkeeping cost for the manufacturers would be between \$.05 and \$.10 per pound of powder.

B. Distributors and Wholesalers or Jobbers

Mr. Robert Hodgdon's testimony before the Subcommittee on Criminal Laws and Procedures of the Senate Judiciary Committee concerning the recordkeeping costs and other problems presented to distributors and wholesalers of smokeless powder from the proposed taggant program is attached hereto.

C. Retailers

For retailers major changes and additions to records and procedures would be necessary. The taggant identification numbers on the product would have to be checked against the shipping documents. Record books would have to be organized or cross-indexed by taggant numbers and powder types, rather than simply by powder types. In turn, incoming powder would have to be inventor-

ied by both taggant numbers and powder types. Finally, powders would have to be grouped in storage by taggant number and powder type, rather than by type alone. Storage space for powders will necessarily increase because there likely will be numerous taggant numbers for each type of powder, and powders must be stored in such a way that taggant numbers are visible for inventory checking.

Upon selling powder the clerk would need to locate the proper powder type and taggant number page or section in the record book. This sequence would be repeated for each different powder type purchased and for each differently tagged cannister within a particular powder type.

The time to execute periodic record checks and inventories would be increased by the need to identify powders by taggant numbers. Each time ATF would request the names of all purchasers of powder with a particular taggant, the clerk would conduct a search of the records and provide the names and addresses of purchasers.

The retail dealers have been unable to provide an exact cost figure for recordkeeping. However, in light of the numerous additions and changes to their current procedures, the cost could be significant.

EXHIBIT

February 9, 1978

DISTRIBUTION

Minutes of the Taggants Meeting
SAAMI Office, January 19, 1978

C. Boyars, Aerospace Corp.
L. W. Werner, E. I. duPont deNemours Co.
G. E. Gourley, Federal Cartridge Corp.
W. W. Board, Federal Cartridge Corp.
L. V. Edwards, Hercules, Inc.
J. C. Delaney, Hercules, Inc.
J. Rasp, Olin Corp.
A. S. Hill, Ilin Corp.
E. Barrett, Remington Arms Co.
C. H. Bateman, Remington Arms Co.
A. Puzio, Remington Arms Co.
W. L. Penn, Remington Arms Co.
E. I. Herring, Remington Arms Co.
C. O. Williams, Olin Corp.
Price Gielen, Cleary, Gottlieb, Steen and Hamilton
C. W. Eilo, Hercules, Inc.
W. Ives, NRMA
Mr. Lunn, E. I. duPont deNemours Co.
R. Gulley, Olin Corp.

cc: Harry L. Hampton, Jr.

TAGGANTS IN SMOKELESS POWDERMINUTES OF MEETINGHELD JANUARY 19, 1978

The SAAMI Ad Hoc Committee for Taggants in Smokeless Powder met on January 19, 1978, in the Hamden office. The purpose of this meeting was to devise a coordinated program designed to show the effect of adding 3M-type taggants to smokeless powder as used by reloaders.

Those who were present at the meeting are as follows:

R. Lunn	E. I. duPont deNemours & Co., Inc.
L. Werner	E. I. duPont deNemours & Co., Inc.
R. Gulley	Olin Corp.
C. Williams	Olin Corp.
E. Barrett	Remington Arms Co., Inc.
C. Bateman	Remington Arms Co., Inc.
P. Gielen	SAAMI, Inc.
W. Bellemore	SAAMI, Inc.
C. Turner	SAAMI, Inc.

Mr. Carl Boyars of Aerospace Corp. and Mr. Wayne Ives of NRMA were also present as invited guests. Although a representative of Federal Cartridge Corp. was not able to be present, their position was explained in a letter from Mr. G. Gourley. All attendees were given a copy of that letter.^(A)

While the committee agreed that there were many possible ballistic factors that might be influenced by adding taggants, it was also agreed that, in order to reduce the program to a reasonable size, all but the "worst-case" parameters would be set aside for the present. "Worst-case" being defined by those present as Fouling for Shotshell, Ignition for centerfire pistol and revolver and Fouling for centerfire rifle. In all types, however, pressure, velocity and in-barrel-time integrity must be preserved, and, therefore, must be examined also.

(A) In that letter, Mr. Gourley expressed concern that the taggants would ".....segregate out when the propellant is still in the containers....." Federal believes a vibration test using taggants in the various types of powder is a paramount importance and should be performed before any other gun tests. Others believe that the logistic problems are of such a magnitude that they must be considered because, the committee believes, these problems will make the whole concept impractical.

It was also agreed that the three ammunition manufacturers would submit their own proposals to Aerospace Corp. following the coordinated program as they see fit, using their components and one type powder normally loaded in the recommended load. Because hand-loading large numbers of rounds is impractical, it was agreed to allow machine loading with new components, realizing, however, that in some instances, a used case may influence important parameters.

SHOTSHELL

It was agreed that a 2 3/4", 1 1/2 oz. Number 4 shot load would be an excellent vehicle to test for Fouling. To that end, the following tests were recommended for each of the three basic powder types made by Hercules, duPont and Winchester.

The tests would be made with three different levels of taggants: 0% (control), 0.05% and 0.1%. These would be fired in 2 different types of shotguns. A Remington Model 1100 and a Browning Automatic - 5. In order to have a degree of replication, 3 guns of each type would be used. To study temperature effect, the ammunition only would be stored at two temperatures: -20°F and +125°F. Analysis of data would be made at 90% and 95% Confidence Limits.

In detail, the test of each station would be as follows:

AT -20°F

TAG %	FIREARM			FIREARM		
	1100	1100	1100	Auto-5	Auto-5	Auto-5
0% (CONTROL)	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.
	Examine	Examine	Examine	Examine	Examine	Examine
	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.
.05%	Examine	Examine	Examine	Examine	Examine	Examine
	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.
	Examine	Examine	Examine	Examine	Examine	Examine
0.1%	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.
	Examine	Examine	Examine	Examine	Examine	Examine
	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.	1000 rds.
	Examine	Examine	Examine	Examine	Examine	Examine

AT +125°F

TAG%	FIREARM			FIREARM		
	1100	1100	1100	Auto-5	Auto-5	Auto-5
0% (CONTROL)	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine
	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine
.05%	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine
	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine
0.1%	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine
	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine	1000 rds. Examine

PROCEDURE

Fire each gun 250 rds.; allow to set overnight before continuing. After 1000 rds have been fired, gun should be dry cleaned examining amount and type of Fouling.

All malfunctioning problems should be logged, noting gun serial number, round number at which malfunction occurred and exact description of the malfunction. If malfunction is directly related to Fouling, analysis of Fouling deposit should be made. Presence of taggants can be confirmed by illumination with 366 Nanometers of ultraviolet radiation. Taggants may also be found using a microscope at about 100x with adequate illumination. If desired, Aerospace will perform chemical analysis.

PRESSURE, VELOCITY, IBT

50 rounds each will be fired for pressure (piezo), velocity and in-barrel-time at normal temperature, at -20°F and at +125°F at the start of the Fouling test, once each month during the test and at the end of the test.

CENTERFIRE PISTOL AND REVOLVER

The "worst-case" for this firearm was considered to be ignition with two different loads: a caliber 38 Special with a 125gr. Jacketed Hollow Point bullet and a 44 Magnum with a 240 gr. Jacket Hollow Point bullet. It was agreed that Remington would propose loading the Cal. 38 Special with Hercules powder and Winchester the 44 Magnum with Ball powder.

A muzzle down test would be made by firing 100 rounds per day for 4 days in one Double Action Revolver with the ammunition at -20°F . All other tests would be made in a vented barrel device set with an .008 inch gap. These tests would consist of pressure (piezo) velocity and in-barrel-time at two temperatures (-20°F and normal) with the powder in two different positions -- 1) at the primer and 2) at the bullet.

In detail, these tests would be:

AT -20°F

Day	Characteristic	$\frac{\%}{\text{Tag}}$	Powder Against Primer	Powder Against Bullet
1	P&V	0	30 rds.	30 rds.
1	IBT	0	30 rds.	30 rds.
1	P&V	0.05	30 rds.	30 rds.
1	IBT	0.05	30 rds.	30 rds.
1	P&V	0.1	30 rds.	30 rds.
1	IBT	0.1	30 rds.	30 rds.
2	P&V	0	30 rds.	30 rds.
2	IBT	0	30 rds.	30 rds.
2	P&V	0.05	30 rds.	30 rds.
2	IBT	0.05	30 rds.	30 rds.
2	P&V	0.1	30 rds.	30 rds.
2	IBT	0.1	30 rds.	30 rds.
3	P&V	0	30 rds.	30 rds.
3	IBT	0	30 rds.	30 rds.
3	P&V	0.05	30 rds.	30 rds.
3	IBT	0.05	30 rds.	30 rds.
3	P&V	0.1	30 rds.	30 rds.
3	IBT	0.1	30 rds.	30 rds.
4	P&V	0	30 rds.	30 rds.
4	IBT	0	30 rds.	30 rds.
4	P&B	0.05	30 rds.	30 rds.
4	IBT	0.05	30 rds.	30 rds.
4	P&V	0.1	30 rds.	30 rds.
4	IBT	0.1	30 rds.	30 rds.

AT NORMAL

<u>Day</u>	<u>Characteristic</u>	<u>% Tag</u>	<u>Powder Against Primer</u>	<u>Powder Against Bullet</u>
1	P&V	0	30 rds.	30 rds.
1	IBT	0	30 rds.	30 rds.
1	P&V	0.05	30 rds.	30 rds.
1	IBT	0.05	30 rds.	30 rds.
1	P&V	0.1	30 rds.	30 rds.
1	IBT	0.1	30 rds.	30 rds.
2	P&V	0	30 rds.	30 rds.
2	IBT	0	30 rds.	30 rds.
2	P&V	0.05	30 rds.	30 rds.
2	IBT	0.05	30 rds.	30 rds.
2	P&V	0.1	30 rds.	30 rds.
2	IBT	0.1	30 rds.	30 rds.
3	P&V	0	30 rds.	30 rds.
3	IBT	0	30 rds.	30 rds.
3	P&V	0.05	30 rds.	30 rds.
3	IBT	0.05	30 rds.	30 rds.
3	P&V	0.1	30 rds.	30 rds.
3	IBT	0.1	30 rds.	30 rds.
4	P&V	0	30 rds.	30 rds.
4	IBT	0	30 rds.	30 rds.
4	P&B	0.05	30 rds.	30 rds.
4	IBT	0.05	30 rds.	30 rds.
4	P&V	0.1	30 rds.	30 rds.
4	IBT	0.1	30 rds.	30 rds.

MUZZLE DOWN FUNCTION

Ammunition Storage Temperature: -20°F

<u>Day</u>	<u>% Tag</u>	<u>No. Rounds</u>
1	0	100
1	0.05	100
1	0.1	100
2	0	100
2	0.05	100
2	0.1	100

<u>Day</u>	<u>% Tag</u>	<u>No. Rounds</u>
3	0	100
3	0.05	100
3	0.1	100
4	0	100
4	0.05	100
4	0.1	100

Analysis would be made at 90% & 95% Confidence Limits for specific differences.

CENTERFIRE RIFLE

Fouling was believed to be the "worst-case" problem for this type of ammunition but in 3 different calibers or rifles. For this reason, it was recommended that:

- 1) Remington test the Cal. 223 (55 gr.) in the AR-15 rifle
- 2) Federal test the Cal. 30-06 (150 gr.) in the Model 742 rifle.
- 3) Winchester test the Cal. 308 (150 gr.) in the Model 742 rifle.

All tests would be performed with three levels of taggants (0-0.05-0.1) and for replication purposes, 3 guns would be used. Ammunition would be stored at one temperature (-20°F) and 1000 rounds would be fired per gun for examination of Fouling characteristics.

Because it was the consensus that pressure and velocity are very important, three temperatures would be involved in this part of the test (+140, +70, -20°F) with 30 rounds each being fired for pressure (short piston) velocity (long piston) and in-barrel-time, at the beginning and end of the centerfire rifle test.

Details of this test are as follows:

<u>Step</u>	<u>% Tag</u>	<u>Gun #1</u>	<u>Gun #2</u>	<u>Gun #3</u>
1	0	500	500	500
2	Examine for Fouling.....			
3	0	500	500	500
4	Examine for Fouling.....			
1	0.05	500	500	500
2	Examine for Fouling.....			
3	0.05	500	500	500

<u>Step #</u>	<u>% Tag</u>	<u>Gun #1</u>	<u>Gun #2</u>	<u>Gun #3</u>
1	0.1	500	500	500
2	Examine for Fouling.....			
3	0.1	500	500	500
4	Examine for Fouling.....			

PRESSURE, VELOCITY AND IBT

BEGINNING OF THIS TEST

<u>Temp.</u>	<u>Function</u>	<u>#Rounds</u>
+140°F	Pressure (Short Piston)	30
+140°F	Velocity (Long Piston)	30
+140°F	IBT	30
+70°F	Pressure (Short Piston)	30
+70°F	Velocity (Long Piston)	30
+70°F	IBT	30
-20°F	Pressure (Short Piston)	30
-20°F	Velocity (Long Piston)	30
-20°F	IBT	30

END OF THIS TEST

<u>Temp.</u>	<u>Function</u>	<u>#Rounds</u>
+140°F	Pressure (Short Piston)	30
+140°F	Velocity (Long Piston)	30
+140°F	IBT	30
+70°F	Pressure (Short Piston)	30
+70°F	Velocity (Long Piston)	30
+70°F	IBT	30
-20°F	Pressure (Short Piston)	30
-20°F	Velocity (Long Piston)	30
-20°F	IBT	30

Analysis for significant differences will be made at 90% and 95% Confidence Limits.

EXHIBIT D

TESTIMONY OF ROBERT E. HODGDON ON S. 2013

Delivered May 9, 1978

I am Robert Hodgdon, an officer and owner of Hodgdon Powder Company, B. E. Hodgdon, Inc. and Pyrodex, Inc. Hodgdon Powder Company is a major distributor of smokeless powders. B. E. Hodgdon, Inc. is a large wholesaler of smokeless powders. Pyrodex, Inc. produces Pyrodex, a relatively new product which is a substitute for black powder.

We are solidly in favor of law enforcement efforts which help thwart criminal activity or strengthen the ability of our officers to apprehend those guilty of crimes. We firmly believe, however, that the economic and social losses necessitated by S. 2013 far outweigh the negligible and doubtful enhancement to law enforcement as it pertains to smokeless powders.

There are compelling reasons to believe that tagging smokeless powder will not aid law enforcement personnel in reducing the small amount of damage caused by criminals using these powders. Certainly once the fact becomes public knowledge that these materials are tagged, bombers will be careful to use stolen explosives. In addition, astute terrorists will mix together any of the more than 50 different kinds of smokeless powder, or will mix together powder obtained from different sources, to compound the problem of tracing.

There would be social costs attributable to the addition of taggants to smokeless powders as a direct result of the increased cost of the powders from adding taggants. Target shooting as a sport, which has grown spectacularly along with

the increase in reloading of ammunition by private individuals, would become more expensive and participation would be discouraged. Many Police Departments and gun clubs handload their ammunition to save on budget costs and, again, their ability to economize would be limited.

Factory loaded ammunition would become more attractive to the present handloaders. This would lead to a restoration of control of the market to the three or four large corporations who predominate in factory loaded ammunition. The many small handloading component manufacturers would be virtually legislated out of business.

The taggants program would also have very serious affects directly upon our companies. It would be a great hardship for our company to establish the recordkeeping system which would be required to allow tracing of powder through the distribution chain. At our current location we simply do not have the storage space which would be necessary to facilitate such record-keeping. Due to zoning restrictions, the necessary additional storage space could be available only at distances from our current location of 100 miles or more.

The actual recording of purchases and sales necessary to allow tracing of powder would be very costly. There are over 200 factory consumer packages of smokeless powders. A typical shipment by us consists of many different products in small amounts. The time to check and receive such shipments would

compound dramatically if a several-digit serial number were attached to each unit.

We have estimated the costs for recordkeeping by extrapolating from known facts derived from our current computerized system for firearms registration as approved by ATF. For Hodgdon Powder Company, a major distributor which handles powder strictly in case lots, we estimate the cost for recordkeeping would be \$.10 for a 1 pound canister of powder. For B. E. Hodgdon, Inc., a wholesaler, where items are not handled strictly in case lots, we estimate the cost for recordkeeping would be \$.42 for a 1 pound canister of powder, or 12.0 percent of the wholesaler's sale price. As a comparison, for firearms the percentage of B. E. Hodgdon's sale price represented by recordkeeping costs is only 1.03 percent. With normal mark-ups the final increase in price to the retailer for a 1 pound canister of powder would be approximately \$.75.

This cost figure represents strictly the effect of recordkeeping costs at the wholesale level. It ignores what may be very significant costs for storage space to facilitate recordkeeping. Also, a majority of distributors and probably most wholesalers are not computerized as are our companies. Thus, their costs would probably be significantly higher.

Apart from the recordkeeping difficulties, requiring the addition of taggants to smokeless powder would place in serious jeopardy the surplus and import phases of our business.

Our company buys government surplus powders, screens and blends them for sale to the handloading public. We have no facilities or equipment to add the taggants and no way to test their effect on our products except as they would affect ballistics. These same problems would be encountered with the importation of several smokeless powders from Imperial Chemical Industries, Ltd. of Scotland. We do not know if ICI would be willing to add taggants prior to shipment, or what the additional cost might be if ICI were willing.

The taggants program would also have a very serious effect upon our production of Pyrodex, a relatively new product.

Our first concern is for the safety of the ultimate consumer of Pyrodex and our manufacturing personnel, facilities and process. We have spent over \$50,000 with safety consulting firms to design our plant and operating procedures. Because of the unique nature of our product, we could anticipate spending a like amount just to be sure both we and our customers have not been endangered by the addition of a "foreign" element.

We are also concerned about the effect the addition of taggants to Pyrodex might have upon ballistic properties and the quality of the final product. One chemical in Pyrodex is intimately blended in the proportion of one-tenth of 1 percent of the final mix. A taggant, even in trace form, might affect the performance of this chemical.

Apart from safety concerns, required addition of taggants to Pyrodex could have very serious and costly effects

upon our manufacturing process. As SAAMI has testified for other smokeless powders, final physical blends of finished product may be stored for weeks until being mixed with other ballistically different lots for a balanced final product blend. These lots would either become unmarketable under the proposed taggants program, or would be mixed with batches containing differently coded taggants. The Pryodex facility would be rendered uneconomic if these lots could not be reblended.

Our use of a continuous packaging operation would also result in mixing of taggants or destruction of considerable amounts of powder.

Our final concern relates to the physical characteristics of the taggants. Taggants would have to be the same size and density as the powder grain to prevent settling out during handling. It would present a tremendous inventory problem to stock the proper range of density of taggants in each of four grain sizes, when density is not predictable in advance. Also, the large particle size of Pryodex (up to 16 mesh) and its unique texture would present a difficult duplication problem to the taggant manufacturer.

The cost of purchasing, storing, handling and record-keeping for taggants itself would, of course, be over and above the other cost considerations set out above.

Mr. TURNER. SAAMI, if you are not familiar with it, is a nonprofit trade association, composed of 11 producers of sporting firearms and ammunition and smokeless propellant powders. The central purpose of SAAMI is to provide a forum for the industry to consider technical matters that bear upon the safety of firearms and smokeless propellant powders.

We are here to present information on the addition of detection or identification taggants to smokeless powder sold in canisters to handloaders of ammunition. Such information will better enable the subcommittee to consider whether there would be benefits to law enforcement agencies sufficient to justify the attendant problems and costs.

Of primary importance, we urge the subcommittee to recognize the significant differences between blasting explosives and smokeless powder. Blasting explosives are sold in large quantities to a relatively few persons. A total of 3.7 billion pounds of blasting explosives are produced annually.

Smokeless powders are sold through a complex distribution chain in small amounts of firearms owners, to gun clubs, and to police departments. They load their own ammunition and form what is known as the handloading trade.

The National Reloading Manufacturers' Association estimates there are $3\frac{1}{2}$ million individual handloaders in the United States. Billions of pounds of ammunition are handloaded annually. But the total market for smokeless powder sold to the handloading trade is only 4 to 4.5 million pounds per year.

In short, it must recognize that the regulation of smokeless powders is regulation of ammunition powder purchased by $3\frac{1}{2}$ million law-abiding firearms owners. The issue raised before the subcommittee is whether the smokeless powder sold to the handloading trade should be subject to tagging under the proposed legislation.

ATF has testified before this subcommittee that, because bombs made of smokeless and black powders, and I quote, "produce a low-order explosion, loss of life, injuries, and property damage are small." This suggests that the benefits of tagging smokeless powder may be quite limited. The subcommittee should carefully weigh those benefits against the problems and adverse consequences of tagging smokeless powder.

An immediate concern of SAAMI is what effect the addition of taggants to smokeless powder would have upon the operation of firearms. Together, SAAMI and Aerospace Corp., ATF's contractor, have developed an initial test program for researching whether there would be deleterious effects of identification taggants upon the operation of firearms.

Olin Corp., Federal Cartridge Corp., and Remington Arms Co., Inc., have each submitted proposals to Aerospace Corp. to participate in the test program but to date have received no response.

The test program will require 10 to 36 months for completion after contracts with Aerospace are executed. I emphasize that both SAAMI and Aerospace recognize that the initial test program may not produce definitive results. Further testing and time may be required.

There are also major problems with adding taggants during the normal manufacturing process for smokeless powder. The subcommittee has been provided with a diagram of the production process for smokeless powder.

Of the 13 steps in that process, the only logical point in the normal manufacturing process for adding taggants is the final step, referred to as the blending operation. Even blending at that point in the process is likely to result in thousands of pounds of powder being rendered unmarketable. There is a common need to reblend powders to meet ballistic specifications. Powder which needed to be reblended would already be tagged and presumably could not be blended with powder containing different taggants.

The variation in the size and shape of smokeless powder grains also raises a serious obstacle to identification tagging.

Smokeless propellant powders are used to power well over 1,000 different rifle, pistol, and shotgun loads. There are approximately 30 different sizes or shapes and eight different specified bulk densities for powder grains. To meet ballistic specifications, grain size or shape must be precise within a particular production lot of powder, and must be precise from lot to lot for a particular powder type.

To prevent removal of taggants by screening, by vibration settling, or by pouring the powder through an airstream, the taggant must be a good match to the size and density of the powder.

Apart from inviting removal by a terrorist, failure to produce the necessary variety of taggants could result in the use of taggants which are not suitable to the present manufacturing process or which stratify in canisters during shipping and storage. A hand loader could suffer a misfire, or possibly a blown-up firearm, by using powder with an extraordinary concentration of taggants. At present, there is only one taggant of a particular size and density being developed by the 3M Co.

The 3M Co. recently testified before the Subcommittee on Criminal Laws and Procedures of the Senate Judiciary Committee that it would require 2 years leadtime before it could begin distribution of identification taggants on a regular basis. However, when 3M provided this estimate it did not know the variety of taggants that would be necessary.

Assuming 3M could develop taggants with the sizes and densities to match the numerous different powder grains found in particular smokeless powders, it would seem that its leadtime for production would be significantly greater than recently estimated.

In addition, 3M would hold a monopoly position over the supply of taggants. Although no person would be legally barred from competing with 3M, the practical barriers to entry into the market would be enormous.

Any serious disruption to the supply of taggants—due, for example, to a strike of 3M workers—could result in a disruption of corresponding length in the manufacture of smokeless powder. Of equal significance, the price charged for the taggants may be exorbitant. Finally, neither 3M nor ATF is willing to assume any liability for harm which may be caused by taggants. The manufacturers deserve protection from any suit which might arise from the compelled inclusion of taggants in smokeless powders.

Even if the technical problems of identification taggants could be overcome, there is a very serious question as to the benefits of such a tagging system. Unlike the situation for blasting explosives, the smokeless powder distribution system is very complex. Any given lot of smokeless powder sold in canisters will typically pass through four levels of distribution before finally being sold through the United States to thousands of individuals typically buying one-half-pound to one-pound canisters.

The last recorded purchasers of a given lot of powders would frequently number close to 10,000. A given lot could be sold to 20,000 or more handloaders. These legal purchasers would most likely be spread throughout North America.

It is difficult to conceive what benefit law enforcement personnel could obtain from expending the resources necessary merely to compose a list of 10,000 or 20,000 purchasers, much less to conduct a meaningful investigation to determine which canister so purchased was misused. The large number of ultimate purchasers greatly enhances the possibility of harassment, intentional or not, of law-abiding dealers and handloaders.

Apparently, the members of the smokeless powder industry are not alone in their inability to foresee tangible benefits from the use of identification taggants. Neither ATF, Aerospace, nor the International Association of Chiefs of Police have provided a specific explanation of the aid to law enforcement personnel for adding identification taggants to smokeless powder. In addition, the scenarios depicting the benefits to law enforcement personnel for tagging found in the cost-benefit study prepared for ATF by Management Sciences Associates are totally inapplicable to smokeless powder.

Given the lack of discernible benefit from adding tagging material to smokeless powder, the significant costs of the program should be given serious consideration. The recordkeeping required of manufacturers, distributors, jobbers, and retail outlets from smokeless powder alone would cause a significant increase in the price of smokeless powder.

It can be conservatively estimated that recordkeeping requirements only for manufacturers, distributors, and jobbers could increase the price of a 1-pound canister of smokeless powder, currently selling for between \$6 and \$9, by 80 cents. There would be recordkeeping costs at the retail level and additional costs at all levels of distribution, such as for inventorying and storing tagged powders, which could easily match the recordkeeping costs.

Many of the serious logistic problems which would be encountered in adding identification taggants to smokeless powder would not be involved in adding detection taggants because detection taggants are not uniquely coded. The recordkeeping and storage for the uniquely coded identification tagged powders would not be necessary for detection tagged powders.

While detection taggants would not pose many of the problems of identification taggants, the technology for an effective detection taggant is only in the very early stages of research and development.

There are also major economic questions yet to be resolved. In SAAMI's view, the primary focus of any future development program

should be on detection taggants. However, until further research and development programs are completed, there is no basis for legislation requiring the addition of detection taggants to smokeless powders.

SAAMI urges that H.R. 13261 be amended to specifically exclude identification tagging of smokeless powders. Quite frankly, it appears that the possibility of adding identification taggants to smokeless powder has been raised only because the idea sounds attractive when considered superficially. Its appeal is lost upon evaluation of the realities of the ballistics, manufacturing and distribution of smokeless powder.

Thank you.

Mr. YOUNG. Thank you very much, Mr. Turner.

Would Mr. Downing or anyone on your panel care to make any further statement?

In this section on screening and stratifying of powders, of your prepared testimony, you express concern that taggants must have many variations in size and density to match the powder.

Mr. TURNER. Yes, sir.

Mr. YOUNG. Do you know of any technical reason why the taggant manufacturers could not meet these requirements?

Mr. TURNER. I do not know the taggant manufacturing process that well. I have discussed it briefly with them, and they told me that they might have to leave off the coating that the tag normally has on it in order to get the density low enough.

Now, we did not get into the exact details, that they could get it all the way down to where it would be required.

Mr. YOUNG. You mention in your prepared statement that in January, SAAMI met with Aerospace about developing a testing program.

Mr. TURNER. Yes, sir.

Mr. YOUNG. To determine what impact, if any, tagging would have on the ballistics quality of smokeless powder.

Are you confident of the test procedures that have been established?

Mr. TURNER. They are the very basic test procedures, the very least we could determine. What we might determine were worse case conditions. But as I said in my oral testimony, they may not give us the answer. There may be additional work needed.

We tried to study this program and to do as much as possible in the shortest period of time. But there are about 249,000 rounds of ammunition that must be fired even in this very preliminary and minimal program.

Mr. YOUNG. Are you going to develop some further test procedures, so that this can be established?

Mr. TURNER. If, when these programs are run and data analyzed, it is between Aerospace and our people, we feel that more data is needed, I have been assured by Aerospace that we will do it.

Now, what "we will do it" means, I do not know right now.

Mr. GEILEN. As an exhibit on our large statement that we submitted, the testing program is put forth in great detail.

Mr. TURNER. It is in the back of the detailed study.

Mr. YOUNG. Thank you.

Mr. Taylor?

Mr. TAYLOR. Thank you, Mr. Chairman.

I do not have a lot of questions. I think the testimony was very concise, very explanatory, and very easy to understand.

You have indicated, I believe, that Olin, Winchester, Remington, and——

Mr. TURNER. Federal.

Mr. TAYLOR [continuing]. Federal—have indicated that they would be willing to participate in a test.

Mr. TURNER. I believe they have already submitted proposals to Aerospace; and there are some discussions that have already been carried on. But no contracts have been signed.

Mr. TAYLOR. Aerospace has indicated they would be willing to cooperate with this?

Mr. TURNER. Aerospace was in on the whole thing, from the very beginning; yes, sir.

Mr. TAYLOR. Do you anticipate that these tests will be run by manufacturers and by Aerospace?

Mr. TURNER. Oh, they will be run by the manufacturers as soon as the contracts are signed. I do not think they will do anything until they see a contract.

Mr. TAYLOR. Is your greatest concern about the tagging of smokeless black powder the cost? Is it the effectiveness that it might have upon the propellant qualities of powder, or is it regulation; or is it a combination of the three?

Mr. TURNER. Yes; I think it is all three, sir. We do not know particularly what is going to happen, so this is why the programs are going to be run. But the logistics is a tremendous and complex distribution chain. And personally, I do not—I am not convinced myself. If we trace it to the last users, even if there are 10 or 20,000 traces made, that we are going to know what happened; because if I wanted to be a crazy and a terrorist, I would not use smokeless or black powder. There are too many other easy, easy ways. I could walk into a hardware store and buy a Bernz-o-Matic torch and I will build the worst bomb you have ever seen.

Mr. TAYLOR. There is no great, widespread use of smokeless black powder?

Mr. TURNER. I do not know what you mean by "widespread."

Mr. TAYLOR. Well, I think the testimony we had indicated between 7 to 12 percent, or something like that, were the end products that were utilized in the bombing.

Would you disagree with those?

Mr. TURNER. I am not in any position to disagree with them. If we had tags, we could have traced them. But I would be willing to wager that in a lot of those cases, that it was stolen material, stolen from the military or stolen from some store, or something of that sort. And you are not going to trace it any further than the store.

Mr. TAYLOR. Would it be difficult to say that this was sold for loading, reloading shells or loading shells and was used for that purpose? You would rather think it would be stolen material from the military, stolen maybe from the——

Mr. TURNER. From the store.

Mr. TAYLOR. Something like that?

Mr. TURNER. I think so.

Mr. TAYLOR. I would agree. I do not think there are very many people who are involved in the loading and reloading that would do it for other purposes.

Mr. DOWNING. I might add that I personally have been involved in assisting law-enforcement agencies in identification of powders that were found in pipe bombs that did not go off. And in the bombs that I have looked at, they did not contain powder that you buy in the store in a canister. They contained a mixture of powders which were obtained from breaking down ammunition, all kinds of ammunition, from the Remington .22 Centerfire, and shotgun shells. And these could have been purchased in many, many different stores.

So the problem becomes even more complex. If the originator of a bomb is smart, he would not go into a store and buy powder. I would buy ammunition and break it down into many different types and combine it.

Mr. TAYLOR. You are not suggesting that we—

Mr. TURNER. No, sir.

Mr. DOWNING. No, sir. I am suggesting that we drop it.

But this has been my personal experience with the New York police and other enforcements, other bomb squads.

Mr. TAYLOR. Well, thank you very much. I think you put your finger on the question that is going to be resolved here; whether or not this tagging of black powder and smokeless powder is worth the cost; and whether or not the infringement upon those who use this for purposes for which it is intended will be harassed unduly.

I do not think there is any question. This Congress on many occasions expressed itself in the area of ammunition and gun control. It is not a very popular subject with a lot of people. I guess it is popular with some, but those who are voting are certainly not for it.

We do have concern, of course, for the terrorism that has swept our country and Nation; and I think that the ATF, regardless of what might have been said about them, are dedicated people who are trying to do a job.

It would not be my objective, nor do I think that any members of this subcommittee—or full committee—want to throw any roadblocks in their way. But we do have a concern for the tradition of black smokeless powders for the millions of people who enjoy it and do it for peaceful purposes.

And, as you know, there is always the chance of overkill. Many times this is what this consequence does in a lot of things. We overkill in our desire and our passions to solve the problem. Sometimes the problem we create is worse than the one we set out to solve.

I appreciate very much your testimony. I think it was good, and thank you very much for being here.

Thank you, Mr. Chairman.

Mr. YOUNG. No questions, Mr. Fary?

Mr. FARY. No.

Mr. YOUNG. I think Mr. Taylor summed up some of my feelings, I am sure.

I do want to thank Mr. Turner for participating in the hearings this afternoon.

And that will close the public hearing on H.R. 13261 at the present time.

Mr. TURNER. Thank you, sir.

Mr. YOUNG. Thank you very much.

[Whereupon, at 4:40 p.m., the hearing in the above-entitled matter was adjourned.]

[The following were received for the record:]

STATEMENT OF REPRESENTATIVE RONALD M. MOTT, D-OHIO

Mr. Chairman and members of the subcommittee: Thank you for allowing me to testify on the need to combat international terrorism,

I am pleased to be a cosponsor of H.R. 13261 which would give the President and the Secretary of Transportation the power to deal with acts of terrorism when they involve U.S. citizens or U.S. property.

Nations that harbor and encourage these terrorists will be put on notice that they will be held responsible for any terrorist acts emanating from or concluding within their borders.

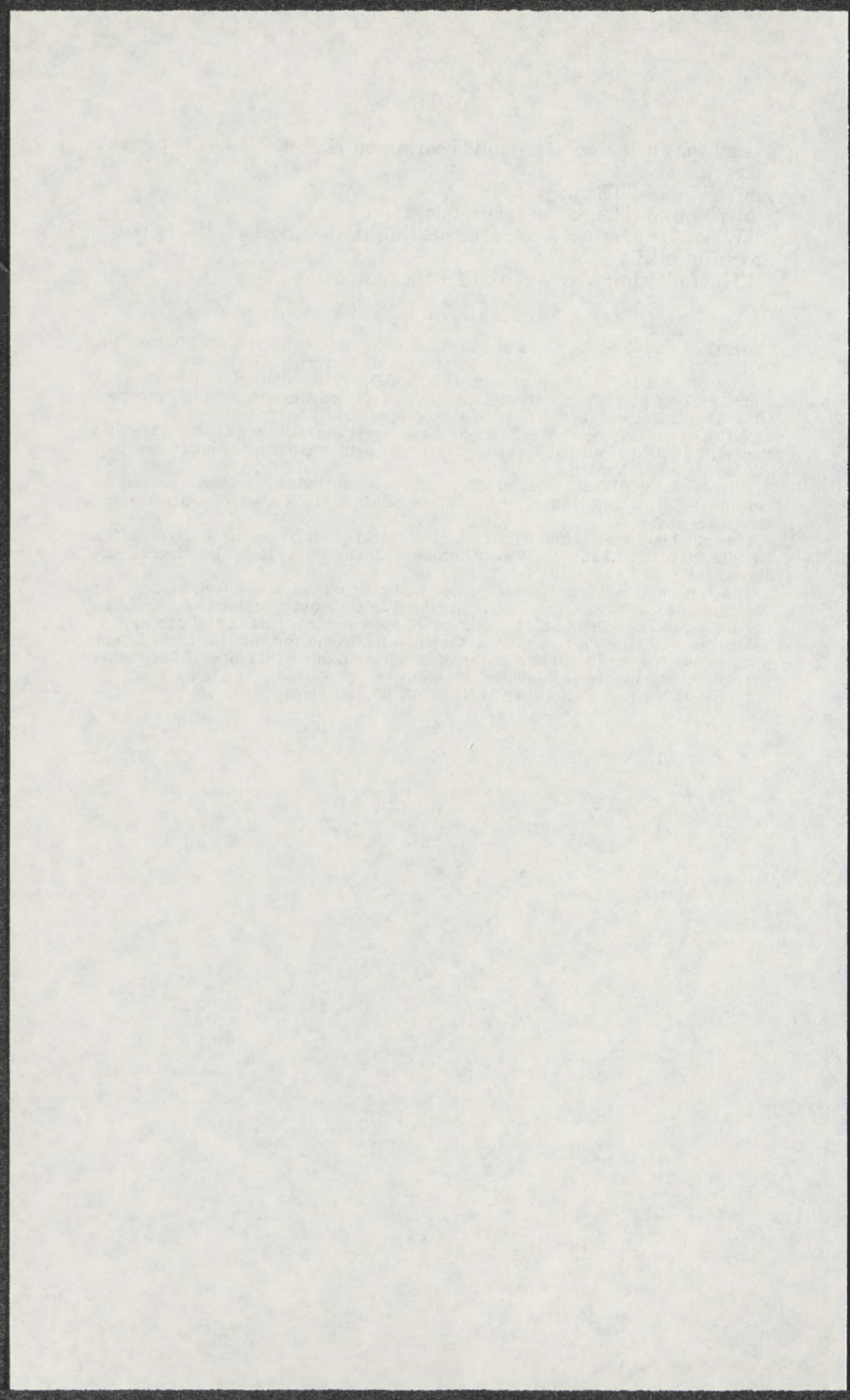
I applaud the "Bonn Agreement" which was concluded over the weekend by President Carter and leaders of six other countries. It is a step toward making air travel safer.

I would hope that other nations in the world would join the United States, Britain, Canada, France, West Germany, Japan and Italy in signing the agreement.

The testimony of Transportation Secretary Brock Adams, I feel, summed up the guts of H.R. 13261—the U.S. is prepared to take unilateral action, including the imposition of sanctions, if necessary to protect U.S. citizens and property.

I agree with the Secretary that the time has come for this Congress to emphasize our resolve to counteract terrorist acts and our willingness to help other nations reach an acceptable level of security.

I urge this panel to approve H.R. 13261. Thank you.



EVALUATION
OF THE
NEEDS AND BENEFITS
OF THE
EXPLOSIVES TAGGING
PROGRAM

Final Report

Prepared For
Department of the Treasury
Bureau of Alcohol, Tobacco and Firearms
Washington, D.C. 20226

By:
Julius Roth

March 1978

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- Figure 11: Percentage of Habitual Bombers At-Large After Tagging Program Implementation as a Function of Program Effectiveness.
- Figure 12: Internal Rate of Return on Investment for the Combined Identification and Detection Tagging Programs.

1.0 ABSTRACT

To combat criminal use of explosives, the Bureau of Alcohol, Tobacco and Firearms (BATF) is sponsoring programs for the tagging of explosives for pre-explosion detection and post-explosion identification. The programs are being conducted in cooperation with other government agencies and industry through the Advisory Committee on Explosives Tagging. As part of the evaluation process a study has been performed to determine the cost-benefits that can be realized by the implementation of the two tagging programs. The study consisted of three major tasks:

1. Assessment of the threat posed to society by the use of explosives in criminal activities
2. Estimation of the anticipated effectiveness of the tagging program
3. Cost-benefit analysis.

The most important conclusion of Task 1 is that the criminal explosive threat over the next 20 years (in the absence of tagging) will remain approximately constant at the level represented by the threat averaged over the five previous years. Of course, there will be fluctuations, but a constant threat level is the best statistical projection of recent and present threat data.

Another interesting result is that dynamite, which is used in about one-quarter of all criminal bombings, accounts for roughly two-thirds of all bombing casualties and about three-quarters of all bombing damage. Attacks on residences, commercial facilities and vehicles constitute the majority (over 50%) of all explosive bombings. In recent years there appears to be a trend towards using more "home-made" explosives, but as shown above these do not have the casualty and damage potential of cap-sensitive explosives.

Estimation of the effectiveness of the tagging programs (Task 2) is beset with difficulties. At present there is no "track record" by which the effectiveness of explosive tagging

can be judged. Consequently, it is difficult to forecast the expected program impact with any great precision. Determination of cost-benefit in Task 3 requires estimates of the increase arrest rate, the increased deterrency effect and the fraction of bombs found as a result of identification and detection tagging. Conservative estimates of these effectiveness parameters are: 1.5-fold increase in arrest rate (present arrest rate is only 8% per year, thus a 1.5-fold increase still leaves the arrest rate at a relatively low 12%); a 5% annual deterrency rate and less than 2% of bombs found annually as a result of detection tagging.

The cost-benefit analysis (task 3) relates the cost of implementing a program to the reduction in social costs realized by the program. A convenient and frequently used end-product of such an analysis is the so-called benefit/cost ratio. Basically, this ratio is the reduction in social costs (benefits) realized by the project over a fixed number of years (customarily 20 years), divided by project costs over the same time period. A model was developed in which program effectiveness and consequently cost benefits are presented in parametric form in terms of the parameters evaluated in Task 2.

Over a range of "realistic" values of these parameters, (and even for pessimistic choices of these parameters), identification tagging is worthwhile from an economic point of view. At present it is impossible to estimate the effectiveness of tagged or untagged detection with any degree of accuracy. Within this large uncertainty, both tagged and untagged detection appear to be, at best, of borderline economic viability. An exception is provided by infrequently attacked special targets whose destruction by bombing can result in catastrophically high costs. The combined identification and detection tagging programs, however, are worthwhile because the favorable cost benefits of identification tagging more than offset the marginal economics of detection tagging.

2.0 INTRODUCTION

Criminal use of explosives in actual bombings or bombing threats is a problem of national concern. However, the complete threat profile of the criminal use of explosives has not been established. Furthermore, the overall cost to society incurred by criminal bombings has not been completely evaluated. Both the threat profile and its cost to society are necessary inputs for evaluating the effectiveness and value of the implementation of systems and procedures to combat criminal bombings.

The Bureau of Alcohol, Tobacco and Firearms (BATF) and other Federal agencies have been seriously concerned over the past few years with the development of methods to control the illegal use of explosives. Ideally, the problem of control would be greatly simplified if every ounce of explosive, legally manufactured and legally used, could be completely accounted for. Unfortunately, such complete accounting is impossible because of pilferage, subterfuge, etc. Furthermore, explosives can and are being prepared illegally in clandestine explosive "plants."* Thus, in spite of all efforts by BATF and other agencies, explosives do get into the hands of criminals and are used in actual bombings or in bombing threats. Clearly, additional procedures are needed to supplement the strictest possible control of explosive manufacture, distribution, storage and use.

A supplementary program that promises effective and quick results is that of explosive tagging. This is a two-part program which consists of:

1. Developing a taggant that survives detonation and can be coded to provide information as to the source of the explosive and its last legal possessor
2. Developing a taggant that makes the explosive easy to detect.

* The current proportion of "home-made" explosives in criminal use is fairly small and the attrition rate of clandestine explosive "plants" is expected to be rather high. However, in incidents involving malicious mischief by juveniles, home-made explosives are frequently used.

Part (1) can provide valuable leads in apprehending the perpetrators by providing law enforcement agencies with:

- Justification for initiating an investigation
- A "starting point" for the investigation
- Important evidence for the judicial proceedings against apprehended suspects.

For example, the recovery of taggants which establish that dynamite was used in an explosion of a manufacturing facility that uses potentially explosive gases (but never uses dynamite) clearly demonstrates that the explosion was deliberate (criminal) and not accidental. The recovered taggant also enables investigators to determine the last legal possessors of the dynamite and thus provides a good starting point for the investigation. Furthermore, the recovered taggants may be most valuable in the judicial proceedings after a suspect has been apprehended for establishing that a crime was committed and for associating the suspect with the crime (for example, finding in the suspect's possession dynamite of the same manufacture date and lot as that used in the bombing). Even though no suspect is apprehended, identification tagging can still be beneficial in that it can point to the source of the explosives used in criminal acts. Law enforcement agencies can then ensure that this explosive source is eliminated, and if necessary initiate criminal proceedings against the legal explosive distributor or user that was the source of the explosives.

Identification tagging has another important application. Underground coal mines are required by law to employ only certain types of explosives, called permissibles, in their mining operations. Periodic governmental inspections are made to ensure compliance with this law. Under normal circumstances inspectors have no difficulty in determining whether permissible explosives are indeed being used. However, after an accidental fire-damp or coal dust explosion there is usually only circumstantial evidence as to the type of explosive that was involved. Recovery of taggants after such an accident can be most helpful in establishing the cause of the accident and in assigning liability for the accident.

Detection tagging (part 2) is expected to have considerably more limited applicability than identification tagging. Its prime benefits are anticipated to be in the reduction of infrequent but potentially very costly bombings, such as bombings of aircraft and airports or of government offices and facilities whose disruption could have grave consequences to our national well-being and security. Under appropriate circumstances detection tagging can also be useful in distinguishing between real bombs and hoaxes, and in helping to locate bombs after a communicated bombing threat.

The goal of this study is the assessment of the effectiveness and cost benefits to be derived from the implementation of various programs of controlling the illegal use of explosives. In particular, it is the assessment of the benefits of the explosives tagging program that is the prime objective of this effort. Furthermore, the effort includes consideration of the need for additional future programs for combatting the illegal use of explosives.

Much of the effort is concerned with modelling, scenario development and cost analysis. However, even the most ingenious and sophisticated models and scenarios are of limited use unless they are based on factual input data. Thus, data gathering is an important aspect of this study.

3.0 SUMMARY OF MAJOR FINDINGS OF THIS STUDY

To facilitate presentation of the diverse results of this study, a narrative discussion of the major results and conclusions of our effort will now be given. This summary, though comprehensive still does not contain the level of detail required for a critical assessment of the results and conclusions obtained. Consequently, each subsection of this summary contains references to the sections and subsections of this report where the appropriate details can be found. Recommendations for further study and development efforts to combat criminal use of explosives will be given in section 7.0 and are not summarized in this section. Only explosive bombings will be considered. Incendiary "bombings" are not the subject matter of our study.

3.1 Bombing Threat Profile

The ultimate goal of this study is the assessment of cost benefits to be achieved from the implementation of identification and detection tagging of explosives. To attain this goal it is imperative to obtain as accurate a description as possible of the recent history of the threat to society engendered by the criminal use of explosives. Furthermore, methods of making future projections of the frequencies of criminal bombings and their social costs must be developed. The elements for developing a present and future bomb threat profile consist of:

- Acquisition of bombing data
- Determination of the reliability of the acquired bombing data
- Characterization of the present bombing threat profile
- Development of a quantitative (statistical) model for the present bombing threat profile

Development of methods of projecting the threat profile into the future

Quantitative (statistical) projections of the threat profile.

Each of these elements will be discussed below.

3.1.1 Acquisition of Bombing Data

Bombing data were acquired in two forms: documented bombing statistics and information obtained via personal contact (visits or telephone conversations) with knowledgeable personnel in government and in the private sector. The main sources of documented data were BATF, FBI, NBDC (National Bomb Data Center), and the California Department of Criminal Justice. Most of the fruitful personal contacts were with local police department "bomb squads" and BATF bomb-scene investigators. Details of the type of data acquired and their source are given in section 4.1.

3.1.2 Bombing Data Reliability

Whenever possible comparisons were made between different data sources to evaluate the degree of reliability of the acquired bombing statistics. Unfortunately these comparisons showed that disagreement among data sources is about as frequent as agreement. Furthermore, no unprejudiced criteria were found for determining which data source is the most reliable. However, from the point of view of projection of data into the future, the source that contains data over several years is to be preferred to that with only a few years' data. It is significant that a preliminary audit in California revealed that only about two-thirds of the California bombings (contained in the records of local law enforcement agencies) were reported to the state agency responsible for maintaining bombing statistics. Since California has a mandatory

requirement for reporting bombings, the fraction of bombings reported throughout the entire United States may be even lower than two-thirds.

Most of the information obtained on the anticipated effectiveness of explosive tagging is conjectural in nature. Much of it is based on "expert opinions" of experienced bomb-scene investigators. Details of the reliability of the acquired bombing data are given in section 4.2.

3.1.3 Threat Profiles

Based on the bombing data acquired, and taking into account the caveats described above, the main features of the present-day (1977) bombing threat profiles are as follows:

- The explosive fillers used in criminal bombings have the following approximate distribution:

• Dynamites	25%
• Military Explosives	2%
• Smokeless Powder	15%
• Black Powder	8%
• "Other" (Mostly Improvised)	18%
• Unknown	32%

(see section 4.3.1).

- Although dynamite is the explosive used in only one-quarter of all bombings its use accounts for (on an unknown-free basis)* at least 55% of bombing injuries, at least 65% of bombing fatalities and about 80% of bombing damage (see section 4.3.2).
- The use of pipe bombs in criminal bombings has increased from about 28% (of all bombs) in 1975 to about 37% in 1977 (see section 4.3.3).
- Positively identified frequency of use of fuse blasting caps (non-electric) exceeds the frequency of use of electric blasting caps. A large undetermined category, however, makes this

* Normalizing the known explosives

conclusion uncertain. The use of a blasting cap (electric and non-electric) could be established for only three-quarters of all cap-sensitive explosives. Thus, in about one-quarter of the bombings involving the use of cap-sensitive explosives, the data made no mention of blasting caps. It is to be expected that in catastrophic bombings (La Guardia Airport, for example) electric blasting caps are used (see section 4.3.4).

- The most frequent targets of criminal bombers are residences, commercial facilities and vehicles. Together these account for over one-half of all the targets (see section 4.3.5).
- As expected, attacks on crowded facilities such as airports result in a higher proportion of casualties than attacks on such people-free targets as construction equipment. It is significant, though again not unexpected, that there is a relatively high proportion of fatalities in attacks on vehicles (see section 4.3.5).
- Black powder is the explosive most frequently used in bombings of schools and to a lesser extent residences. The explosive most frequently used in attacking most other targets is dynamite (see section 4.3.5).
- Accurate information on bombing motives is lacking. Roughly two-thirds of all bombing may be attributable to malicious destruction and personal animosity (see section 4.3.6).

3.1.4 Statistical Model of the Present Bombing Threat

A statistical analysis of the criminal bombing threat will enable us to estimate the confidence that can be assigned to the numerical values of the various bomb threat elements shown in section 3.1.3. More importantly, it will establish a basis for projecting the bombing threat trends into the future. The model is predicated on the assumptions that the highly non-homogeneous bombing threat can be decomposed into more nearly homogeneous subsets to make the statistical treatment more tractable. Thus, in order to obtain a statistical model for the entire threat one merely needs a model for the number of events and the magnitude of the important attributes (casualties, property damage, etc.) of each event during the time

interval of interest. It was found that catastrophic bombing events, because they occur infrequently and irregularly but are very costly, have different statistical properties than the more "ordinary" or "normal" bombings. Thus, catastrophic bombings had to be modelled separately from "normal" bombings. Property damage was used as the criterion for defining "catastrophic" bombings (see sections 4.4, 4.4.1 and 4.4.2, as well as Appendix 3).

Statistical analysis of past bombing history indicates that for the overall bombing threat there are no significant upward or downward trends with time. Consequently, the best estimated projections of the bombing threat into the future are at the average levels of recent past history (see sections 4.4.2.1 and 4.4.2.2). These bombing predictions agree rather well with the preliminary year-end BATF data for 1977 (see section 4.4.3).

3.2 Assessment of Anticipated Effectiveness of the Tagging Program

To date there is no "track-record" upon which to base accurate estimates of the effectiveness of either identification or detection tagging in reducing criminal bombings. For the overall explosive threat we believe that detection tagging will be considerably less effective than identification tagging, even though detection tagging has the capability of stopping bombings, whereas identification tagging is mainly effective in reducing future bombings. Probability considerations suggest that, as far as the overall bombing threat is concerned, detection tagging will be relatively ineffective because for most targets the probability of a detector and a bomb being near each other is very low. However, for a few targets, whose destruction can result in catastrophic costs, detection tagging can be of great value, both in detecting bombs before they explode and as a deterrent, particularly if there is limited access for the general public to these targets. Operational scenarios for conditions under which identification tagging, detection tagging and untagged detection of explosives may be effective are presented in section 5.1.

3.2.1 Estimated Effectiveness of Identification Tagging

Identifiable post-explosion residues (tags) should provide valuable clues to bombing investigators and thereby appreciably increase the chance of finding and arresting the bomber. Knowledge that the explosion can no longer destroy most of the "evidence" of the explosives used and their source, as well as the anticipated increase in bomber arrests, might deter at least some bombers from further bombings and also tend to reduce the number of new bombers. Thus, increased arrest rates and deterency rates are appropriate measures of program effectiveness. From the discussion in section 5.2.1, 1.5- to 2-fold increases in the annual arrest rate (now at about 8%) appear to be reasonable estimates for identification tagging. Unambiguous estimates of the deterrent effect are unavailable. A 5% annual deterency rate appears "reasonable" and might even be low (see section 5.2.1).

3.2.2 Estimated Effectiveness of Detection of Tagged and Untagged Explosives

As already mentioned, detection of explosives (whether tagged or untagged) is a very low probability event, except for targets with limited access to the general public. The chance of detection for the majority of targets is further reduced if detection systems are not portable and at present there appears to be some doubt about the portability of detection systems. There is now no real basis upon which the effectiveness of explosive detection can be judged. Optimistic guesses (see sections 5.2.2 and 5.2.3) are: 10% increase in arrest rates, 2% annual deterency rate, and 2% more bombs found before they explode.

For special targets, airport terminals for example, where people, packages and baggage can be funneled through a few controlled areas, detection tagging may be considerably more effective than suggested above, but quantitative effectiveness estimates are unavailable. Attacks on such targets, though

infrequent, can result in catastrophic costs. Because of their rarity it is difficult to assign the contribution of these bombings to the overall bombing cost, but indications are that the cost of airport and aircraft bombings is a relatively small fraction of the overall annual bombing costs.*

3.3 Cost-Benefit Analysis

Cost-benefit analysis relates the cost of a project to the reduction in social costs realized by the project. A convenient and frequently used end-product of such an analysis is the so-called benefit/cost ratio. Basically, this ratio is the reduction in social costs (benefits) realized by the project over a fixed number of years (customarily 20 years), divided by project costs over the same time period. Both benefits and costs occurring at different times in the future have to be "discounted" because money spent or gained today is "worth" more than money spent or gained several years from now.

Generally, it is easier to estimate the costs of a project than the benefits that it will realize. This is particularly true of the explosive tagging program, for which there is no closely analogous past experience upon which cost-benefit analysis can be based. The lack of past experience necessitates the development of a cost-benefit model that is rather general but still based primarily on variables that are quantitatively expressed. It is obvious that precise assignment of costs to the controlling variables is not possible prior to gaining at least some experience in the effectiveness of the tagging program. What can be done is to construct a model in which program effectiveness and consequently cost benefits are presented in parametric form.

* Data kindly provided to us by Mr. J. H. Henry of IDA show that the total losses due to bombing of aircraft in the U.S. during 1949-1976 are about 104M\$ (in 1977 dollars). This total cost divided by the 27 year time period over which it occurred gives an "average" annual cost of 3.9M\$ which is relatively small compared to the overall annual bombing cost of at least 130M\$ (see sections 6.2.1 and 6.2.2).

3.3.1 Methodology

The parameters chosen to measure the effectiveness of the tagging program are:

1. Arrest rate
2. Deterrency rate
3. Bombs detected prior to explosion.

The first two parameters are attributes of both the identification and detection tagging programs, while the third is strictly an attribute of detection tagging. The degree to which identification tagging or detection tagging contribute to arrest rate or deterrency needs to be determined. Fortunately, the overall cost benefits depend only on the total increase in the arrest rate or deterrent effect of both identification and detection tagging. To obtain the cost benefits of either identification or detection tagging separately will, however, require estimates of the degree of contribution of each.

Details of the model (and in particular the assumptions upon which it is based) are set forth in sections 6.1.1, 6.1.2 and Appendix 5. Fundamentally the model is predicated on the supposition that a decrease in the number of bombers results in a proportionate decrease in bombings which in turn determine the cost benefits. As the model developed, it became apparent that one needs to distinguish between habitual bombers (those that bomb more than once) and one-time bombers. Unfortunately, this introduces another undetermined factor, namely the fraction of one-time bombers in the total bomber population. It was possible to obtain an analytical solution for the model equations. This enables one to determine the importance of various factors in the model vis-a-vis each other without recourse to computers.

3.3.2 Threat and Program Costs

Based on the projections summarized in section 3.1.5 and 3.1.6, annual bombings costs over the next 20 years are expected to stay constant if the tagging programs are not implemented. The constant annual direct costs of the projected bombing threat are expected to be: 15 million dollars for property damage, 30 million dollars for bombing fatalities and 6 million dollars for bombing injuries (see section 6.2.1 and Appendices 6 and 7 for details). The total annual direct cost to be used hereafter is rounded off to 50 million dollars.

The estimated indirect costs are expected to be (annually) 45 million dollars for bombing investigations and bomb disposal, 15 million dollars for the cost of evacuations and delays due to bombing threats, 10 million dollars for security guards employed because of bombings, 5 million dollars for judicial proceedings against arrested bombers and their incarceration costs, and 2 million dollars for disruption of vital services. The total amounts to 77 million dollars, but since we were unable to estimate some indirect costs and are uncertain about the estimates of some of the costs that were considered, we will use a total indirect cost of 80 million dollars in our analysis (see section 6.2.2).

Program costs are estimated to be 10 million dollars annually for identification tagging and an average annual cost (over 20 years) of 9.4 million dollars for detection tagging. Because the major cost in detection tagging is for detection equipment, which must be replaced periodically, only an average annual cost can be defined for this program. Details are shown in sections 6.2.3.1 and 6.2.3.2. Average costs for untagged detection are crudely estimated to be 12.5 million dollars per year (see section 6.2.3.3).

3.4 Cost Benefits

Favorable benefit/cost ratios (appreciably greater than one) are obtained for identification tagging under reasonable and even pessimistic assumptions of program effectiveness; e.g., an increase in current arrest rate of 1.5-fold and an annual deterrence rate of 5% (see section 6.3.1). Thus, identification tagging is worthwhile from an economic point of view.

Definition of a "realistic" range of effectiveness for detection tagging (as it applies to the overall explosive threat) is much more uncertain than for identification tagging. Within this large uncertainty, it appears that detection tagging is not worthwhile or just barely worthwhile from an economic point of view (see section 6.3.2). This program may still be justifiable in terms of its potential to reduce very infrequent but very costly bombings.

Similarly, detection of untagged explosives appears to be unfavorable from an economic point of view (see section 6.3.4).

It should be emphasized that the combined identification and detection tagging programs give favorable benefit/cost ratios for realistic estimates of the combined program effectiveness. Clearly the favorable cost benefits of identification tagging more than counteract the unfavorable economics of detection tagging (see section 6.3.3).

The break-even point (benefit/cost ratio = 1) for identification tagging is reached in about 8 to 12 years depending on the degree of optimism in evaluating program effectiveness. Similarly, the break-even point for detection tagging is reached in about 14 to 19 years, while for the combined programs it occurs between 11 and 17 years (see sections 6.4.1 through 6.4.3).

An interesting prediction of the model is that the number of bombers, under reasonable conditions of program effectiveness, will eventually drop to about 47% of its present value. This drop is rapid in the first five years and then more gradual thereafter (see section 6.4.4).

3.5 Effect of Pre-Program Explosive Thefts on Program Cost Benefits

Information contained in BATF's computerized tape indicates that a large amount of stolen cap-sensitive explosives has not been recovered. If a large proportion of these unaccounted for explosives is now in the possession of criminals, these untagged explosives may be sufficient for five to six years of bombing at the present bombing rate (see section 5.2.1).

Of course it is most unlikely that only these untagged explosives will be used in criminal bombings after the tagging programs are implemented. But if this were the case, cost benefits would be reduced by almost 2-fold. However, even a 2-fold cost benefit reduction still leaves identification tagging economically worthwhile! (see section 6.5). For the detection tagging program, however, the use of untagged pre-program explosives may indeed change its anticipated border-line cost benefits into unfavorable ones.

4.0 DETERMINATION OF THE CRIMINAL BOMBING THREAT

Basic to every aspect of this study is the assessment of the threat to society posed by the use of explosives in criminal activities. A definitive evaluation of the effectiveness and cost of tagging explosives cannot be made unless one establishes certain baselines in terms of which this evaluation will have significance. The obvious baselines are the nature, extent and total cost to society of the entire explosive threat. The best possible characterization of the threat is of utmost importance to the successful performance of this study. The development of such a threat profile is no trivial task since the threat has many facets and the forecasting of future trends on the basis of past experience is always uncertain. Furthermore, information on some of the facets of the overall threat is either unavailable, incomplete or unreliable. For example, indications are that the best sources of bombing data may be based on only two-thirds of all bombings; i.e., some one-third of all bombings are probably not reported to the agencies that keep bombing statistics.

4.1 Sources of Bombing Data

Of prime importance to the determination of the overall criminal bombing threat are data on bombing casualties, property damage, targets attacked, explosives used, type of initiation, motives for bombing and current arrest rates for criminal bombings. The main sources for these data were:

1. Two magnetic computer tapes of BATF data covering the time periods of April 1975 through July 1977 and April 1975 through September 1977. These data bases included, in addition to bombing-related data, information on explosive thefts and explosive recoveries.
2. FBI Uniform Crime Reports "Bomb Summary" for 1972 through 1976.

3. FBI Bomb Data Program, Monthly Incident Summaries from May 1975 through June 1977
4. National Bomb Data Center, Monthly Incident Summaries from 1970 through April 1975
5. California Department of Justice, Division of Law Enforcement, Organized Crime and Criminal Intelligence Branch "Bombing Incidents in California" from 1971 through June 1977

Specific documented information such as the explosive threat to air transportation or the postal service was obtained from:

6. Bengston, Cutchis and Henry, "Protection of Airports Against Explosives" (IDA Paper P-1057), January 1977
7. "Control of Explosives" Hearings before the Judiciary Committee of the Senate, September 1976

Information on tagging methods and applicability and costs of tagging was extracted from the following Aerospace Corporation reports:

8. "Reassessment Survey Report on Explosive Detection and Identification Techniques," April 1977
9. "Study of the Use of Taggants for Explosive Identification," May 1977
10. "Explosive Tagging and Control," October 1977
11. "Explosive Tagging and Control Inflation Impact Analysis," March 1977

Much additional information on investigation costs, evacuation costs and estimates of tagging program effectiveness was obtained in visits to and discussion with personnel in Federal agencies such as BATF, FAA, GSA and FBI, as well as personnel in city and county police departments, bomb squads, and state investigative agencies. More specifically the Federal agencies visited were:

- Explosive Technology Branch, BATF
- Office of Criminal Enforcement, BATF
- Forensic Science Laboratory, BATF
- Management Program, BATF

- System Research and Development Service, FAA
- Civil Aviation Security Service, FAA
- Air Transportation Security Field Office, Dulles Airport
- Air Transportation Security Field Office, San Francisco Airport
- Planning and Development Section, Region 3, GSA
- Federal Protective Services, GSA
- Bomb Data Center, FBI

Local and state law enforcement and investigative agencies visited were:

- California Department of Justice, Division of Law Enforcement, Sacramento
- Cleveland Police Scientific Unit
- Colorado Bureau of Investigation, Denver
- Dade County (Miami, Florida) Public Safety Department
- Louisiana State Police, Baton Rouge
- Los Angeles Police Department, Criminal Conspiracy Section and Forensics Laboratory
- New York City Police Department, Bomb Section
- San Francisco Police Department, Bomb Squad

In the private sector, visits were made to the following locations:

- Law Enforcement Development Group, Aerospace Corporation, Washington, D.C.
- Security Department, Safeway Stores, Inc., Oakland, California
- Security Department, Gulf Oil Corporation, Denver, Colorado
- Security Department, Pacific Gas and Electric Co., San Francisco, California
- E. I. Dupont de Nemours, Inc. (Explosives Products Division), Wilmington, Delaware
- Hercules, Inc. (Industrial Systems Department), Wilmington, Delaware

These visits were supplemented by telephone contacts with:

- BATF Special Agents in Boston, Chattanooga, Chicago, Cleveland, Denver, Salt Lake City and San Francisco
- International Association of Bomb Technicians and Investigators (IABTI)
- Los Angeles County Sheriff's Office, Arson and Explosives Section
- Washington Police Department Bomb Section

and with:

- American Association of Industrial Security, Washington, D.C.
- Three private industrial security agencies in Washington, Miami and Los Angeles
- Security Department, Standard Oil Company of California, San Francisco
- Island Creek Coal Company, Madisonville, Kentucky

The BATF data were computerized and thus amenable to the ease of data retrieval that such a system provides (see Appendix 1). We extracted pertinent information from the FBI Monthly Summaries of 1976 and 1977, and placed this information on punched cards to obtain the advantages of computerized data retrieval for this source (see Appendix 2). A portion of the California Bombing Incident data was similarly computerized (see Appendix 2).

4.2 Bombing Data Reliability

It is obviously important to verify the accuracy and completeness of the bombing statistics obtained. In the preceding section it was mentioned that an appreciable number of bombings appear to go unreported. The figure of around 33% of unreported bombings is a preliminary audit of local police department records made by the person responsible for maintaining

bombing statistics for the State of California. It should be emphasized that in California it is mandatory for all law enforcement agencies to report bombings to a central file. Thus, the number of unreported bombings may be even higher in the other states than it is in California. Furthermore, preliminary estimates indicate that the percentage of "serious" bombings (those resulting in casualties) that are unreported in California is around 28% or only a little less than the percentage of all unreported bombings.

Let us assume that two-thirds of all bombings are reported and are entered into the various bombing statistics documents. From a statistical point of view this constitutes a very significant sampling of all bombings. Thus, information on targets attacked, motives, explosives used, etc. will be statistically significant. Actual figures on casualties and property damage, however, might be low in these documents by as much as a factor of one-third or even more.

Since this study is primarily concerned with costs, it is important to check the reliability of bombing damage costs reported in the various bombing statistics documents. This is done in Table 1. Admittedly, the sampling shown is quite meager, but the data in Table 1 suggest that reported bombing damage costs are reasonably reliable.

Because bombing information may be incomplete, delayed or even inaccurate it is imperative to compare bombing data from various sources. Such comparisons can establish the degree of confidence one has in the acquired data. As shown in Table 2, recent BATF and FBI bombing statistics on the number of bombings and number of casualties are in reasonable agreement. The apparent disagreement in attempted bombings can be attributed to BATF's practice of listing "undercover buys" of explosive devices under "bombing attempts." We have, as yet, no plausible explanation why injuries reported by FBI are higher than those reported by BATF in 1976 but lower in 1977. Similarly, in 1977 FBI reports only about one-half the fatalities reported by BATF. Possibly the FBI data for the first half of 1977 reflect slower data receipt

Target	Date	Damage (\$1000)			Source for Actual Damage
		FBI Report	California Report	Actual	
BATF, San Francisco	07/21/75	250	300	283*	BATF
Oil Company Headquarters	04/04/75	300	"Extensive"	500	Company Security
La Guardia Airport, New York City	12/29/75	750	-	700	Airport Manager
Oil Company Headquarters	06/13/74	300-500	-	350	Company Security
Food Market	11/27/75	4.0	-	1.6	Company Security
Food Market	01/27/76	0.5	-	0.4	Company Security
Utility Company	03/27/75	80-100	-	110	Company Security

* plus 16 added security people

Table 1: BOMBING DAMAGE COSTS FOR SELECTED INCIDENTS

Type	Number of Incidents			
	1976		1977	
	BATF	FBI	(Semi-Annual) BATF	FBI
Explosive Bombings	854	852	-	-
Explosive Bombing Attempts	318	188	567*	483*
Fatalities (Includes Incendiaries)	44	50	10	6
Injuries (Includes Incendiaries)	159	212	76	67

* Explosive bombings and attempts

† Extracted from computer tape (item 1, of section 4.1.1)

Table 2 : COMPARISON OF BATF[†] AND FBI BOMBING STATISTICS

and recording than for BATF. This data lag generally makes one-half year data less reliable than data for the entire year which is not reported as promptly as the one-half year data.

The information in Table 3, which compares California bombing statistics, according to data from BATF, FBI and the California Department of Criminal Justice (CDCJ), is quite disturbing. Clearly, many bombings listed in the CDCJ file for 1976 are not included in the BATF or FBI files. Rather unexpectedly the semi-annual statistics for 1977 appear to be in much better accord.

The discrepancies between data sources are further emphasized in Table 4 which compares CDCJ and FBI bombing statistics for California for 1972 through 1975 (1976 and 1977 comparisons were shown in Table 3). As shown in Table 4 the FBI reports many more bombing incidents and bombing casualties for California in 1973 than the California Department of Justice. In 1976, however, there is a complete reversal with California reporting many more incidents and casualties than the FBI. The reasons for the discrepancies and reversals remain unexplained.

It is clear from the material presented in this section that there is disagreement among the documented bombing data sources. At present there appear to be no unprejudiced criteria for determining which data source is to be preferred. Since the bombing data are to be used for projecting bombing costs and bombing activity into the future, logic would favor the data base that covers the largest number of years of past and present bombing history. If this data base is suspect, then obviously it can lead to incorrect projections. However, as already stated, we have no valid reasons to consider any one data base to be less accurate than any of the other data bases. Fortunately, as will be shown in section 4.4, projections based on BATF or FBI data are quite similar even though there is some disagreement between the data bases.

1976 Data for California

	<u>CDCJ</u> [*]	<u>BATF</u>	<u>FBI</u>
Explosive Bombings and Attempts	310	135	162
Fatalities (Includes Incendiaries)	10	2	10
Injuries (Includes Incendiaries)	45	13	36

1977 Semi-Annual Data for California

	<u>CDCJ</u> [*]	<u>BATF</u> [†]	<u>FBI</u>
Explosive Bombings	79	83	62
Explosive Bombing Attempts	18	11	26
Fatalities (Includes Incendiaries)	0	0	0
Injuries (Includes Incendiaries)	6	5	5

* California Department of Criminal Justice

† Seven months data

Table 3: COMPARISON OF BOMBING STATISTICS FOR CALIFORNIA

	<u>FBI</u>	<u>CDCJ</u>
<u>1972</u>		
Number of Bombings ^{a/}	545	538
Bombing Fatalities ^{b/}	6	7
Bombing Injuries ^{b/}	39	26
 <u>1973</u>		
Number of Explosive Bombings	197	184
Number of Incendiary Bombings	376	179
Bombing Fatalities ^{b/}	2	2
Bombing Injuries ^{b/}	43	6
 <u>1974</u>		
Number of Explosive Bombings	193	244
Number of Incendiary Bombings	337	297
Bombing Fatalities ^{b/}	3	2
Bombing Injuries ^{b/}	43	35
 <u>1975</u>		
Number of Explosive Bombings	295	310
Number of Incendiary Bombings	238	234
Bombing Fatalities ^{b/}	5	5
Bombing Injuries ^{b/}	47	43
<u>a/ Explosive plus incendiary bombings</u>		
<u>b/ For explosive and incendiary bombings</u>		

Table 4: COMPARISON OF FBI AND CDCJ BOMBING DATA FOR CALIFORNIA

4.3 Threat Profiles

As mentioned in section 2.0, a detailed description of the complete threat profile of the criminal use of explosives has not been heretofore available. Obviously in combatting this threat one needs as detailed a picture as possible of what one is combatting. In this section we will develop such a picture and summarize our findings in the form of a bombing profile network diagram. In particular, the facets of the bombing profile to be addressed are:

- Type of explosives used
- Explosives which have the greatest casualty and damage potential
- Frequency of use of electric and fuse blasting caps
- Targets most frequently attacked
- Motives for bombings.

4.3.1 Type of Explosives Used in Criminal Bombings

An effective bomb leaves little or no identifiable residue upon explosion. Any such residue requires careful chemical and physical analysis for positive identification of the explosive used. Even experienced bomb-scene investigators cannot always establish the type of explosive used, unless they submit appropriate samples for analysis by qualified forensics laboratories. In view of the above, it was determined to base our characterization of the type of explosives now in use by criminal bombers primarily on the results of laboratory analyses by BATF's Headquarters Laboratory. For 1977 these data were supplemented by results from BATF's Regional laboratories, and all the BATF laboratory data are shown in Table 5 and plotted in Figure 1. These plots show the following interesting trends over the years 1974 to 1977:

- The "unknown" category, though still large is decreasing

<u>Explosive</u>	<u>1977</u> [*]	<u>1976</u>	<u>1975</u>	<u>1974</u>
Dynamite ^{a/, d/}	23.7	23.1	32.6	22.7
Black Powder	9.3	9.2	7.8	6.4
Smokeless Powder	13.9	17.1	13.3	18.2
Military	1.8	2.8	3.2	0.5
Primers ^{b/, d/}	1.2	0.0	0.9	0.0
Other ^{c/, d/}	22.4	17.5	12.4	11.8
Unknown	27.7	30.3	29.8	40.4
Totals	100.0%	100.0%	100.0%	100.0%
Number of Samples Analyzed	398 [†]	244	279	-

* One-half year average for Headquarters and Regional Laboratory data

† 135 of these were analyzed at the BATF Headquarters location

a/ Includes slurries and nitrostarch dynamites

b/ Includes boosters and detonating cord

c/ Includes flash powder and other low explosives, blasting agents and home-made explosives

d/ Regional Laboratory data contains 30 items in a category entitled "Other High Explosives" which presumably includes slurries, blasting agents, detonating cord boosters. We have arbitrarily split these into 13 dynamites, 2 "other", and 15 primers.

Table 5 : EXPLOSIVE FILLERS USED IN CRIMINAL BOMBINGS
(BATF Headquarters Laboratory Data)

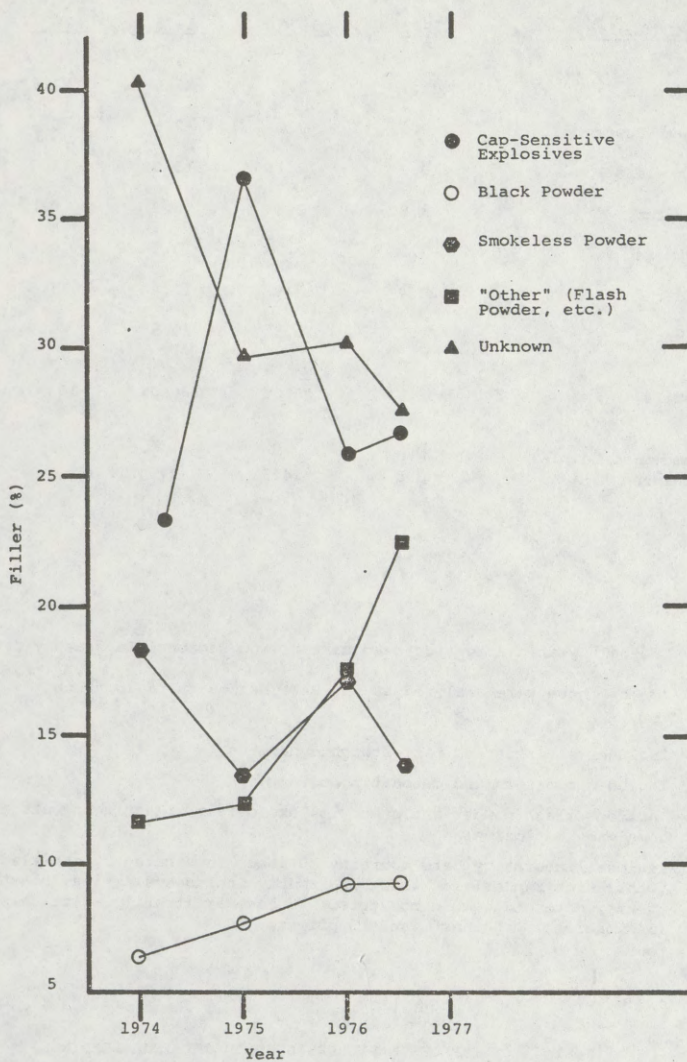


Figure 1: EXPLOSIVE FILLERS USED IN CRIMINAL BOMBINGS
(BATF Laboratory Data)

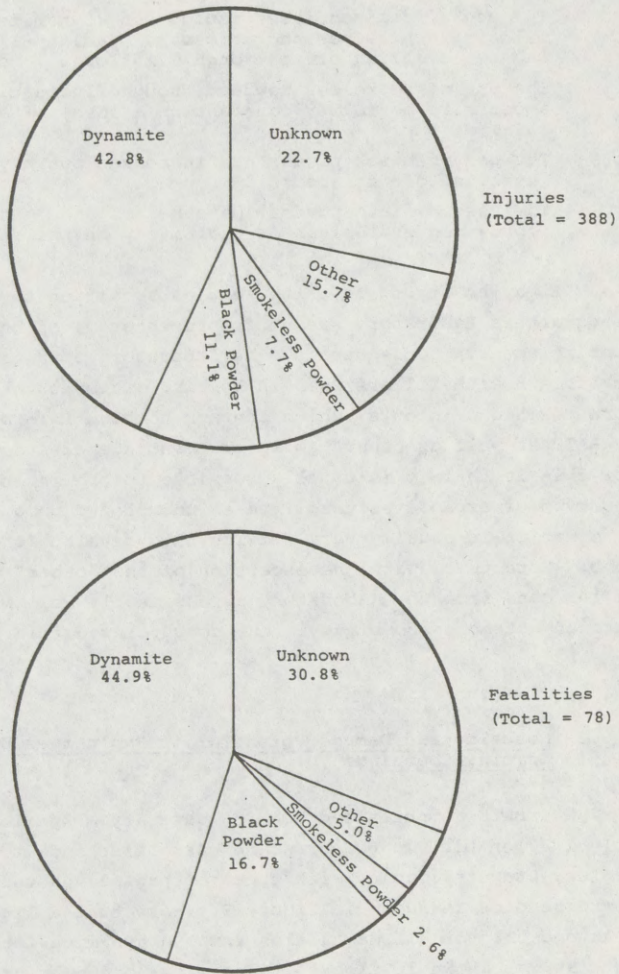


Figure 2: BOMBING CASUALTIES AS A FUNCTION OF EXPLOSIVES USED (BATF Data)

- The use of cap-sensitive explosives (dynamites, military explosives and primers of Table 4-1) may be levelling off at roughly 25% of all bombs
- The use of smokeless powder, though fluctuating, appears to be fairly constant at a level of about 15%
- The use of black powder has increased but may be levelling off at about 10%
- The use of flash powder, matchheads, and "other" improvised explosives is definitely on the increase.

It may be argued that the samples submitted to BATF's Headquarters Laboratory are not representative of the over-all bombing scene. Consequently, the laboratory data are compared in Table 6 with fillers used in bombing attempts (taken from BATF's computerized printouts which contain bombing information obtained by BATF as well as other law enforcement agencies). The rationale for this is that it is usually possible to obtain information on the type of explosives used from an unexploded bomb whereas this information is usually very difficult to develop for an exploded bomb. Note that, with the exception of the "other" category, filler data from the laboratory agrees fairly well with filler data on attempted bombings in the computerized file.

4.3.2 Casualty and Damage Potential of Explosives Used in Criminal Bombings

The BATF computerized bombing data (from April 1975 through July 1977) enabled us to correlate casualties and, to a lesser degree, property damage with types of explosives used. Casualty correlations are shown in Figure 2. Note that a little less than one-half of all casualties involve dynamite-loaded bombs, but, as was shown in Figure 1, dynamite-loaded bombs constitute only one-quarter of all bombs. Indeed the casualties attributable to dynamite are undoubtedly even greater than shown in Figure 2 because of the large "unknown" category for which there was no information on the type of explosive used in bombings that

Explosive	1977 [*]		1976		1975	
	Lab	Bombing Attempts	Lab	Bombing Attempts	Lab	Bombing Attempts
Dynamite ^{a/}	32.7	32.6	33.1	41.5	46.4	48.9
Black Powder	12.9	29.8	13.2	17.4	11.1	10.9
Smokeless Powder	19.2	17.3	24.5	21.2	18.9	26.1
Military	2.5	5.8	4.0	8.2	4.6	5.4
Primers ^{b/}	1.7	1.0	0.0	2.0	1.3	6.5
Others ^{c/}	31.0	13.5	25.2	9.7	17.7	2.2
Totals	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Number of Samples	398	204 [†]	244	410 [†]	279	177 [†]

§ Each explosive percentage is divided by $\frac{100 - \% \text{ unknowns}}{100}$.

* One-half year data

† It is possible that a few of these were analyzed in BATF laboratories.

a/ Includes slurries and nitrostarch dynamites

b/ Includes boosters and detonating cord

c/ Includes flash powder and other low explosives, blasting agents and home-made explosives

Table 6: EXPLOSIVE FILLERS USED IN CRIMINAL BOMBINGS -
Comparison of Lab Analyses and Bombing Attempts
(Normalized[§] BATF Data)

produced casualties. On a normalized basis, about 55% of all injuries and about 65% of all fatalities are produced by dynamite-loaded bombs. These percentages are expected to be even higher because dynamite-loaded bombs are expected to leave less identifiable residue than black powder, smokeless powder and "other" bombs, therefore a large proportion of the "unknowns" should be attributed to dynamite.

The BATF computerized data is not very reliable as to property damage, because if no information about property damage is contained in the original report, zero property damage is entered for that incident in the computer file. Furthermore, property damage is rarely up-dated if more information is received at a later date. Thus property damage information tends to be on the low side. Taking into account these caveats, an approximate value of property damage caused by dynamite-loaded bombs is about 80% on a normalized basis, if most of the "unknown" category is attributed to dynamite.

4.3.3 Frequency of Use of Pipe Bombs

Indications are that the use of pipe bombs is on the increase. Predominantly the filler in pipe bombs will be black powder, smokeless powder, flash powder, matchheads and other "improvised" materials. According to Figure 2, the casualty potential of such devices is relatively low. Nevertheless, this apparent trend is cause for some concern and suggests the need for tagging pipe bomb fillers.

BATF data for April 1975 through July 1977 show a total of 888 pipe bombs in a total of 2,907 explosive devices (computer categories B, C and N) or 30.5%. BATF data from April 1975 through September 1977 for pipe bombs for which no filler is listed show:

1975, 90/761	=	11.8%	Pipes (no filler listed) in total bombing incidents
1976, 167/1,336	=	12.5%	Pipes (no filler listed) in total bombing incidents
1977, 161/1,020	=	15.8%	Pipes (no filler listed) in total bombing incidents

The overall ratio of pipe bombs (no filler listed) to pipe bomb (filler listed) is $382/888 = 0.43$. If we assume that this ratio remains constant from year to year we get:

1975,	27.5%	Pipe bombs in total bombing incidents
1976,	29.2%	Pipe bombs in total bombing incidents
1977,	36.8%	Pipe bombs in total bombing incidents

These trends, if they are assumed to be representative of all pipe bombs, provide the rationale for suggesting that the use of pipe bombs is on the increase. However, based on the casualty potentials shown in Figure 2, the first priority for the tagging programs should be the tagging of cap-sensitive explosives as indeed it is in the BATF plans.

4.3.4 Frequency of Use of Blasting Caps

Since the major development in detection tagging is directed towards tagging electric blasting caps*, it is important to determine the frequency of their use in criminal bombings. BATF's computerized bombing data contains a total of 195 incidents (bombings and bombing attempts) in each of which an electric blasting cap was positively identified, and 181 incidents in each of which a fuse cap was positively identified. In each of 159 additional incidents, for which the use of a cap-sensitive filler was shown, there was also

* Recent developments appear to have revised the original goals and tagging fuse caps is now also contemplated.

mention of safety fuse. The obvious conclusion is that the safety fuse was there to initiate fuse blasting caps. Thus, the total number of fuse caps is $181+159=340$ or apparently considerably greater than the number of electric blasting caps. The total number of electric plus fuse blasting caps thus identified is $340+195=535$ which is 72.9% of 733 which is the number of incidents in the computer file that show the use of cap-sensitive explosive fillers. Now if $733-535=198$, the total number of "missing" blasting caps, is added to 195, the total of identified electric blasting caps, the absolute upper limit of the number of electric blasting caps used is $195+198=393$.

Thus, the available data indicate that the use of fuse caps is more frequent than the use of electric caps (340 fuse caps vs. 195 electric caps) unless one counts most of the "unknowns" (198) as electric caps. It must be realized, however, that the really catastrophic bombings involved bombs that contained long delay systems which most likely required the use of electric blasting caps.

Quantitative yearly trends in the ratio of positively identified fuse caps to positively identified electric caps are most difficult to establish. However, there is little doubt that this ratio increased greatly from 1975 to 1976 and appears to be currently decreasing from the 1976 peak.

4.3.5 Targets Most Frequently Attacked

Data on targets attacked were obtained from FBI and BATF sources. The frequency (percentages) of targets attacked shown in Table 7 are average values for actual bombings and bombing attempts. For the FBI data they are averages for the years 1972 through 1976 and for the BATF data they are averages for April 1975 through July 1977. Agreement between the two data bases is generally quite good. Note that over one-half of all bombings are directed at commercial establishments, residences, and vehicles.

<u>Target</u>	<u>FBI Data</u> *	<u>BATF Data</u> †
Commercial Establishments	21.7	24.2 ^{a/}
Private Residences	20.6	19.9
Vehicles	13.4	16.6
Schools	9.5	6.3
Utilities	4.9	2.6
Government Facilities ^{c/}	4.6	3.7
People	3.5	b/
Law Enforcement Agencies	2.9	0.8
Transportation Facilities ^{c/}	1.8	1.6
Manufacturing Facilities	1.7	1.9
Construction Sites and Equipment	1.7	0.8
Aircraft ^{c/}	0.2	0.2
Unknown	13.5	21.4

* Data for 1972 through 1976

† Data for April 1975 through July 1977

a/ BATF includes restaurants and taverns under a separate category called "Recreation Facilities." We included the 7.8% of attacks on "Recreational Facilities" under "Commercial Establishments."

b/ No such category in BATF data

c/ Amenable to "protection" by explosive detection systems

Table 7: FREQUENCY OF BOMBING ATTACKS ON VARIOUS TARGETS

The above data are strictly for frequency of attack. They are not equivalent to attack costs. Clearly the La Guardia Airport bombing is much more costly in casualties and property damage than many attacks on rural mailboxes or abandoned barns. As shown in Table 7, the attack frequency on targets for which detection tagging is expected to be effective is quite low.

Table 8 shows casualty frequency (percentages) for various targets. Numbers in excess of 100% mean that there were multiple casualties per attack. Not unexpectedly attacks on vehicles have a relatively high fatality frequency. What is more surprising is the high fatality frequency in attacks on manufacturing facilities. Of course, when the number of attacks on a particular type of target is small a single multiple injury or multiple fatality event can produce a large increase in casualty frequency. The data in this table were extracted from the BATF tape that included data through September 1977. A previously received tape contained data through July 1977. Thus, the number of incidents in Table 8 (based on the later tape) will be greater than number of incidents in Tables 11 and 12 which are based on the earlier tape.

The fraction of bombings that caused casualties or property damage are shown in Figure 3. These percentages: 57% of all bombings resulted in property damage; 16% resulted in injuries; 3% resulted in fatalities are based on FBI data. Correlation of damage costs with targets attacked will be presented in section 4.4 (Table 14).

Table 9 shows the explosives used in attacking various targets. These results are based on the latest BATF tape. Note that in attacks on schools and "other" targets and, to a lesser extent, residences (including mailboxes, etc.), the explosives used were mainly black powder and home-made explosives ("other" explosive category). In attacks on most of the other targets the explosive used (if known) was primarily dynamite.

Target	Number of Attacks	% Casualties/ Attack	% Injuries/ Attack	% Fatalities Attack
Transportation Facility	47	193.7	166.0	27.7
Federal Government	54	61.1	57.4	3.7
Law Enforcement	24	16.7	16.7	0.0
Residence	580	15.7	13.1	2.6
Local Government	45	15.5	13.3	2.2
Recreation Facility	205	14.2	13.2	1.0
Unknown	621	13.0	10.3	2.7
Vehicles	482	12.8	9.1	3.7
State Government	9	11.1	11.1	0.0
Schools	184	9.7	9.2	0.5
Commercial	476	8.4	7.6	0.8
Manufacturing	54	7.5	1.9	5.6
Utility	76	6.5	3.9	2.6
Other	24	0.0	0.0	0.0
Heavy Equipment	22	0.0	0.0	0.0
Aircraft	5	0.0	0.0	0.0

* Injuries + fatalities/attack

Table 8: CORRELATION OF BOMBING CASUALTIES AND TARGETS
(BATF Data through September 1977)

Target	Dynamite	Military	Black Powder	Smokeless Powder	Primers	ANFO	Unknown	Other
Private Residences	16.7	2.8	12.9	10.3	1.2	1.4	37.2	17.4
Commercial Establishments	25.0	2.1	7.6	6.7	0.8	2.9	44.7	10.1
Vehicles	22.8	4.6	8.5	10.4	1.0	0.8	43.2	8.7
Schools	7.6	1.1	27.2	14.7	0.5	1.1	35.9	12.0
Law Enforcement Agencies	25.0	12.5	0.0	12.5	0.0	0.0	37.5	12.5
Federal Government Facilities	18.5	0.0	3.7	11.1	0.0	0.0	55.6	11.1
State Government Facilities	55.6	0.0	0.0	0.0	0.0	0.0	33.3	11.1
Local Government Facilities	24.4	2.2	6.7	2.2	0.0	6.7	35.6	22.2
Manufacturing Facilities	31.5	1.9	7.4	11.1	7.4	0.0	31.5	9.2
Aircraft	20.0	0.0	0.0	0.0	0.0	0.0	80.0	0.0
Transportation Facilities	27.7	2.1	6.4	6.4	4.3	0.0	46.8	6.4
Utilities	40.8	3.9	7.9	10.5	1.3	0.0	35.5	0.0
Construction Sites and Equipment	18.2	4.5	9.1	13.6	0.0	0.0	40.9	13.6
Recreation Facilities	29.3	3.9	11.2	4.4	1.5	2.0	35.6	12.2
Other	20.8	0.0	20.8	8.3	4.2	0.0	29.2	16.7
Unknown	15.9	4.5	12.7	11.0	0.6	1.0	43.6	10.1

Table 9: TYPE AND FREQUENCY OF USE OF EXPLOSIVES EMPLOYED AGAINST VARIOUS TARGETS
Percent of Total Attack for Any Particular Target
(BATF Data through September 1977)

4.3.6 Bombing Motives

Accurate information on bombing motives is difficult to obtain. As will be shown later, only a small fraction of the bombers are caught and convicted, and most likely only a few of these confess as to the motives for their bombings. Thus, most motives must be inferred. The apparent motives shown in Table 10 are based on FBI data for 1972 through 1976.

Note that malicious destruction (mostly by juveniles) and personal animosity are the motives for about two-thirds of all bombings. Because of uncertainties in the motive data, we have attempted no further correlation such as motive vs. casualties or motive vs. property damage.

4.3.7 Network Diagram of Bombing Profile

A summary of the separate facets of the criminal bombing threat is presented in the form of a network diagram in Figure 3. This diagram presents a concise description of the current criminal explosive threat. However, the reader must be cautioned that many of these numbers are very uncertain. The numbers in this diagram are percentages; e.g., vehicles represent 15% of all targets attacked. Whenever sufficient information was available these percentages are averages of BATF and FBI data. The BATF data base is for April 1975 through September 1977 while the FBI data are for 1972 through 1976. The categories for which we had to rely on a single data base are noted at the bottom of the diagram.

<u>Motives</u>	<u>Percent of Total</u>
Malicious Destruction	34.5
Personal Animosity	32.8
Unknown	14.3
Political	10.8
Labor Disputes	4.6
Financial Gain	2.1
Organized Crime	<u>0.8</u>
	99.9

Table 10: BOMBING MOTIVES
(FBI Data 1972 Through 1976)

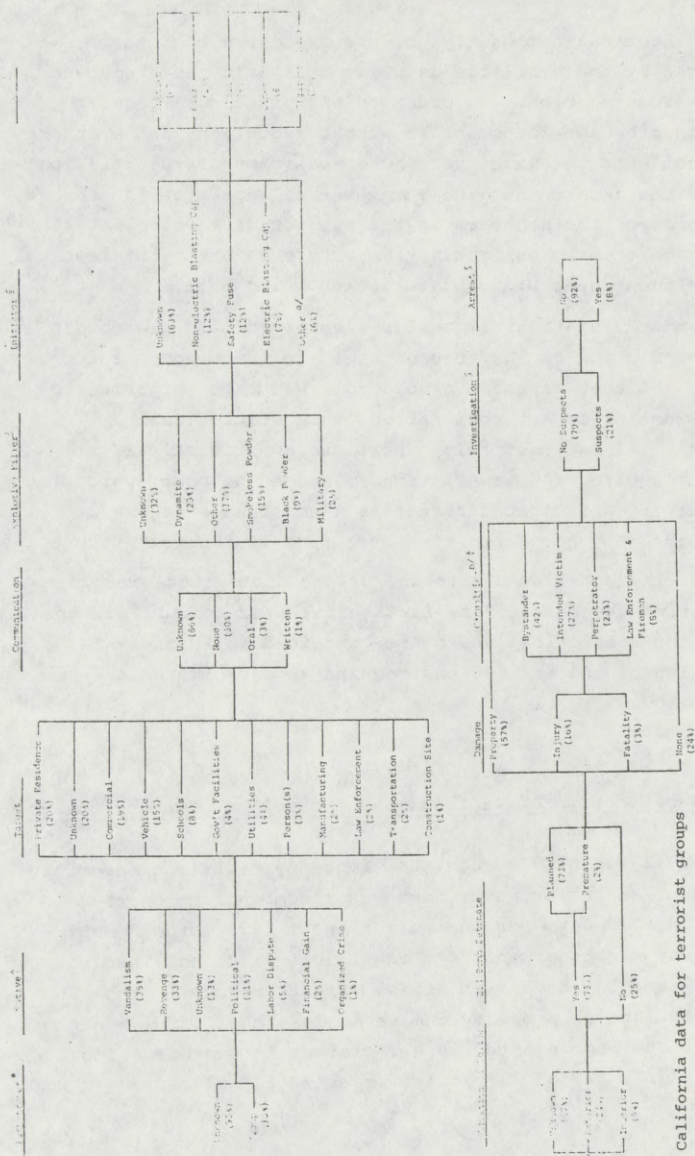


Figure 3: NETWORK DIAGRAM OF CRIMINAL EXPLOSIVE THREAT

4.4 Projection of the Threat to Future Years

The historical composition of the explosive bombing threat as evidenced by the available data was presented and discussed in the previous section. In order to perform a cost-benefit analysis on programs for possible threat reduction in the future, one must estimate the magnitude and composition of the anticipated threat and the impact that these programs will have on the threat. Effectiveness of the programs is the subject of section 5.0; this section is devoted to estimating the future threat by statistical prediction techniques using historical bombing data.

In summary, statistical analyses were performed to obtain the best prediction of the future threat for each component of the threat. A test of these predictions was then performed to determine whether or not compositions were statistically significant. Almost uniformly, there are no statistically significant upward or downward trends, hence the most appropriate estimate of the anticipated threat is a constant one; i.e., neither increasing nor decreasing over time in the near future.

Supporting background material on the statistical models used to define the threat, the statistical predictions, and the bases for the statistical tests are contained in Appendix 3. Amplification of the methods and results appears in the subsections below.

4.4.1 Classification of Incidents as "Normal" or "Catastrophic"

Tables 11, 12 and 13 show the frequency distributions of deaths, injuries and property damage for bombing incidents contained in BATF data for the period April 1975 through July 1977. Ninety-eight percent of these bombing incidents had no fatalities, and 93% had no injuries. Eighty percent of the bombings resulted in property damage of less than \$500. On the other hand, one bomb planted in a locker at La Guardia Airport in December 1975 killed 11 people, injured 51 and caused

approximately \$750,000 damage. This single catastrophic bombing accounted for much of the dramatic increase in the total property damage, total injuries as well as total fatalities in 1975.

In defining the overall bombing threat, the catastrophic bombings are important because even though they constitute only a small proportion of total incidents, they contribute a substantial proportion of the total damage and casualties. Furthermore, the amount of total damage for any given time period may largely depend upon the number of these extreme incidents which occur within this time period. This total damage may have a very large variance if determined primarily by the number of extreme incidents. It seems quite possible, indeed likely, that the catastrophic bombings may have entirely different statistical characteristics from the non-catastrophic bombings.

The data in Tables 11, 12 and 13 indicate that the frequency distribution of property damage has two peaks, but those of fatalities and injuries only have one peak. This bimodal distribution can be traced back to the fact that bombing incidents differ qualitatively in kind; there are "normal" incidents and extreme or "catastrophic" incidents, these catastrophic events being infrequent but having unusually high property damage. Consequently, all bombings were divided into "normal" and "catastrophic" subpopulations according to property damage.

The classification of an incident as catastrophic was done on the basis of the property damage level of the incident relative to the average damage per incident for attacks against similar targets. A vehicle totally destroyed may amount to \$25,000 of damage (this is serious for the car incidents) but a \$25,000 loss caused by an airport bombing will be treated as a minor one. Therefore, the cutoff levels for "catastrophic" events was different for different types of targets. The criterion adopted defined catastrophic bombing incidents as those causing property damage greater than three standard deviations from the average of the target subpopulation involved. All other incidents were classified as "normal" or "ordinary."

Target	Number of Victims:					Number of Incidents			
	Zero	One	Two	Three	Four or More	Total			
Private Residences	505	11	2	0	0	518			
Commercial Establishments	434	4	0	0	0	438			
Manufacturing Facilities	49	0	0	1	0	50			
Vehicles	420	12	3	0	0	435			
Aircraft	4	0	0	0	0	4			
Schools	169	1	0	0	0	170			
Utilities	65	2	0	0	0	67			
Law Enforcement Agencies	20	2	1	0	0	23			
Government Property	97	3	0	0	0	100			
Transportation Facilities	39	2	0	0	1	42			
Recreational Facilities	178	0	1	0	0	179			
Construction Sites and Equipment	20	0	0	0	0	20			
Other	21	0	0	0	0	21			
Unknown/Premature	536	10	1	0	1	548			
Total	2560	45	7	1	2	2615			

Table 11: DISTRIBUTION OF FATALITIES PER BOMBING INCIDENT
(BATF data from April 1975 through July 1977)

	Number of Incidents					
	Number of Victims:		One	Two	Three	Four or More
	Zero					Total
Target						
Private Residences	471		34	6	5	2
Commercial Establishments	425		7	1	3	2
Manufacturing Facilities	49		1	0	0	0
Vehicles	396		34	5	0	0
Aircraft	4		0	0	0	0
Schools	156		12	1	1	0
Utilities	54		3	0	0	0
Law Enforcement Agencies	20		2	1	0	0
Government Property	93		4	0	1	2
Transportation Facilities	38		3	0	0	1
Recreation Facilities	159		6	1	1	2
Construction Sites and Equipment	20		0	0	0	0
Other	21		0	0	0	0
Unknown/Premature	510		28	5	3	2
Total	2,436		134	20	14	11
						2,615

Table 12: DISTRIBUTION OF INJURIES PER BOMBING INCIDENT
(BATF Data from April 1975 through July 1977)

Target	Number of Incidents with Property Damage					Total
	None	\$500 or Less	\$501 to \$2,000	\$2,001 to \$5,000	Greater Than \$5,000	
Private Residences	357	92	25	16	28	518
Commercial Establishments	261	50	41	28	58	438
Manufacturing Facilities	34	4	2	3	7	50
Vehicles	259	65	50	21	30	435
Aircraft	3	0	0	0	1	4
Schools	106	44	14	3	3	170
Utilities	30	16	9	3	9	67
Law Enforcement Agencies	17	2	2	1	1	23
Government Property	60	15	9	2	14	100
Transportation Facilities	28	10	3	0	1	42
Recreation Facilities	90	35	12	11	31	179
Construction Sites and Heavy Equipment	9	6	1	0	4	20
Other	15	4	1	1	0	21
Unknown/Premature	410	74	24	11	29	548
Total	1,679	417	193	100	216	2,615
% of Total	64.2	16.0	7.4	3.8	8.2	

Table 13: DISTRIBUTION OF PROPERTY DAMAGE COSTS PER BOMBING INCIDENT
(BATF Data from April 1975 through July 1977)

In order to classify bombing incidents into the two categories, individual incidents for property damage and casualties were examined. The FBI bomb data programs provided information on the attributes of each event in the Monthly Incident Summaries from 1974 through 1976. Sixty "catastrophic" bombings were identified from this data base. This data base was also used to estimate the statistical characteristics such as mean, standard deviation, and time trends.

The FBI "Bomb Summaries" from 1972 through 1976 were used for "normal" bombings. According to these data there were no "catastrophic" bombings in 1972 and 1973.

4.4.2 Predictions for "Normal" Incidents

Normal incident data for each target was fitted to a least-squares straight line and statistical significance tests were used to determine whether the slopes of such lines were significantly different from zero. A statistically significant positive slope indicates a significant upward trend with time and significant negative slope indicates a significant downward trend. As will be shown in the following tables, no significant upward or downward trends were found for most bombing targets.

Tables 14 and 15 present the results of these analyses. Details are given in Appendix 3. Table 14 is based on FBI data for 1972 through 1976, while Table 15 is based on BATF data for April 1975 through July 1977. Only a few targets in Table 14 (those marked with footnotes b or c) show significant upward or downward time trends. In general, there is reasonable agreement between the two data bases for targets for which there are no significant time trends.

The overall assessment of the "normal" bombing threat per year for the next 20 years (based on FBI data) is as follows:

Total predicted number of "normal" explosive bombings	$= \sum_{i=1}^{N_1} (n) = 902$
Total predicted number of attempted bombings	$= \sum_{i=1}^{N_1} (n) = 196$

Target	a/ Predicted Number of Bombings Per Year N_i (n)	Predicted Number of Bombing Attempts Per Year N_i (n)	Predicted Property Damage Per Bombing (1976 K\$ Per Year) A_{11} (n)	Predicted Annual Injury Rate in 100 Bombings (No. of Persons) $100 \times A_{12}$ (n)	Predicted Annual Fatality Rate in 100 Bombings (No. of Persons) $100 \times A_{13}$ (n)
Private Residences	187 ± 20	38 ± 4	5.0 ^{b/}	3.6 ^{c/}	3.0
Commercial Establishments	185 ± 25	36 ± 5 ^{c/}	14.72	13.4	2.0
Manufacturing Facilities	14 ± 4	4 ± 1	36.8 ^{b/}	20.2 ^{b/}	6.3 ^{b/}
Vehicles	110 ± 10	37 ± 6	4.06	2.5 ^{c/}	2.2
Aircraft	1 ± 0.5	1 ± 1	47.5	0	0
Schools	85 ± 6	11 ± 2 ^{c/}	3.84	10.2	0
Utilities	45 ± 10	6 ± 1	3.58	2.2	0
Law Enforcement Agencies	20 ± 4	7 ± 2 ^{c/}	5.07	23.0	3.6
Government Property	68 ± 18 ^{b/}	9 ± 2 ^{c/}	1.50 ^{c/}	6.6	0.4
Transportation Facilities	12 ± 1	7 ± 4	3.52	15.2 ^{b/}	0
Persons	39 ± 4 ^{b/}	32 ± 5 ^{b/}	2.96 ^{b/}	92.0	34.7 ^{b/}
Recreation Facilities	18 ± 3	5 ± 2	0.83	6.8	1.2
Premature	48 ± 1 ^{b/}	0 ±	0.65	98.0	21.5
Construction Sites and Equipment	15 ± 6	1 ± 1	28.45	2.5	0
Other	55 ± 15	1 ± 1 ^{c/}	3.03	21.7 ^{b/}	0.6

a/ The ± values are 90% confidence intervals (refer to Appendix 3 for the calculation of confidence intervals)
b/ Indicates significant linearly increasing trend with time (see Appendix 3); other values are 5-year averages
c/ Indicates significant linearly decreasing trend with time (see Appendix 3); other values are 5-year averages
Note: Sufficient data were available to determine confidence intervals for N_i and N_i' but not the other quantities shown. Conversely, in Table 15 (BATF data), sufficient data were available for confidence intervals for property damage and casualty rates but not for N_i .

Table 14: PREDICTION OF ANNUAL "NORMAL" BOMBINGS FOR THE NEXT 20 YEARS
(FBI Data from 1972 through 1976)

Target	a/b/ Predicted Number of Bombings Per Year N_i (n)	a/ Predicted Property Damage Per Bombing (1976 \$ Per Year) A_{i1} (n)	a/ Predicted Annual Injury Rate in 100 Bombings (No. of Persons) $100 \times A_{i2}$ (n)	a/ Predicted Annual Fatality Rate in 100 Bombings (No. of Persons) $100 \times A_{i3}$ (n)
Private Residences	221	3.278 $\pm$ 2.068	15 $\pm$ 4	2.9 $\pm$ 1.0
Commercial Establishments	185	14.502 $\pm$ 6.336	8 $\pm$ 5	0.9 $\pm$ 0.7
Vehicles	188	1.664 $\pm$ 0.670	10 $\pm$ 3	4.1 $\pm$ 1.8
Schools	72	1.062 $\pm$ 1.218	10 $\pm$ 5	0.06 $\pm$ 0.9
Law Enforcement Agencies	10	0.556 $\pm$ 0.570	17 $\pm$ 16	0
Government Property	43	16.253 $\pm$ 17.010	38 $\pm$ 42	3.0 $\pm$ 2.7
Manufacturing Facilities	21	6.605 $\pm$ 6.260	2 $\pm$ 3	6.0 $\pm$ 9.8
Aircraft	2	2.5 $\pm$ 5.230	0	0
Transportation Facilities	18	0.752 $\pm$ 1.00	7 $\pm$ 6.7 ^{c/}	5.0 $\pm$ 5.0 ^{c/}
Utilities	29	25.259 $\pm$ 0.775	4 $\pm$ 4	3.0 $\pm$ 3.0
Construction Sites and Equipment	8	15.117 $\pm$ 15.80	0 $\pm$	0 $\pm$
Recreation Facilities	78	7.535 $\pm$ 3.557	15 $\pm$ 10	1.1 $\pm$ 1.8
Other	9	0.300 $\pm$ 0.356	0	0
Unknown	236	3.228 $\pm$ 1.840	12 $\pm$ 5	3.1 $\pm$ 1.8
Total estimated number of bombings: Explosions = 1,120; Attempts = 278				
Total estimated injuries per year = 134				
Total estimated fatalities per year = 29				
Total estimated property damage per year = \$6,863,969				

a/ The t_{corr} test shows that no significant increasing or decreasing trends were found. All values are averages over the time period shown. The $\pm$ values are 90% confidence intervals.

b/ Not enough data to be used to calculate the confidence intervals.

c/ Excluding La Guardia Airport bombing of December 29, 1975 which caused 11 deaths and 75 injuries according to BATF data

Note: Reference to Appendix 3, for the calculation of confidence intervals; see note in Table 14

Table 15: PREDICTION OF ANNUAL "NORMAL" BOMBINGS FOR THE NEXT 20 YEARS

Total predicted property damage	$= \sum_i N_i^{(n)} A_{i1}^{(n)} = \$6,157,020$
Total predicted injuries	$= \sum_i N_i^{(n)} A_{i2}^{(n)} = 154$
Total predicted fatalities	$= \sum_i N_i^{(n)} A_{i3}^{(n)} = 28$

4.4.3 Predictions for "Catastrophic" Bombings

By our criterion for "catastrophic" bombings (see section 4.4.1) there were 60 such incidents during 1974 to 1976. This small data base and the arbitrary criterion for separating "catastrophic" bombings from the "normal" ones make statistical judgements difficult. Therefore, one should be conservative in determining if time trends are significant. Observed trends based on a few observations could be misleading when determining if there will be a trend over the next 20 years. Therefore, a high confidence level (99.9%) was used in the significance tests.

As shown in Table 16, only a few targets (those marked with footnotes b or c) show statistically significant upward or downward time trends. These significant trends occur only in the number of bombings and not in any of the other attributes. Note that injury and fatality rates in Table 16 are per bombing and not per 100 bombings as in Tables 14 and 15.

The overall predictions for catastrophic bombings per year (based on FBI data) are:

Number of bombings	$= \sum_i N_i^{(c)} = 20$
Property Damage	$= \sum_i N_i^{(c)} A_{i1}^{(c)} = \$9,272,833$
Injuries	$= \sum_i N_i^{(c)} A_{i2}^{(c)} = 68$
Fatalities	$= \sum_i N_i^{(c)} A_{i3}^{(c)} = 9$

Target	Predicted Number of Bombings Per Year N_i (c)	Predicted Property Damage Per Bombing (1976 \$/Year) A_{11} (c)	Predicted Annual Injury Rate Per Bombing (No. of Persons) λ_{12} (c)	Predicted Annual Fatality Rate Per Bombing (No. of Persons) λ_{13} (c)
Private Residences	1.0	79.9 $\pm$ 32.4 ^{a/}	1.0	1.0
Commercial Establishments	5.0	303.0 $\pm$ 49.6	4.7	0.27
Manufacturing Facilities	1.0	5091.0 $\pm$ 3970.0	1.0	0
Vehicles	0.67	12.2 $\pm$ 3.0	0	0.5
Aircraft	0.67	546.2 $\pm$ 454.3	0.5	0
Schools	0.33	125.3	0	0
Utilities	0.25 ^{b/}	208.2 $\pm$ 53.8	0	0
Law Enforcement Agencies	0.49 ^{b/}	116.7 $\pm$ 43.3	0.17	0
Government Property	3.0	258.0 $\pm$ 46.2	3.4	0
Transportation Facilities	0.67	510.6 $\pm$ 280.6	38.5	7.0
Persons	0.67	261.2 $\pm$ 239.1	7.5	3.0
Recreation Facilities	3.0 ^{c/}	50.6 $\pm$ 12.2	0	0
Construction Sites and Equipment	1.66	291.6 $\pm$ 30.0	0	0
Other	1.33	101.7 $\pm$ 37.3	0.5	0

a/ $\pm$ values are 50% confidence intervals

b/ Significant decreasing time trend at 0.1% significance level

c/ Significant increasing time trend at 0.1% significance level

Table 16: PREDICTION OF ANNUAL "CATASTROPHIC" BOMBINGS FOR THE NEXT 20 YEARS
(FBI Data from 1974 through 1976)

4.4.4 Total Predicted Threat ("Normal" and "Catastrophic")

The prediction of the expected annual frequency and magnitude of "normal" bombings and the prediction of the expected annual frequency and magnitude for "catastrophic" bombings can be combined to obtain the total threat prediction by summing the figures for the two categories. The prediction of the expected overall annual frequency and attributes and their 90% confidence range (i.e., 90 times out of 100 predicted value will fall within this range) are as follows (based on FBI data):

<u>Threat Category</u>	<u>Predicted Value^{a/}</u>	<u>90% Confidence Range</u>
Annual Bombing Frequency	$902 + 20 = 922$	± 244
Annual Property Damage in M\$ (1976 \$)	$\$6.15 + 9.27 = 15.43$	± 8.77
Annual Injuries	$154 + 68 = 222$	± 82
Annual Fatalities	$28 + 9 = 37$	± 15

a/ First column is for "normal" incidents; second column is for "catastrophic" incidents

4.4.5 Comparison Between Model Prediction and the Actual Data in 1977

Confidence in the proposed threat model can be gained by comparing predicted data with actual 1977 bombing data. If the actual data lies within reasonable confidence bounds of the predicted values, the model should be accepted as predicting 1977 bombings adequately. If the observed data is outside the 90% confidence bounds, the predictive value of the model becomes questionable.

Table 17 shows the predicted bombing threat, based on FBI data, under the assumption that

- 1 Attacks on all targets have the same rate of occurrence

or that

- 2: Attacks on different targets have different rates of occurrence

as discussed in sections 4.4.2 through 4.4.4. Comparison of the predicted values with preliminary year-end BATF data for 1977 (last two rows) appears to favor assumption (2), particularly so if catastrophic bombing history is not used in making the prediction. The following tabulation illustrates this agreement:

	Actual 1977 Data	Predicted Data
Number of Bombings	968	922 $\pm$ 244
Property Damage	\$5,900,000	\$6,157,020 $\pm$ \$2,406,463 ^{a/}
Injuries	128	154 $\pm$ 82 ^{a/}
Fatalities	26	28 $\pm$ 15 ^{a/}

a/ Excluding "catastrophic" bombings

	Number of Bombings	Number of Bombing Attempts	Property Damage (In 1976 Dollars)		Injuries		Fatalities	
			Total	Excluding Catastrophic Bombings	Total	Excluding Catastrophic Bombings	Total	Excluding Catastrophic Bombings
1972	744	237	-	-	-	-	-	-
1973	742	253	5,346,742	-	138	-	18	-
1974	893	236	6,653,434	4,398,434	166	140	22	19
1975	1,088	238	24,896,292	6,418,542	273	153	45	30
1976	852	188	8,892,500	2,503,500	176	142	39	34
Direct Prediction (Per Year) ^{a/}	858	230	11,447,242	4,440,159	188	145	52 ^{d/}	43 ^{d/}
Model Prediction (Per Year) with 90% Confidence Range ^{c/}	922 ± 244	196 ± 41	+15,429,853 - 8,768,491	+6,157,020 - 2,406,463	222 ± 82	154 ± 82	37 ± 15	28 ± 15
Actual Data for 1977	968	299 ^{b/}	-	5,900,000	128	-	26	-

a/ Averages over the time period shown except for fatalities

b/ The figure is taken from the "non-detonation" category in the BATF tape file, which includes not only attempted bombings but also a large number of BATF "undercover buys" of explosive devices

c/ See section 4.4.3

d/ Significant increasing trend at a 5% significance level

Table 17: COMPARISON BETWEEN MODEL PREDICTIONS AND ACTUAL DATA FOR 1977

5.0 EFFECTIVENESS OF TAGGING PROGRAMS

In principle, an effective system for detecting explosive devices appears to be much more beneficial than a system that helps arrest the perpetrator of a bombing that has already been committed. The former prevents a bombing if the detected device is disarmed before it explodes. The latter only prevents and/or deters some future bombings. In practice, however, expectations are that the identification tagging program will be considerably more effective in reducing the overall criminal explosive threat than the detection tagging program, even if cost considerations (which favor identification tagging) are omitted. The main reason for this expectation is the very low probability of having a detection device near enough to a bomb before it explodes. Clearly it is impossible to monitor continuously all potential bombing targets; particularly so since at present there is some question about the portability of detection equipment. However, for selected highly important or highly vulnerable targets, with controlled access to the general public, detection tagging can be effective. Thus, it is anticipated that detection tagging, at best, will result in very few bomb findings, but some of these bombs may have generated catastrophically costly explosions had they not been detected and disarmed.

It should be noted that most bombing investigators feel that the majority of bombs now found before they explode are not found because of diligent searches, but because they have malfunctioned and may have been lying around for a considerable time before they are detected. Although these malfunctioned devices are still potentially dangerous, finding them via detection tagging (or by any other means) contributes only marginally to the overall reduction of the criminal explosive threat.

Identification tagging, on the other hand, will leave identifiable material that survives detonation and this material may provide valuable clues in the search for the perpetrators. Of course, the main benefits of identification tagging are realized

only after a bombing has been committed. Nevertheless, its role in preventing future bombings is expected to outweigh the anticipated reduction in bombings resulting from bomb detection prior to explosion. Furthermore, as will be shown in section 6.2.3, the projected cost benefits of detection tagging are smaller than those for identification tagging.

5.1 Operational Scenarios

The expected benefits of explosive tagging are best illustrated by a series of scenarios. Although these scenarios are hypothetical, they describe operational conditions for which post-explosion identification and pre-explosion detection may function effectively. Three types of scenarios will be presented:

- Scenarios for post-explosion identification of tagged explosives
- Scenarios for pre-explosive detection of tagged explosives
- Scenarios for pre-explosion detection of untagged explosives.

5.1.1 Scenarios for Post-Explosion Identification

5.1.1.1 Scenario I

A violent explosion destroys a meat storage locker. There are fatalities, injuries and extensive property damage. No identifiable explosive residues, blasting cap wires, timing mechanisms, etc. are found. There are no craters or fragment patterns on surviving structures or fixtures. The locker facility contained both natural gas and ammonia (refrigerant) pipes, the latter at elevated pressure.

The above conditions suggest that this catastrophe is a gas explosion that is accidental rather than deliberately initiated. The evidence, however, is circumstantial and certainly not fool-proof.

Now if some identification taggants were recovered in the debris of this explosion, then in spite of the circumstantial evidence it would be established that this explosion was the result of a deliberate criminal act. Conversely, absence of taggant would support the accidental explosion hypothesis. However, it should be realized, absence of taggant per se does not conclusively prove an accidental explosion. It is conceivable, though unlikely in view of the evidence found, that the gas explosion was initiated by military explosives, home-made explosives or cap-sensitive explosives made before identification tagging was implemented.

Proof of the presence of explosives is crucial to whether or not law enforcement agencies start a criminal investigation. It is important to make this decision to investigate as promptly as possible.

5.1.1.2 Scenario 2

Several explosions in a coal-mining region occur within a fairly localized area over a relatively short period of time. Recovered taggants from all these explosions show that these explosives came from a local distributor who has experienced no thefts or losses in the past year. These particular explosives are used in only three mines in the area. Clearly there is explosive "leakage" from some, or all, of these three mines. Law enforcement agencies thus have a very good lead to someone who is doing the bombing or else someone who is illegally selling or providing explosives to the bombers. Furthermore, they have a strong case for making mine management improve their control over the amount of explosive actually consumed in their mining operations.

5.1.1.3 Scenario 3

Several explosions occur in a short period of time in widely separated locations. Recovered taggants show that the explosives used in these bombings came from a single distributor whose magazine had been burglarized recently. The widely separated locations of the bombings and the single source of explosives are strong indications that a group of criminals rather than one individual is doing the bombing. Law enforcement personnel can now concentrate on investigating the magazine burglary and look for a group of criminals; e.g., organized crime, terrorists, etc. Also, because of the established interstate character of the bombings, Federal agencies can assume responsibility for the investigations if they so desire.

5.1.1.4 Scenario 4

The evidence collected in the debris from a bombed car and the structural damage to the car indicate that a high velocity explosive was used. No taggant was found, but recovery of a segment of blasting cap leg wires provides strong evidence that this was a detonation of a cap-sensitive explosive. This bombing occurred in a city located in an area where little or no explosive is used for mining, road construction, etc. A check of the nearest explosive distributors established that most of their stock of cap-sensitive explosives was tagged. There were no recent thefts of explosives. All of the above suggests that the explosive used in this bombing was a military explosive. This gives law enforcement personnel a good starting point for their investigation. They can concentrate on potential suspects that can have access to military explosives.

5.1.1.5 Scenario 5

A school that has recently been integrated is bombed. Recovered taggants quickly establish the type of explosive used but unfortunately this explosive has several local distributors and many legal sales. A rabid anti-integrationist farmer had actually made threats against the school and is a prime suspect. This farmer was known to have used dynamite for stumping. A warrant was obtained to search his house and several sticks of dynamite of the exact type used in the bombing were found. Law enforcement agencies now have a case to hold this suspect and bring him to trial. The speed with which the explosive was identified is an important aspect of this case. It did not allow the criminal enough time to cover his trail or go into hiding without bringing further suspicion upon himself.

5.1.1.6 Scenario 6

A cache of dynamite is found by a law enforcement agency. Whoever was hiding the dynamite had carefully removed the date/shift code from the box containing the dynamite and from the individual sticks. No thefts of explosive had been reported in the general vicinity of the recovered cache. Without identification tagging, law enforcement personnel would have no lead as to the source of the dynamite. With identification tagging this dynamite could be traced to its last legal possessor or possessors and investigation could start there. At the very least, this information can be used to determine whether the theft of this dynamite, if indeed it was stolen, had been properly reported.

5.1.1.7 Scenario 7

The sheriff of a rural county does not like to cooperate with BATF or FBI. There are no legitimate blasting activities in this county and no legitimate explosive storage facilities. Bombings have occurred sporadically because of labor unrest. Although the sheriff usually requests BATF assistance after a bombing he is loath to hand over jurisdiction to BATF personnel. Recovered taggants in these bombings show that the explosive in these bombings came from magazines in a neighboring state where mining activity is heavy. Because the explosives involved crossed a state line, BATF can assume jurisdiction in these bombings if it so desires.

5.1.1.8 Scenario 8

A small underground coal mine experiences a coal dust explosion. There are casualties and considerable damage. During the post-accident investigation taggants are found near the last pre-accident shot area that definitely establish detonation of a non-permissible dynamite. In inspecting the mine's explosive storage magazine investigators found several cases of non-permissible dynamite which mine management claimed to be used solely for above-ground blasting. However, the grade, manufacturer and lot of the stored non-permissible dynamite match exactly that obtained from analysis of the recovered taggants. This information goes a long ways towards establishing accident cause and accident liability.

5.1.2 Scenarios for Pre-Explosion Detection of Tagged Explosives

5.1.2.1 Scenario 1

A terrorist group has threatened to bomb the Senate Chambers. The manner in which the threat was delivered and its contents suggest that it is a real threat rather than a "crank call." Consequently, security personnel install "sniffers" to continuously monitor all entrances to the Senate Chambers and adjoining rooms. As an extra precaution, all packages, briefcases, etc., brought into the chambers or adjoining rooms, are to be passed through a reduced pressure chamber to enable a detector to "sniff" air samples that are taggant enriched provided any of these packages do contain blasting caps.

5.1.2.2 Scenario 2

The President is to speak before a large audience in an auditorium. Secret Service agents equipped with explosive "sniffers" thoroughly search the auditorium and surroundings. Tent-like structures are set up at each of two entrances to the auditorium through which the audience has to pass to enter the auditorium. Controlled air-flow within these entrance-ways greatly enhances the probability of detecting explosive taggants emanating from bombs that anyone might be trying to carry into the auditorium.

5.1.2.3 Scenario 3

An individual is suspected of clandestinely transporting explosives in his car. However, there is insufficient evidence to obtain a search warrant. A state highway patrol car is assigned to "tail" the suspected car. The suspected car is stopped for some justifiable traffic violation or warning. A "sniffer" operated

outside the suspected car by the highway patrol officer positively detects blasting cap taggant vapors. The officer can immediately arrest the individual for the illegal transportation of explosives (no placards, fire-extinguishers, etc.).

5.1.2.4 Scenario 4

A bomb threat is received via telephone by a plant where many people are engaged in electronic assembly work. Bringing in bomb dogs to determine whether the threat is real or a crank call may seriously and unnecessarily disturb the workers in the room. A "sniffer" device may be able to make this determination quite inconspicuously without creating any unnecessary disturbance.

5.1.2.5 Scenario 5

The home office of a large oil company received a telephoned threat stating that a bomb will go off in its building in one hour. Company security personnel decide that the threat is real and not a crank call. The building is evacuated. A visual bomb search is started immediately and the local bomb squad is called in. The bomb squad's detection equipment indicates that a package left inside a paper-towel dispenser in one of the restrooms probably contains an electric blasting cap. The bomb squad therefore treats this package as a live bomb and starts its standard disarming procedures. The device, upon being rendered safe, is determined to be a bomb consisting of six sticks of dynamite, an electric blasting cap and a clock-and-battery delay mechanism.

5.1.2.6 Scenario 6

Baggage to be loaded on airplanes at a busy airport is placed on a conveyor belt that passes through a tunnel in which air pressure is below atmospheric. The air in the tunnel is continuously monitored by taggant vapor detectors. Detection of taggant vapor automatically stops the conveyor and rings an alarm. A portable "sniffer" can then be used to examine individual suitcases in order to determine which one contains an explosive device.

5.1.2.7 Scenario 7

Similar circumstances to those described in Scenario 6 except that people rather than baggage are examined with a sniffer as they enter the boarding areas through controlled access entries. Obviously reduced pressure cannot be used here.

5.1.2.8 Scenario 8

Entrances to a nuclear reactor are via long hallways. Air circulation in these hallways is such that taggant detectors can effectively and continuously monitor the atmosphere in the hallways. Detection of taggant automatically seals off the hallway and rings an alarm.

Note: Three of the eight scenarios above require portable detection systems. At present there still are technical problems to be solved before detection systems can be fully portable.

5.1.3 Scenarios for Pre-Explosion Detection of Untagged Explosives

5.1.3.1 Scenario 1

Equivalent to Scenario 6 for tagged detection but presently limited solely to the detection of nitroglycerine dynamites and possibly TNT.

5.1.3.2 Scenario 2

Equivalent to Scenario 1 above but using dual-energy tomograph for detection (see section 4.1, item 10). In this system reduction of air pressure is not necessary and it is applicable to most explosives rather than nitroglycerine dynamites or TNT. Obviously this scheme is limited to checking baggage and packages since people cannot be exposed to the radiation of the tomography system.

5.2 Effectiveness Estimates

The fundamental criterion by which the effectiveness of the tagging program can be judged is the reduction that it produces in criminal bombings. Since neither the identification tagging nor detection tagging programs have been implemented, there is no "track record" on the degree of reduction of criminal bombings that they can generate. Indeed the technology of detection tagging is still in the developmental stage. Thus, at least as far as detection tagging is concerned, we have the unenviable task of determining the effectiveness of a system for which there is no track record and maybe not even a system.

Because of the lack of any "hard" data we must resort to analogy, inference and even oracular opinion. However, the situation is not as bleak as it may appear at first glance. We cannot expect to estimate program effectiveness with pin-point accuracy and absolute certainty but, as shown below, one can develop plausible estimates whose confidence limits are not ridiculously broad.

5.2.1 Effectiveness of Identification Tagging

Effectiveness experience with date shift code markings on dynamites and slurries may provide some insight into the effectiveness of identification tagging. In 19 of the 58BATF records we obtained there was at least one conviction per record. However, it could not be determined that the conviction was a direct consequence of the date shift code tracing of the explosive. A subjective evaluation of the significance of these records is shown below:

<u>Type of Incident</u>	<u>Number of Incidents</u>	<u>Number of Incidents Checked*</u>	<u>% Useful</u>	<u>% Question-able</u>	<u>% Not Useful</u>
Bombing or Attempt	10	5 (2)	40	10	50
Thefts, Recoveries and Seizures	40	10 (3)	35	18	47
Undercover Buys	5	-	20	20	60
Other**	3	- (1)	0	33	67

* By examining their UI files; numbers in brackets refer to additional incidents found in the BATF tapes

** Hoax; bank robbery; killing contract

Note that in roughly one-quarter of these records (those "checked") we obtained confirmation about the type of incident and its degree of usefulness by examining its UI folder. According to the above tabulation the upper limit for the overall date shift code effectiveness is $19/58 = 33\%$ and for bombing and attempts it is $4/10 = 40\%$. Thus, we can set one-third (33.3%) as a high upper limit for the arrest rate (in bombing cases conviction rate is probably larger than three-fourths of the arrest rate) for bombing incidents after the identification tagging program is implemented. It is noteworthy that the current arrest rate in firearms cases (firearms bear serial numbers that can be traced to the last legal owner) is about 28% which is quite comparable to the 33% estimate made above.

Actual case histories in which explosive tracing was indeed helpful are summarized in Appendix 10. As discussed in section 4.1.1, we contacted BATF and police department bomb investigators throughout the country. These bomb investigation experts provided us with their best guesses as to how much bombing arrests will increase after the identification tagging program is implemented. Ten such "oracles" were contacted (six BATF agents and four police department bomb experts). Their average predicted increase in bombing arrests is about 1.5-fold, ranging from no increase to a 2.5-fold increase.

The average annual arrest rate for bombings and attempted bombings for the period April 1975 through September 1977 (BATF data) is about 8%. There are compensating factors which may make this figure realistic. The BATF data includes "undercover buys" of explosive devices under attempted bombings. Arrest rates for undercover buys are expected to be rather large. On this basis, the 8% arrest rate figure for bombings and attempts will be high. However, the number of arrests in the BATF data bank is lower than the actual number of arrests because their data bank is primarily based on early reports of bombings and not necessarily updated for later arrests. This trend tends to counteract the effect of including undercover buys in bombing attempts.

If we accept a current 8% arrest rate for bombings and attempts, then a 1.5-fold increase in arrests after implementation of identification tagging results in a 12% arrest rate which is still substantially lower than the upper limit of about 33% based on date shift code and firearms experience. Thus, a 1.5-fold increase in arrests is probably a fairly conservative estimate - even a 2-fold increase in arrests appears to be quite plausible.

The effect of identification tagging on deterring future bombings is much more difficult to estimate than its effect on arrest rates. Little or no pertinent data exist and any such data may be so dependent on psychological theory and dogma as to have little objectivity.

Airplane hijacking in this country has virtually stopped after metal searches and hand baggage x-rays were instituted at all U. S. airports. Here the deterrent effect appears to be very large. At the other extreme is the deterrent effect of arrest rates on homicides. Depending on which study one accepts this deterrent rate ranges from zero to about 7% annually (see Appendix 4).

Probably new bombers (those who have not bombed before but are thinking about it) will be deterred to a greater degree than "habitual" bombers, and "crime-of-passion" bombers may not be deterred at all. With all this uncertainty it is best to be conservative and assume that the annual deterrence rate of identification tagging will not exceed 5%; i.e., less than one in twenty bombers will stop bombing because they fear that the tagging system won't let them get away with it.

Tagging should also decrease explosive thefts via increased arrests and fear of arrest. However, this effect may not be felt as a reduction in bombings for many years since criminals appear to possess large stocks of explosives.

A rough estimate of the amount of cap-sensitive explosives now in possession of criminals is presented in Table 18. The data shown are taken from the BATF tape for April 1975 through September 1977. There are many difficulties in the interpretation of these results. For example, some of the "recovered" explosives may have been stolen in the years prior to 1975, and certainly some of the recoveries were of abandoned rather than stolen explosives. It is also likely that a substantial quantity of stolen explosive is never reported. All these considerations tend to under-estimate the amount of explosive now in criminal hands. On the other hand, some of these explosives could have been lost or have deteriorated or never reached a bomber. Considerable uncertainty is also introduced by the "each" category of the BATF tape. This category gives the number of items without specifying their weight. Nevertheless, within wide limits of uncertainty, criminals now appear to have sufficient explosive stocks for about five to six years of bombing at the rate of 1000 bombings per year and three pounds of explosive per bomb.

<u>Cap-Sensitive Explosives</u>	<u>Stolen (Pounds)</u>	<u>Recovered (Pounds)</u>	<u>"Seized" (Pounds)</u>	<u>Net[*] (Pounds)</u>
Dynamite	99,746	75,041	2,677	22,028
Slurries	1,270	705	-	565
Military	369	1,302	920	-1,853
Primers	<u>16,110</u>	<u>35,024</u>	<u>-</u>	<u>-18,914</u>
Total	117,495	112,072	3,597	1,826
	<u>("Each")</u>	<u>("Each")</u>	<u>("Each")</u>	<u>("Each")</u>
Dynamite	28,222	1,848	45	26,329 + 13,165 Lbs. ^a
Slurries	-	-	-	- -
Military	261	164	47	50 + 50 Lbs. ^b
Primers	<u>24,193</u>	<u>13,609</u>	<u>7,222</u>	<u>3,362 + 1,121 Lbs.^c</u>
Total	52,676	15,621	7,314	29,741 + 14,336 Lbs
	<u>(Feet)</u>	<u>(Feet)</u>	<u>(Feet)</u>	<u>(Feet)</u>
Primers	333,673	113,386	26,465	193,822 + 1,108 Lbs. ^d
GRAND TOTAL				17,270 Pounds

* Net = stolen minus recovered minus seized

a/ Assumed "each" represents a 1½ x 8" stick dynamite weighing about ½ pound

b/ Assumed "each" represents a one pound block of TNT or Comp B

c/ Assumed "each" represents a one-third pound booster

d/ Assumed to be 40 grain/foot detonating cord

Table 18: ESTIMATE OF THE AMOUNT OF CAP-SENSITIVE
EXPLOSIVES NOW POSSESSED BY CRIMINALS

5.2.2 Effectiveness of Detection Tagging

Obviously every bomb found and disarmed before explosion results in a direct decrease in the criminal explosives threat. Unfortunately, very few bombs can be expected to be found because the probability of having a bomb and a detection device in the same location at the same time is very low. Thus, we expect detection tagging to be rather ineffective as far as the overall explosive threat is concerned. However, it can be beneficial for specialized applications such as airport baggage searches, VIP protection and safeguarding of nuclear facilities.

The only information on the potential effectiveness of detection tagging comes from the bomb experts that we consulted. Only two of ten investigators thought detection tagging would aid their investigations, but all agreed that it would be a valuable tool for the FAA. Only two investigators ventured to place any quantitative value on detection tagging. One of them thought implementation of detection tagging would increase arrests by 10% and the other thought that there would be zero increase in arrests.

Detection tagging could have some deterrent value - certainly for potential targets that are publicized to have continuous detection monitoring. All but the stupidest of bombers will realize that most targets are not protected by detection devices. Thus, the overall deterrent effect of detection tagging is expected to be very small. At present it is impossible to assign quantitative values to the effectiveness of detection tagging. Our guesses, and these are probably optimistic guesses, are: 10% increase in annual arrest rate, 2% increase in annual deterrence rate, 2% more bombs found each year before they explode.

5.2.3 Effectiveness of Untagged Detection

The present systems are expected to be even less effective than the detection tagging system, primarily because of greater chance of false alarms. For example, electron capture detection systems that are capable of detecting vapors emanating from dynamites may also be triggered by cigarette smoke, vapors from shoe polish, etc.

In addition to dual-energy tomography, other schemes for detecting untagged explosives have been considered; e.g., detection of natural vapors emanating from explosives or characteristic electrical properties of explosives. To date none of the schemes appear to be very promising.

6.0 COST-BENEFIT ANALYSIS

Cost-benefit analysis relates the cost of a project to the reduction in social costs realized by the project. A convenient and frequently used end-product of such an analysis is the so-called benefit/cost ratio. Basically, this ratio is the reduction in social costs (benefits) realized by the project over a fixed number of years (customarily 20 years), divided by project costs over the same time period. Both benefits and costs occurring at different times in the future have to be "discounted" because money spent or gained today is "worth" more than money spent or gained several years from now. The "discount factor" is determined by current interest rates and the expected inflationary impact on these interest rates. Since the discount factor is applied to both costs and benefits, which are relatively constant over time, the actual value of the discount factor used has relatively little effect on the benefit/cost ratio. Thus, we are mainly concerned with the ratio of project benefits divided by project costs. If this ratio is substantially greater than one, the project is economically worthwhile. Obviously, if costs are low and benefits are large, the benefit/cost ratio will be favorable; i.e., larger than unity. It is important to realize that a project which is very effective in reducing social costs may still have an unfavorable benefit/cost ratio because projects costs are too high. For example, if social costs before the project is implemented are 100 million dollars and project costs are 95 million dollars, then even for a project that is 90% effective the benefit/cost ratio is $\frac{0.90 \times 100}{95} < 1$.

Generally, it is easier to estimate the costs of a project than the benefits that it will realize. This is particularly true of the explosive tagging program, for which there is no closely analogous past experience upon which cost-benefit analysis can be based. The lack of past experience necessitates the development of a cost-benefit model that is rather general but still based primarily on variables that can be assigned quantitative values.

6.1 Methodology

It is obvious that precise prediction of the controlling variables is not possible prior to gaining at least some experience of the effectiveness of the tagging program. What can be done is to construct a model in which cost benefits are presented in parametric form. Currently available best estimates of the controlling variables can then be used to obtain the best currently available estimate of the costs and benefits. The parametric model will provide increasingly more accurate cost-benefit estimates as more information on the effectiveness of the tagging program becomes available.

6.1.1 Qualitative Discussion

The controlling variables chosen to measure the effectiveness of the tagging program are:

1. Arrest rate
2. Deterreny rate
3. Bombs detected prior to explosion.

The first two variables are attributes of both the identification and detection tagging programs, while the third variable is strictly an attribute of detection tagging. The degree to which identification tagging or detection tagging contribute to arrest rate or deterreny is not known. However, it is expected that identification tagging will affect these variables to a considerably greater extent than detection tagging. Fortunately, the overall cost benefits depend only on the total increase in the arrest rate or deterrent effect of both identification and detection tagging. To obtain the cost benefits of either identification or detection tagging separately will, however, require estimates of the degree of contribution of each.

The quantitative cost-benefit model to be developed below is based on the following assumptions:

1. The pre- and post-program social costs of bombings are directly proportional to the number of pre- and post-program bombers.
2. The yearly arrest rate and deterrence effect remains constant from year to year after the tagging program is implemented. Actually, all that is required is that an appropriate average arrest rate and deterrence effect be defined for the duration of the program.
3. The arrest rate is substantially equivalent to the conviction rate; i.e., once bombers are arrested they are permanently removed from the bombing population.*
4. The model incorporates a conclusion reached in section 4.4 that the projected social costs of bombings (without the tagging program) will stay constant over the next 20 years.

In the model we must consider "habitual" bombers (those that bomb more than once) and "one-time" bombers separately, because one-time bombers are obviously unaffected by arrest rates since, by definition, they have already bombed and will bomb no more. We must also make allowance for the possibility that the tagging program will reduce direct and indirect bombing costs unequally. Direct bombing costs consist of casualty costs and property damage, while indirect costs include the costs of investigation, evacuations, security, etc.

* Some allowance for recidivism can be made by adjusting the average increase in arrest rate.

6.1.2 Quantitative Cost-Benefit Model

The first steps in developing the model involve the selection of appropriate symbols to be used in the standard formulae of cost-benefit analysis. This is done below.

Benefit/cost ratio	= β
Social cost of program in t^{th} year	= C_t
Social benefit of program in t^{th} year	= B_t
Social cost of "direct" bombing threat in t^{th} year	= T'_t
Social cost of "indirect" bombing threat in t^{th} year	= T''_t
Total social cost of bombing threat in t^{th} year	$T_t = T'_t + T''_t$
Discount factor	= ϕ_t
Effective annual interest rate	= r
Number of years	= τ

The benefit/cost ratio is then defined as follows:

$$\beta = \frac{\sum_{t=1}^{\tau} \phi_t B_t}{\sum_{t=1}^{\tau} \phi_t C_t} \quad (1)$$

$$\phi_t = (1+r)^{-t} = e^{-pt} \quad (2)$$

where $p = \ln(1+r)$.

The crux of the model is the quantitative definition of the program benefit B_t in terms of variables that can be assigned numerical values. To simplify the development of a quantitative expression for B_t , we will derive separately equations for B_h and B_s , the annual benefits to be obtained from the reduction of the number of habitual* and one-time bombers, and combine these terms

* Bombers who have bombed previously and will continue to bomb

with B_f , the benefits generated via finding bombs through detection tagging. We also need to define an additional set of symbols:

Average bombing cost per bomber	= c
Number of bombings per active habitual bomber per year	= h
Number of habitual bombers per bombing	= z
Number of active habitual bombers <u>before</u> tagging program is implemented	= N
Number of active habitual bombers <u>after</u> tagging program is implemented	= N'
Influx rate of new habitual bombers*	= g
Fraction of bombings <u>before</u> program for which there is at least one arrest	= a
Fraction of bombings <u>after</u> program for which there is at least one arrest	= na
Deterrent rate of program on habitual bombers (dimensions: 1/time)	= δ
Fraction of new habitual bombers-to-be deterred by program	= σ
Social cost of bombings by habitual bombers	= T_h
Social cost of bombings by one-time bombers	= T_s

With these variables the following differential equations (see Appendix 5 for details) give the program's cost benefits generated solely by its increased arrest rate and deterrent effect on habitual bombers. The net rate of increase of the number of active habitual bombers is equal to the new bombers that are not arrested minus the number of arrests of the active habitual bombers. Thus, before the program:

$$\frac{dN}{dt} = -ahzN + (1-a)g \quad (3)$$

* Bombers who have not bombed previously but will bomb more than once

and after the program:

$$\frac{dN'}{dt} = -[nahz + \delta]N' + (1-na)(1-\sigma)g \quad (4)$$

In both these equations the terms $ahzN$ or $[ahz + \delta]N'$ represent the removal rate of bombers and the terms $(1-a)g$ or $(1-na)(1-\sigma)g$ represent the net influx rate of new bombers. Note that n , a and σ are dimensionless, while ahz and δ have the dimensions of inverse time.

The projected social costs of bombings (without tagging program) are approximately constant from year to year. This implies that there is no time variation in the number of bombers and that $\frac{dN}{dt} = 0$.* This condition determines that

$$g = \frac{ahzN_0}{1-a}$$

where N_0 is the number of active bombers before the program is implemented.

Equation (4) can be written as

$$\frac{dN'}{dt} = -AN' + D$$

where

$$A = nahz + \delta$$

and

$$D = (1-na)(1-\sigma)g = (1-na)(1-\sigma)\frac{ahzN_0}{1-a}$$

* We need not restrict our model to $\frac{dN}{dt} = 0$. For $\frac{dN}{dt} = f(N)$ the algebra becomes considerably more cumbersome, but analytical solutions were obtained. Sample calculations showed that there is very little difference in computed benefits with $\frac{dN}{dt} = 0$ or $\frac{dN}{dt} = f(N)$.

Details of the solution of equation (4) and the subsequent algebraic manipulations are shown in Appendix 5. They lead to:

$$B_h(t) = T_h [(1 - e^{-(\alpha + \delta)t})] [1 - \frac{(1 - \sigma)(\alpha + \delta a)}{\alpha + \delta}] \quad (5)$$

where the new variable $\alpha = ahz$ and T_h is the social cost of bombings by habitual bombers.

Inclusion of the discount factor θ_t (see Appendix 5 for details) leads to:

$$\sum_{t=1}^{\tau} \theta_t B_h = T_h [1 - \frac{(1 - \sigma)(\alpha + \delta a)}{\alpha + \delta}] [\frac{1 - e^{-p\tau}}{p} - \frac{1 - e^{-(p + \alpha + \delta)\tau}}{p + \alpha + \delta}] \quad (6)$$

Equation (6) gives the cost benefits that are realized over a period of τ years because of the increased arrest rate and deterrent effect on bombers that bomb more than once. We must also take into account the costs and program benefits attributable to one-time bombers. By definition, the social costs of one-time bombers are not directly affected by arrest rates; i.e., they have already bombed and will bomb no more whether or not they are arrested. However, they can be deterred by the program. Thus, if v is the number of one-time bombers before the program, $T_s = ch'z'v$ where T_s is the social cost of one-time bombings, h' is the number of bombings per year per one-time bomber (equals one by definition), and z' is the number of one-time bombers per bombing. After the program, the social cost, T_s , becomes $T'_s = ch'z'(1 - \sigma')v$, where σ' is the fraction of one-time bombers deterred by the program, and $\Delta T_s = B_s = ch'z'v\sigma'$, but $ch'z' = T_s$, therefore B_s is simply $\sigma'T_s$ and

$$\sum_{t=1}^{\tau} \theta_t B_s = \sigma'T_s \sum_{t=1}^{\tau} \theta_t \quad (7)$$

We must further consider the benefits to be derived from detecting bombs before they explode. Let f be the fraction of bombs detected (before they explode) as a direct result of the

detection tagging program. Then the benefit B_f , attributable to pre-explosion detection is simply

$$B_f = f(T_h + T_s)$$

and

$$\sum_1^T \theta_t B_f = f(T_h + T_s) \sum_1^T \theta_t \quad (8)$$

It is probable that direct and indirect social costs of bombings will be affected somewhat differently by the tagging program. It is to be expected that in the first few years of the program, indirect costs are likely to be reduced to a lesser degree than direct costs. For example, investigative costs, court costs and incarceration costs may actually increase because the better investigative clues provided by the tagging program lead to more investigations, more arrests and more convictions. For some years after program implementation, the cost of security guards is also likely to be unchanged since only a very minor portion of their time is truly bomb-devoted. Of course, direct costs (fatalities, injuries and property damage) will be directly reduced by the increased arrest rate and deterrent effects of the program.

In view of the above considerations, we might apportion somewhat different benefits for direct and indirect social costs. This is conveniently done by assigning a factor θ , $0 < \theta < 1$, to the indirect cost terms in equations (6), (7) and (8). For example,

$$T_h = T_h + \theta T_h''$$

Also,

$$T_h = x(T' + \theta T'') \text{ and } T_s = (1-x)(T' + \theta T''),$$

where x is the number of habitual bombers divided by the number of all bombers (habitual plus one-time).

Finally, by combining equations (6), (7) and (8), we obtain the overall cost benefit of the program:

$$\sum_1^T \theta_t B_t = x(T' + \theta T'') \left[1 - \frac{(1-\sigma)(\alpha + \delta a)}{na + \delta} \right] \left[\frac{1 - e^{-p\tau}}{p} - \frac{1 - e^{-(p+na+\delta)\tau}}{p+na+\delta} \right] \\ + (1-x)(T' + \theta T'') \sigma \sum_1^T \theta_t + (T' + \theta T'') f \sum_1^T \theta_t \quad (9)$$

provided that $\sigma = \sigma'$.

As shown in Appendix 5, for the limiting conditions of $\sigma = 1$ or $f = 1$, that is all bombers are either deterred or all bombs are found prior to explosion, equation (9), for $\tau = \infty$, becomes:

$$\sum_1^T \theta_t B_t = (T' + \theta T'') \sum_1^T \theta_t$$

which is the expected result since all bombings have ceased.

For the other limit conditions of $na = 1$ and $\delta = f = \sigma = 0$ and $\tau = \infty$, equation (9) becomes:

$$\sum_1^{\infty} \theta_t B_t = (T' + \theta T'') (1-a) \sum_1^{\infty} \theta_t$$

This somewhat unexpected result shows that it is more effective to deter bombers than arrest them because "habitual" bombers, by definition, have to commit at least one bombing before they are arrested!

6.2 Cost Data

As outlined in sections 6.0 and 6.1, necessary input data for our cost-benefit analysis are the overall projected bombing threat costs and the costs of the tagging and detection programs. The societal costs of the bombing threat consist of direct and indirect costs. Direct costs include property damage and casualty costs. Indirect costs consist of costs of bombing investigations; costs of judicial proceedings against arrested bombers; costs of incarceration of convicted bombers; costs of security guards added to

security staffs because of bombings; costs of loss of business or production because of bombings. Program costs consist of taggant costs; equipment costs for introduction of taggants; record keeping costs; and costs of detection equipment.

6.2.1 Direct Costs

The 20-year projections of section 4.4 provide the expected annual property damage costs and the expected number of annual bombing casualties. The casualties have to be converted into dollar figures. The rationale (cold-blooded though it may seem) for assigning three-quarters of a million dollars for each fatality is given in Appendix 6. On the basis of information obtained from the FBI Monthly Summaries for 1976, projected injuries were divided into four categories: minor, requiring hospitalization, severe, and disabling, as shown in Appendix 7. These, as well as property damage and fatality costs, are shown in Table 19. Because of uncertainties in projection and assignment of dollar values the total direct cost of 51 million dollars shown in Table 19 will be rounded off to 50 million dollars which is the figure that will be used in most of the cost-benefit analyses.*

6.2.2 Indirect Costs

As will be shown, the largest portion of indirect bombing cost is cost of investigation followed by the cost of evacuations and added security guards. Accurate information on indirect bombing costs is unavailable. Below we present the best estimates available for the annual costs of:

* As discussed in section 4.1.2, it is estimated that only about two-thirds of all bombings are reported and appear in bombing statistics. Consequently, in some of our analyses we will use $4/3 \times 50M\$ = 67M\$$ as the direct bombing cost.

<u>Direct Costs</u>		<u>M\$ Yearly</u>
Property Damage		15.0
40 Fatalities at 3/4M\$ Each		30.0
220 Injuries:		6.0
132 Minor @ \$150 Each	0.02	
22 Hospitalized @ \$300 Each	0.07	
44 Severe @ \$7,000 Each	0.31	
22 Disabilities @ \$250,000 Each	<u>5.50</u>	
	5.90	

Use: 50M\$ for T'_t = Direct Cost of Bombings

Table 19: PROJECTED ANNUAL DIRECT BOMBING COSTS

1. Investigations and disposal
2. Evacuations and delays
3. Added security
4. Judicial proceedings and incarceration
5. Disruption of services.

6.2.2.1 Investigation and Disposal Costs

There are about 1,400 IABTI (International Association of Bomb Technicians and Investigators) members in this country. About half of them are employed in bomb investigations and bomb disposal. At an annual rate of \$25,000 per person and a 150% overhead rate, the total cost amounts to about $700 \times 25,000 \times 1.5 = 26M\$$.

Alternately we obtained bomb-devoted cost data from eight large police departments and two state agencies that do appreciable bomb work. We then divided all U. S. cities and towns according to population:

Greater than 1 million
 500,000 - 1 million
 100,000 - 500,000
 50,000 - 100,000
 25,000 - 50,000
 Below 25,000

The cities of greater than one million were each assigned a cost figure equivalent to the average costs that we obtained from the New York City and Los Angeles Police Departments. The cities of 500,000 to one million were each assigned a cost figure based on the average cost that we obtained for the San Francisco and Cleveland Police Departments. Cities of 100-500,000 had costs equivalent to that obtained for Miami. Cities of 50-100,000, 25-50,000 and below 25,000 were arbitrarily assigned annual costs of \$25,000, \$10,000 and none. The grand totals of this method of estimation are about $20M\$ \times 150\% \text{ overhead} = 30M\$$ or surprisingly similar to the 26M\$ based on IABTI figures.

The two major Federal agencies that are involved in bombing investigation are BATF and FBI. BATF costs in 1976 or 1977 were about ten million dollars (September 23, 1977 letter to Senator McClellan). These figures include costs of investigation of incendiary bombings and non-criminal explosive accidents and thus are somewhat higher than the costs attributable solely to investigating explosive bombings. Consequently, we will use eight million dollars for the annual BATF bombing-related cost.

The FBI would not provide us with any data on the annual cost of their bomb-related efforts. We expect their efforts to be comparable but somewhat lower than those of BATF. Consequently, we arbitrarily assigned five million dollars to the FBI annual bombing-related costs.

The total cost of local and Federal law enforcement agencies devoted to bombing-related work is then approximately $30M\$ + 8M\$ + 5M\$ = 43M\$$. We will round this off to $45M\$$.

6.2.2.2 Evacuation and Delay Costs

The only "hard" data that we were able to obtain are for costs of evacuation of GSA-controlled Federal buildings and delay costs (to the air-transportation industry) of threats against aircraft. These amounted to about one million dollars each in 1976. Threats of bombings occur frequently - particularly after a well-publicized actual bombing. Currently most threats do not result in evacuations. Nevertheless, even infrequent evacuations can be very costly; e.g., approximately five million dollars in the evacuation of the World Trade Center in New York City in 1977. A series of threats and evacuations of underground coal mines in western Kentucky in 1976 and 1977 are estimated to have cost 7.5 million dollars. Although the above costs were incurred in 1976 and 1977 we will combine them and estimate a yearly evacuation and delay cost of fifteen million dollars ($1 + 1 + 5 + 7.5 = 14.5M\$ \approx 15M\$$). We believe this figure to be a lower limit since we were unable to obtain a large sampling of all evacuation and delay costs.

6.2.2.3 Additional Security Costs

Because of bombing threats and actual bombings both private business and government agencies have increased their security guard forces. We were unable to obtain an accurate cost for this increase in security. Information obtained from the American Society for Industrial Security as well as three private security firms, indicates that there are at present some one million security guards throughout the United States, but less (and probably much less) than 1% of this number are employed because of bombings or bombing threats. We have assumed the percentage of bombing-devoted security guards to be 0.1% of the total U. S. security guard force. At an annual salary of \$10,000 per guard the annual cost is then $1,000,000 \times \$10,000 \times 0.001 = 10M\$$.

6.2.2.4 Judicial Proceeding and Incarceration Costs

At the current arrest rate there are roughly 100 bombers arrested per year. Allowing ten days total for case preparation and court proceedings at \$1,500/day, we have 1.5 million dollars as the annual judicial proceedings costs. Annual incarceration costs are roughly \$9,000 per prisoner. On the average there are about 300 convicted bombers in United States jails (see Appendix 9). Thus, yearly judicial and incarceration costs are about 1.5 plus 3.2 million dollars or a total of 4.7 million dollars.

6.2.2.5 Disruption of Services Cost

As shown in Appendix 8, 2 million dollars is a high estimate for an annual disruption of vital services cost. Major disruptions are infrequent and even they are not very costly.

6.2.2.6 Total Indirect Cost

The individual costs which we can more or less account for are, according to sections 6.2.2.1 through 6.2.2.5, equal to:

$$45\text{M\$} + 15\text{M\$} + 10\text{M\$} + 5\text{M\$} + 2\text{M\$} = 77\text{M\$}$$

Since we have not included loss of business^{*} and lawsuits and may have underestimated evacuation costs in these figures, we will arbitrarily use an annual indirect cost of bombings of 80 million dollars.

6.2.3 Program Costs

Costs of identification tagging and detection tagging were estimated in the Aerospace Corporation report of March 1977 entitled "Explosives Tagging and Control Inflation Impact Analysis," We have revised these costs on the basis of more recent cost information of taggants, more accurate values of the yearly production of cap-sensitive explosives, and explosive manufacturers' estimates of additional record-keeping costs.

6.2.3.1 Identification Tagging Costs

A better estimate of the annual production of cap-sensitive explosives is 450 million pounds rather than the 600 million pounds used in the Aerospace Corporation report. Apparently the initial cost quote of \$36/pound is now up to \$56.5/pound (in 2,500 pound lots) (Aerospace Corporation Annual Report for 1977, "Explosives Tagging and Control, p. 3-5). However, the projected costs for large quantities of taggant is much less or about \$25/

* From an economist's point of view, societal cost of loss of business occurs only if a sole source supplier is bombed out or the supply of a commodity is greatly reduced by bombings.

pound of taggant. Thus, the revised taggant cost, based on the \$25/pound price, is 5.6 million dollars instead of the 10.8 million dollars given by Aerospace Corporation. To this cost one must add the cost of tagging boosters, smokeless powder and black powder. According to Aerospace estimates, these costs amount to about 0.5 million dollars. Additional mixing equipment and detection devices (microscopes, u.v. lights) may amount to another 0.5 million dollars. Additional labor and record-keeping may cost two to three million dollars more. Thus, the total annual cost will be about 8.5 to 9.5 million dollars. To be conservative, the cost figure for identification tagging that we shall use in the cost analysis will be 10 million dollars annually.

6.2.3.2 Detection Tagging Costs

The technology of detection tagging is much less advanced than for identification tagging. Consequently, cost estimates for the detection tagging program are much more uncertain than those for the identification tagging program. The cost of vapor taggants for blasting caps has not been established since at present the taggant to be used and its method of incorporation are still under study. A conservative estimate assigns about two million dollars annually for these costs. The initial cost for 1,300 pieces of detection equipment at 2.5 thousand dollars each amounts to about 32 million dollars. It will be assumed that detection equipment has to be replaced every five years. To maintain and operate the equipment may require an additional one million dollars yearly. Then, over a 20-year period, the cost of detection tagging is 35 million dollars in the first, sixth, eleventh, and sixteenth years and three million dollars for the remaining years of the 20-year program. The total 20-year cost is accordingly 188 million dollars or an average annual cost of $188/20 = 9.4\text{M\$}$.

is a measure of this difference. Most likely θ approaches unity in the later years of the program, but is probably less than one in the early years. In agreement with our policy to make conservative estimates, we have assumed $\theta=3/4$ for most of our calculations. The other factor that requires quantification is x , the fraction of habitual bombers in the total bomber population. We used bombing motive data to estimate x , even though motives are not established for a large proportion of bombings. Of the motive categories listed in Table 10, only "personal animosity" bombings appear to be largely committed by one-time bombers. These bombings produce a relatively high number of casualties and consequently a rather high societal cost. Thus, in terms of societal costs, one-time bombings may account for about one-quarter of the total societal costs. Consequently x , the fraction of habitual bombers, is 1 minus 1/4 or 3/4. In all our computations we used $x=3/4$.

6.3.1 Benefit/Cost Ratios for Identification Tagging

The various factors in equation (9) were assigned the following values in the computation of β_1 , the benefit/cost ratio of identification tagging (see section 6.1.2 for symbol definitions):

$$\begin{aligned} \tau &= 20 \text{ years} \\ r &= 0.06 \\ C_t &= 10\text{M\$ per year} + \sum_{t=1}^{20} \theta^t C_t = 114.7\text{M\$} \\ T'_t &= 50\text{M\$ per year} \\ T''_t &= 80\text{M\$ per year} \\ \theta &= x=3/4 \\ f &= 0 \\ a &= 0.08 \\ \alpha &= 0.1 = \text{annual arrest rate} \\ \delta, \sigma \text{ and } \sigma' &\text{ are all assumed to be numerically equal} \end{aligned}$$

Figure 4 gives β_i as a function of the parameter $na+\delta$. The numerical values of the δ 's used are shown next to the data points. Values of β_i in excess of one (above the horizontal line of Figure 4) show that the program is economically worthwhile. The effectiveness range of the program is believed to lie between $0.15 \leq na+\delta \leq 0.2$ (to the left of the vertical line of Figure 4). The lower portion of this range corresponds for example to $n=1.3$ and $\delta=0.02$. This level of program effectiveness should be readily achievable. Over this $na+\delta$ range, β_i is well in excess of unity and the identification tagging program is thus economically worthwhile. It should be emphasized that conservative values were used in this computation; e.g., $\theta=3/4$ rather than $\theta=1$ and $T'=50M\$$ rather than $T'=4/3 \times 50M\$$ (see section 6.2.1). The break-even point ($\beta_i=1$) occurs at $na+\delta=0.125$, (typically for $n=1.15$ and $\delta=0.01$). Note that the curve for β_i with $\delta=0$ falls slightly below that with $\delta>0$. The rationale for this has been presented at the end of section 6.1.2. The small fluctuation of the other data points is ascribable to the effect of varying δ when $\delta>0$.

The effect of changing σ (σ' is still assumed to be equal to σ) is shown in Figure 5. Note that for a given $na+\delta$, β_i varies linearly with σ .

It should be noted that even for the conservative estimates of β_i shown in Figure 4, a 1.5- to 2-fold decrease in threat costs (if T' and T'' are grossly over-estimated), or conversely a 1.5- to 2-fold increase in program costs (if these are grossly under-estimated), still leaves identification tagging economically worthwhile provided program effectiveness is near the upper limit of its "realistic" range.

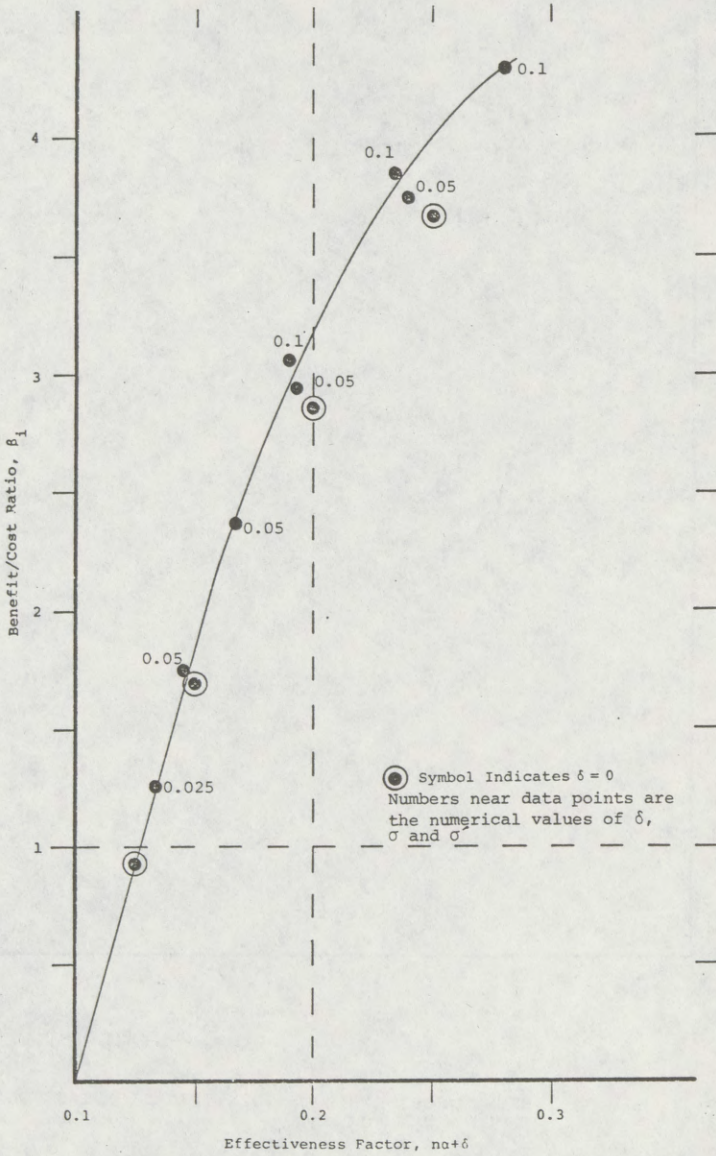


Figure 4: BENEFIT/COST RATIO FOR IDENTIFICATION TAGGING

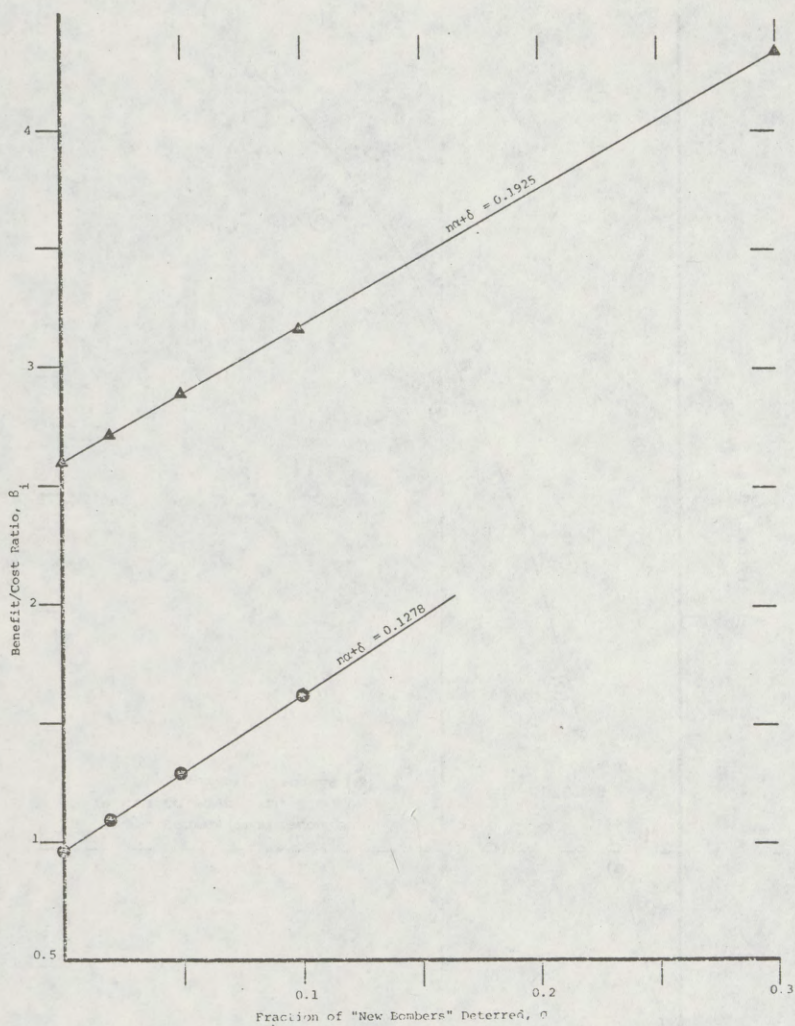


Figure 5: BENEFIT/COST RATIO OF IDENTIFICATION TAGGING
(Effect of σ)

6.3.2 Benefit/Cost Ratios for Detection Tagging

Factors were assigned the same values as in section 6.3.1 except:

$$\bar{C}_t = 9.4M\$ + \sum_{i=1}^{20} \theta_t C_t = 116.6M\$$$

$$f \geq 0$$

Also in a series of computations we used $\theta=1$ and $T'=4/3 \times 50M\$$ (see section 6.3.1 for the rationale for these higher values).

Figure 6, a plot similar to Figure 4, gives β_d , the benefit/cost ratio for detection tagging as a function of $n+\delta$ for $f=0$ and $f=0.02$; i.e., for no bombs found as a result of detection tagging and 2% of all bombs found as a result of detection tagging. Here we have no a priori means of determining the realistic $n+\delta$ range which we were able to do for identification tagging. Common sense, however, suggests that the overall effectiveness of detection tagging will generally be very low. The reasons for this are as follows:

- Chances of detecting a bomb on a criminal carrying or placing it are exceedingly small. Consequently chances of increasing arrests as a consequence of detection tagging are small and n is expected to be only slightly larger than unity; e.g., 1.1.
- Chances for an appreciable deterrent effect as a result of detection tagging are expected to be small. Bombers will soon realize that only a very small fraction of targets will have detectors that monitor continuously.
- Chances of finding and disarming bombs that have not already malfunctioned are indeed small. At present there is some question about the portability of detection systems. Obviously a non-portable system is of no use in bomb searches made after a communicated bombing threat.

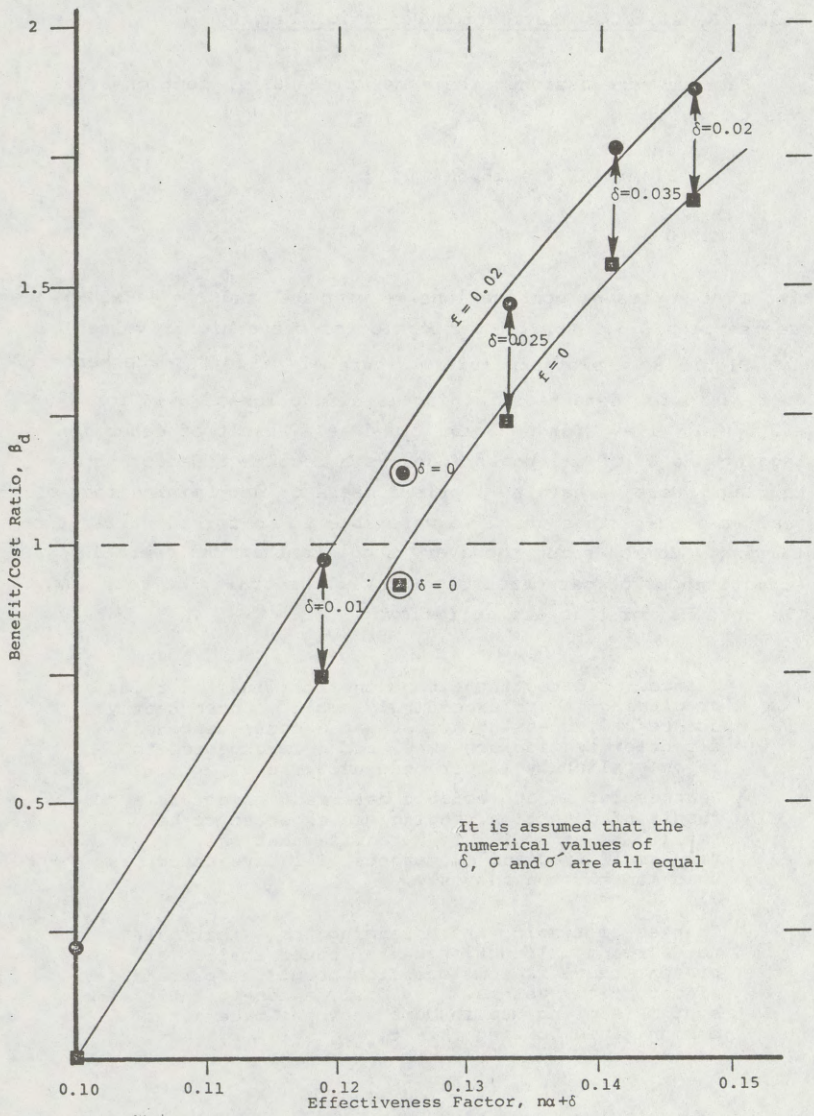


Figure 6: BENEFIT/COST RATIO FOR DETECTION TAGGING

In Figure 7 we present the data of Figure 6 in somewhat different form. We have arbitrarily assumed that $n=1.08$; i.e., an 8% increase in the current arrest rate as a direct consequence of detection tagging. It is difficult to imagine that the annual deterency rate of detection tagging will exceed 0.02 and probably it is considerably lower. Thus, the "realistic" region in Figure 7 is probably well to the left of a vertical line drawn through $=0.02$. If so, detection tagging is not worthwhile or just barely worthwhile from an economic point of view, unless one assumes the rather optimistic bomb finding frequency of $f=0.02$ and uses somewhat larger values (but still justifiable values) for the societal cost of bombings. It must be emphasized that current detection tagging technology does not permit accurate estimates of detection tagging costs. Even less certain are estimates of the overall effectiveness of detection tagging in reducing the societal costs of bombing. Probably the only truly justifiable statement one can presently make about detection tagging is that its economic viability is questionable.

In defense of detection tagging, one should re-emphasize its applicability to monitoring airplane baggage and cargo. For many years now no aircraft has been bombed out of the sky in the United States. Thus, the frequency of aircraft bombings is miniscule. Nevertheless, a single commercial airplane shot down by a bomb can exceed the societal cost of all current bombings. Prevention of this type of very infrequent but catastrophically costly event may indeed be the main justification for the implementation of an explosives detection tagging program.

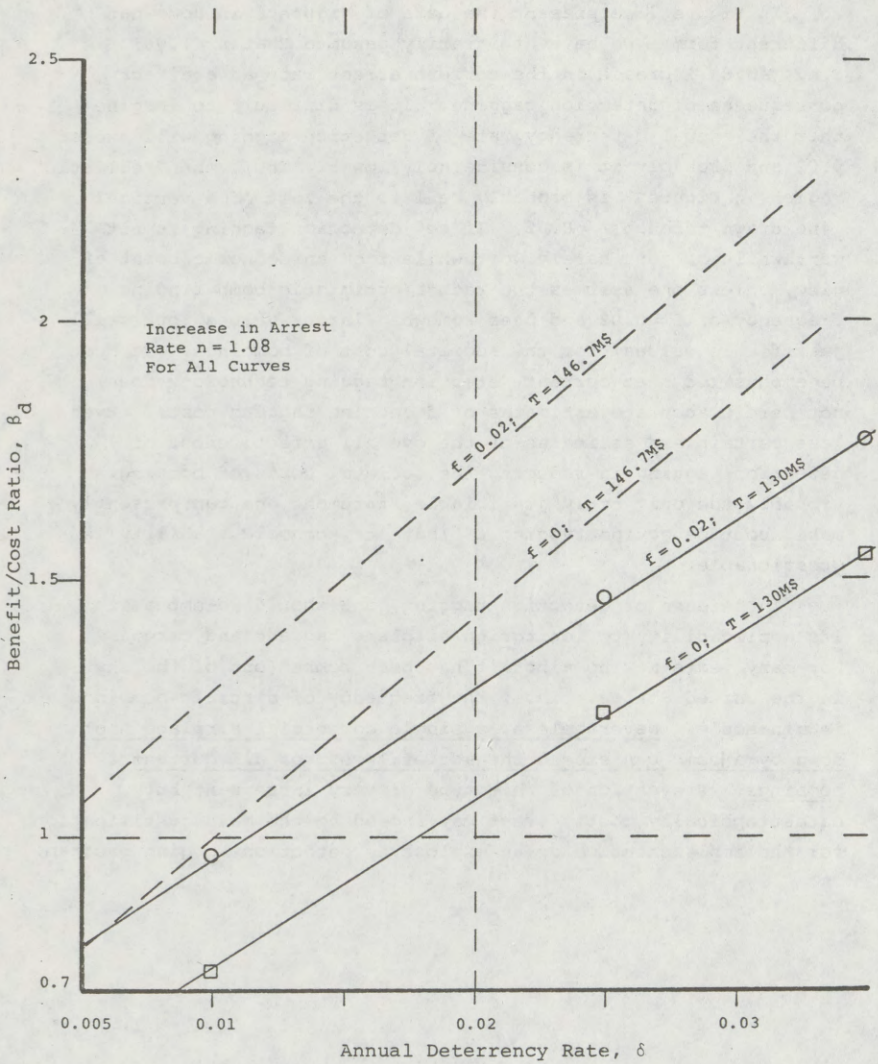


Figure 7: BENEFIT/COST RATIO FOR DETECTION TAGGING AS A FUNCTION OF DETERREncy RATE δ , AND FREQUENCY OF FINDING BOMBS, f

6.3.3 Benefit/Cost Ratios for the Combined Identification and Detection Tagging Programs

As shown in section 6.3.2, the economic viability of detection tagging is uncertain. It is of interest to examine the cost benefits of the combined identification and detection tagging programs. Such an approach tends to reduce the uncertainty of the input data required for the analysis, but more importantly it is anticipated that the expected effectiveness of identification tagging will more than counteract the questionable effectiveness of detection tagging, thus making the combined programs economically worthwhile.

The benefit/cost ratio β_b for the combined programs is shown as a function of the effectiveness parameter, $n\alpha + \delta$, in Figure 8. The same values of δ , σ and σ' as were used in computing β_i were used in computing β_b . The lower curve represents a conservative estimate since it is based on $T' = 50M\$$, $\theta = 3/4$ and $f = 0$. The upper curve probably represents a fairly optimistic estimate since it is based on $T' = 4/3 \times 50M\$$, $\theta = 1$, $f = 0.02$. The combined discounted program costs for both curves, $\sum_{t=1}^{20} \delta_t C_t$, are the sum of the discounted costs for the individual programs or 231.3M\$. The "real" curve presumably lies between these two limiting curves.

If we again take the region to the left of the vertical line through $n\alpha + \delta = 0.2$ to characterize the anticipated program effectiveness, we can be fairly confident that a favorable benefit/cost ratio can be achieved for the combined programs. The "break-even" point ($\beta_b = 1$) occurs at $n\alpha + \delta \approx 0.15$, or typically at $n = 1.3$ and $\delta = 0.02$.

The data from Figure 8 can be presented in different form which shows the separate effects of n and δ more clearly. This is done in Figure 9 for the conservative case of $f = 0$ and $T = 50M\$$ and $\theta = 3/4$. Note that β_b depends strongly on δ at low n -values and less so at the higher n -values.

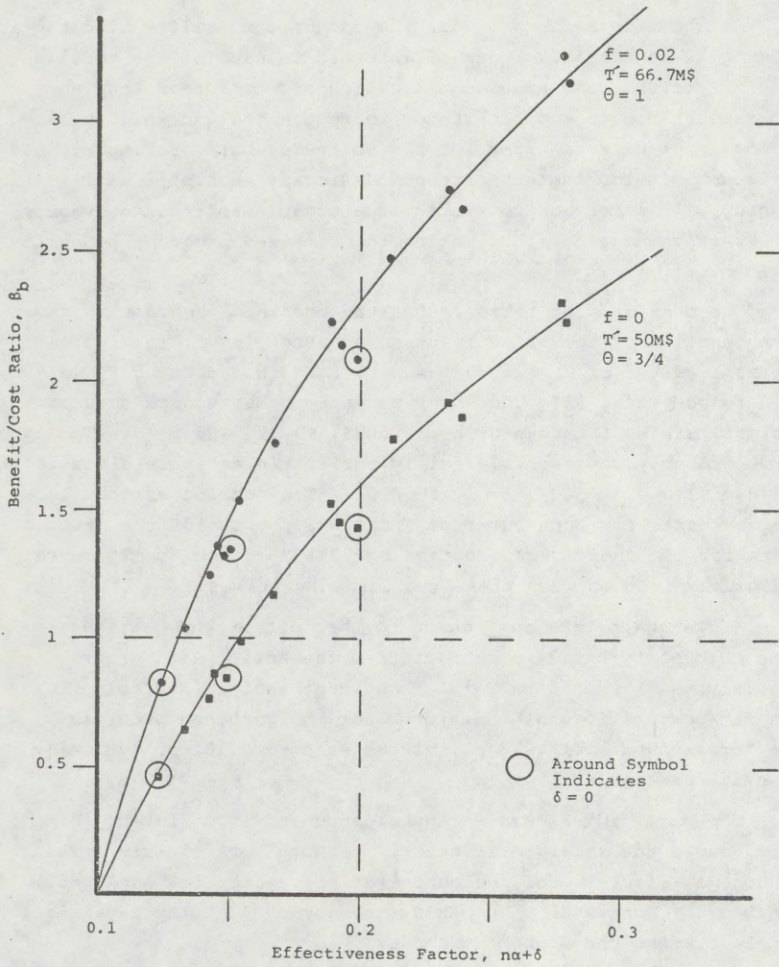


Figure 8: BENEFIT/COST RATIO FOR COMBINED IDENTIFICATION AND DETECTION TAGGING

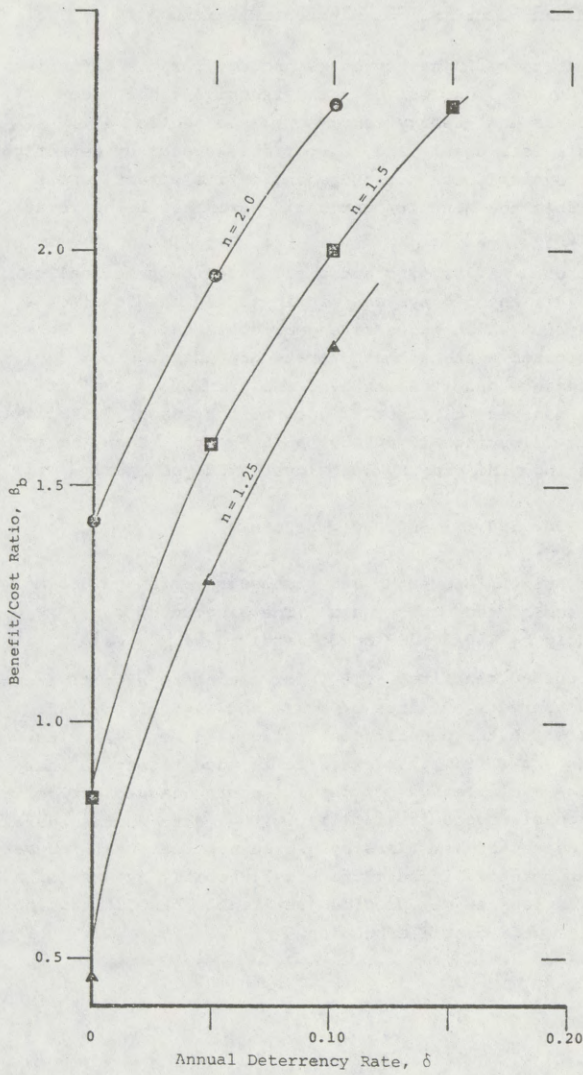


Figure 9: BENEFIT/COST RATIO FOR COMBINED IDENTIFICATION AND DETECTION TAGGING AS A FUNCTION OF INCREASED ARREST FACTOR, n AND DETERRENCE RATE, δ

6.3.4 Benefit/Cost Ratios for Untagged Detection

At present there is no proven technology for the effective detection of untagged explosives. One technique, now under investigation, is dual-energy tomography (see section 4.1, item 10). This is a costly and non-portable system of detection. Since neither system costs nor judgement of its effectiveness are now available the benefit/cost ratio estimated below is at best a "ball-park" figure.

Assume that $n=1.08$, δ , σ and σ' all have the numerical value of 0.02, $f=0.01$, and 500 systems are installed at a cost of \$50,000 per system which has a five-year operating life. These are to be automated systems that operate around the clock. Between maintenance and standing by for alarms it is realistic to assign one man-year of labor to each unit or about 7.5 million dollars yearly (figuring \$15,000 for a man-year). Then, as for detection tagging, the program costs over a 20-year period will be:

$$\$50,000 \times 500 + \$7,500,000 = \$32.5\text{M\$}$$

for the first, sixth, eleventh, and sixteenth years and 7.5 million dollars for each of the other years. The discounted cost, $\sum_1^{\infty} \delta_t C_t$, will accordingly be 150.3 million dollars.

The discounted benefits, $\sum_1^{20} \delta_t B_t$, for the above effectiveness factors and conservative values of $\theta=3/4$ and $T'=50\text{M\$}$ are 138.3 million dollars and the benefit/cost ratio will be 0.92. The conclusion one draws from this exercise in uncertainty is that currently foreseeable methods of detection of untagged explosives are of questionable economic viability with regard to the overall criminal explosive threat. In specialized applications, for very infrequent but potentially catastrophically costly events, untagged detection of explosives may provide justifiable benefits to society in spite of its unfavorable economics.

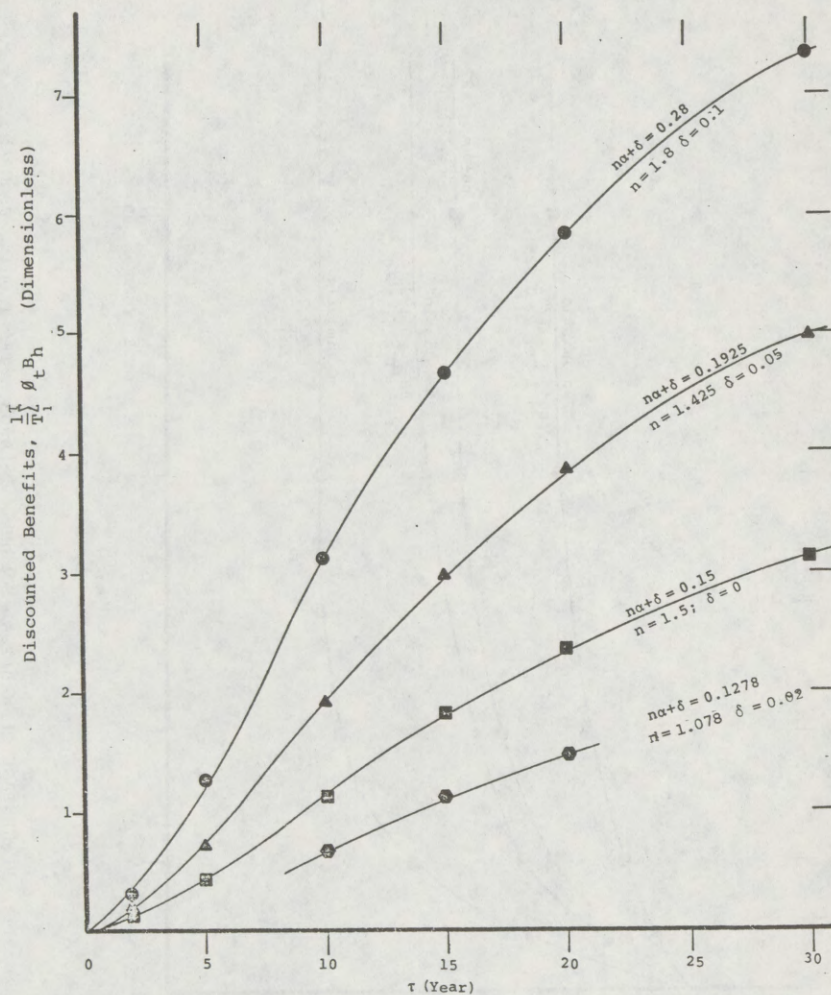


Figure 10: VARIATION OF DIMENSIONLESS DISCOUNTED BENEFITS WITH TIME

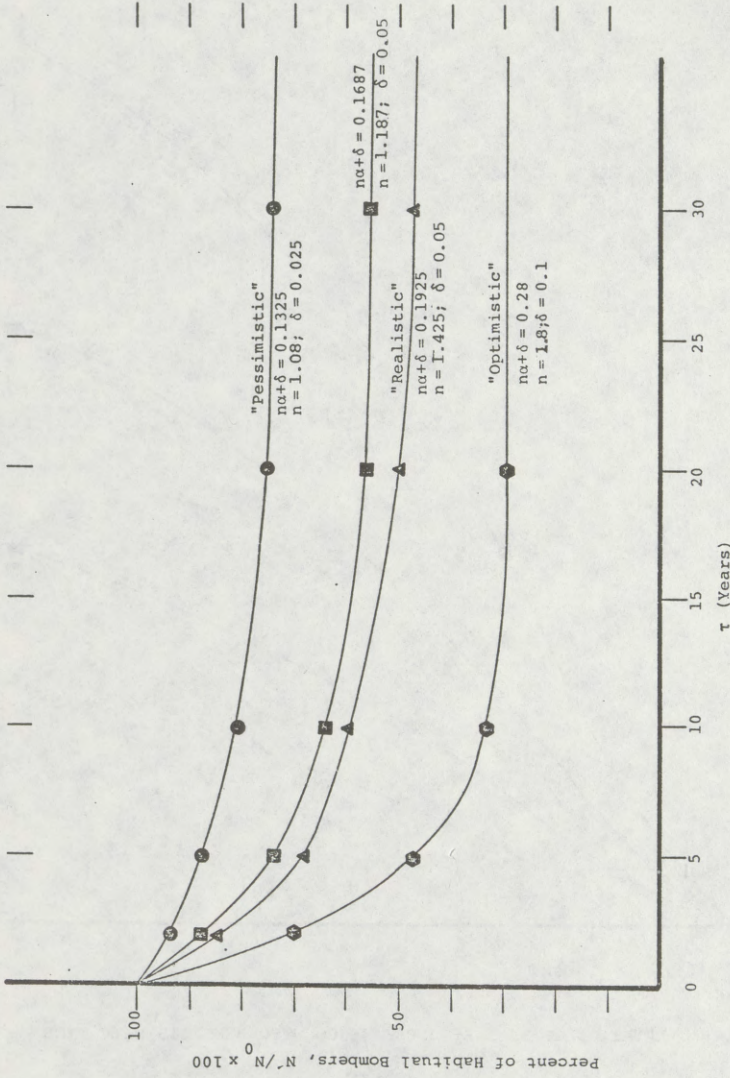


Figure 11: PERCENTAGE OF HABITUAL BOMBERS AT-LARGE AFTER TAGGING PROGRAM IMPLEMENTATION AS A FUNCTION OF PROGRAM EFFECTIVENESS

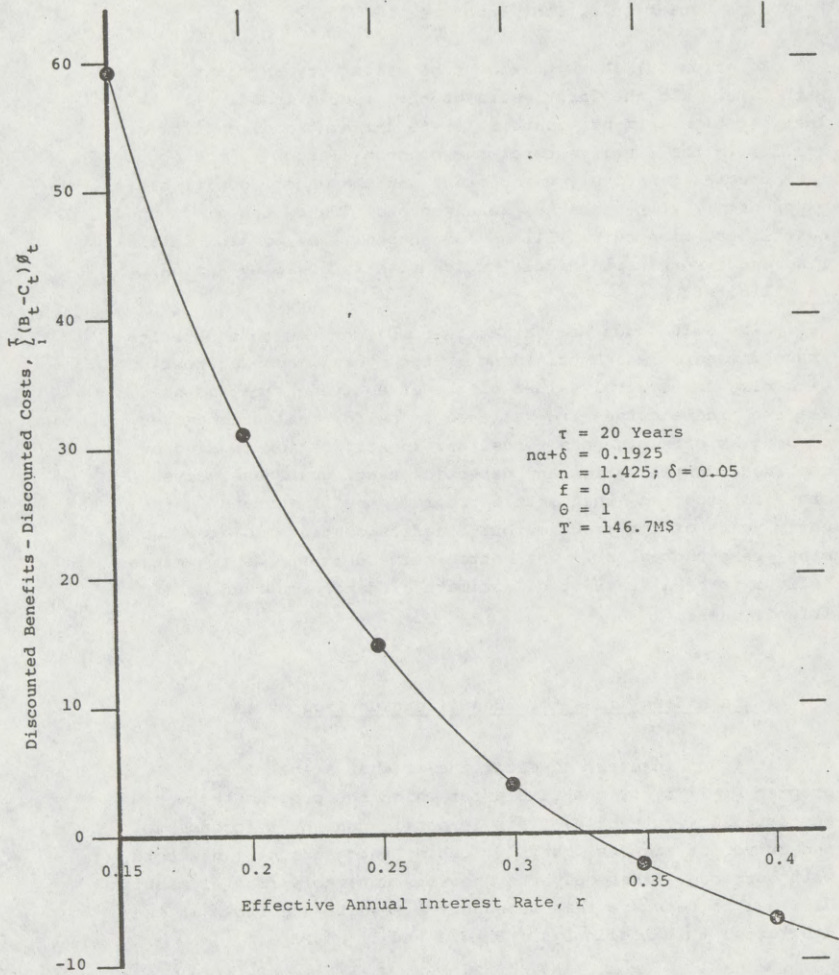


Figure 12: INTERNAL RATE OF RETURN ON INVESTMENT FOR THE COMBINED IDENTIFICATION AND DETECTION TAGGING PROGRAMS

6.4 Time Variation of Cost Benefits

Equation (9) shows that cost benefits vary exponentially with time. For the first years of the program (small τ), the last negative term of equation (9) is dominant and benefits are small. In the final years of the program (large τ), the above term becomes relatively unimportant and the other (positive) exponential term approaches an asymptote. Thus, the discounted benefit vs. time curve will be "S" shaped; i.e., a slow initial rise and a more rapid middle region rise followed by a slow levelling off.

Figure 10 shows the variation of discounted cost benefits (made dimensionless by dividing by the overall bombing cost, T) with time for several values of the effectiveness factor $na+\delta$. The two middle curves are believed to be for realistic values of program effectiveness for either identification tagging or combined identification and detection tagging. These curves show, as expected, that little program benefit accrues in the early years of the program, but benefits continue to grow for many years thereafter. The bottom curve corresponds to what we believe to be a "realistic" estimate of detection tagging effectiveness.

6.4.1 Break-Even Times for Identification Tagging

It is of interest to determine at what stage of the program $\beta_i = 1$; i.e., the time after which the program becomes economically worthwhile. This is easily done by reference to the curves of Figures 4 and 10, taking into account (in accord with our model) that only the benefits derivable from eliminating habitual bombers are time-dependent. Results are shown in the tabulation which follows, for $\theta = 3/4$ and $T' = 50MS$.

$na+\delta$ (Per Year)	n	δ (Per Year)	σ	Time to Reach $\beta_i = 1$
0.1925	1.425	0.05	0.05	7.8 Years
0.1500	1.5	0	0	11.9 Years

6.4.2 Break-Even Times for Detection Tagging

In a manner identical to that used above (except that Figure 7 is used instead of Figure 4), we obtain the following:

$\alpha + \delta$ (Per Year)	n	δ (Per Year)	σ	Time to Reach $\beta_d = 1$	
				Conservative* Estimate	Optimistic** Estimate
0.1278	1.078	0.02	0.02	18.7 Years	14.5 Years

* $\theta = 3/4$; $T' = 50M\$$; $f = 0$

** $\theta = 1$; $T' = 66.7M\$$; $f = 0.02$

6.4.3 Break-Even Times for Combined Identification and Detection Tagging

From Figures 8 and 10 we obtain:

$\alpha + \delta$ (Per Year)	n	δ (Per Year)	σ	Time to Reach $\beta_d = 1$	
				Conservative* Estimate	Optimistic** Estimate
0.1925	1.425	0.05	0.05	14.2 Years	11.0 Years
0.1500	1.5	0	0	25.0 Years	17.5 Years

* $\theta = 3/4$; $T' = 50M\$$; $f = 0$

** $\theta = 1$; $T' = 66.7M\$$; $f = 0.02$

6.4.4 Decrease in the Number of Habitual Bombers After Program Implementation

The model described in section 6.1 permits estimation of the relative number of habitual bombers still at-large after tagging program implementation. The predicted time-dependence of the percentage of habitual bombers still at-large ($N'/N_0 \times 100$ where N' = bombers at-large at time τ and N_0 = bombers at $\tau=0$) can be obtained from equation (5) of Appendix 5. Results are plotted in Figure 11. For "realistic" estimates of program effectiveness, this percentage approaches an asymptotic value of 47%. The asymptote is almost reached in 20 years. Indeed the rapid drop in N'/N_0 occurs within the first five years.

6.5 Internal Rate of Return

In the preceding sections the cost/benefit ratio was used to characterize tagging program cost benefits. An alternate approach that is also used in cost-benefit analysis is the computation of the so-called internal rate of return on investment. This is the maximum interest rate at which money can be borrowed to defray program costs and still have the summed discounted costs exactly equal the summed discounted benefits. The usual method of computation involves plotting $\sum_1^T (B_t - C_t) \delta_t$ vs. r , the effective interest rate. The r -value at which the curve crosses the $\sum_1^T (B_t - C_t) \delta_t = 0$ line is R , the desired internal rate of return on investment. For an effectiveness factor of $\alpha + \delta = 0.1925$, which is probably near the upper limit of the "realistic" range, and $\tau = 20$ years, the plot of Figure 12 gives an R -value of 32.5%. This is quite a handsome internal return on investment, but probably represents an upper level of R .

6.6 Effect of Pre-Program Explosive Thefts on Program Cost Benefits

The data presented in section 5.2.1 (Table 18) suggest that criminals may now possess enough cap-sensitive explosives for five to six years of bombing at the current bombing rate. It is important to evaluate the effect of the criminal use of these pre-program explosives on program cost benefits. An exact evaluation of this effect is most difficult. What can be done is to estimate the worst possible effect that the use of these explosives will have on the cost benefits.

Assume that for τ' years after program implementation only pre-program explosives will be used in criminal bombings. Obviously this is a drastic assumption and leads to an over-estimate of the reduction in cost benefits. With this assumption F , the time-dependent terms of equation (9) are modified to:

$$F' = (e^{-p\tau'}) \left[1 - \frac{(1-\sigma)(\sigma+\delta a)}{n\alpha+\delta} \right] \left[\frac{1-e^{-p(\tau-\tau')}}{p} - \frac{1-e^{-(p+n\alpha+\delta)(\tau-\tau')}}{p+n\alpha+\delta} \right]$$

For reasonable values of the effectiveness factor $n\alpha+\delta = 0.1925$, $\delta = 0.05$ per year, $\sigma = 0.05$ and other terms equal to those given in section 6.3.1, we obtain the following tabulation with $\tau = 20$ years:

τ' (Years)	F ($\tau' = 0$)	F'	β_i ($\tau' = 0$)	β'_i	β'_i/β_i
3	3.82	2.80	2.89	2.15	0.745
4	"	2.50	"	1.94	0.671
5	"	2.22	"	1.73	0.600
6	"	1.97	"	1.56	0.539

This tabulation shows that benefit/cost ratios may be reduced by a factor of almost 2-fold if we assume that criminals use only their pre-program "stocks" of explosives. However, even for this drastic assumption the benefit/cost ratios for identification tagging are still favorable. For detection tagging, and to a

lesser degree for the combined detection and identification tagging program, where the economic viability of the program is already border-line, use of pre-program explosives may indeed change a border-line situation into an unfavorable one.

7.0 RECOMMENDATIONS FOR FURTHER STUDIES

The present study indicates that identification tagging is expected to be more effective in combatting the criminal use of explosives than detection tagging. Post-explosion recovery of taggants should provide means of determining the last legal possessors of the explosives used in the bombing. However, the entire identification tagging scheme is only as good as the records kept of the life-cycle of the explosive from the time of its manufacture to its receipt by the last legal possessor. Thus, accurate record-keeping and rapid record retrieval are required for the success of the program. Preliminary studies of record-keeping procedures have been made by some of the explosive manufacturers, but more definitive studies are needed. It is suggested that a general scheme of record-keeping and record retrieval be developed. This scheme should be sufficiently flexible to permit adjustment to the specific requirements of individual manufacturers, distributors and users.

In our study we found the BATF computerized file a most useful source of bombing data. There are, however, some shortcomings in this file which appear to be easily correctable. For example, all undercover buys of explosive devices are now classified as bombing attempts (the symbol N in the file). It should be a simple matter to assign another symbol to undercover buys. Whenever the initial incident reports contain no information on property damage, "zero" damage is entered in the file for that incident. Since property damage in the file is rarely updated, it is impossible to tell whether the actual property damage is indeed zero or whether the initial incident report contained no damage information. A glaring example of this is the La Guardia Airport bombing for which the file shows zero property damage. Again, it should be simple to assign different symbols for no property damage or unknown property damage.

Occasionally it is difficult to retrieve useful information from the computerized file due to the current file structure. The "miscellaneous records" of the file are used to describe

different major categories of information; e.g., suspects, arrests, explosive fillers, initiators, containers, and types of initiation delay. This information structure makes it difficult to provide meaningful special request reports to management concerning any relationships between the above categories. More importantly, it is difficult to relate these major categories with other pertinent information of the explosives incident to provide useful data such as socio-economic cost (injuries, fatalities, damage, etc.) by explosive filler type, or bombing motive.

A possible remedy for this situation would be to modify the existing BATF computer program that now appends a unique number to the current file for updating purposes. This particular program could be used to alter the file structure to contain all pertinent information for each explosive incident on one larger record, for example, in a record that contains the information now listed on number 1 type records and on one or more number 2 type records. Distinct major categories would then be separated out and individual incident data thus consolidated would be available for efficient computer processing. A new file structure updated monthly in this manner would greatly facilitate the programming of special request reports. It would further facilitate the use of an information retrieval software package, such as the Statistical Package for Social Sciences, to provide statistical data and meaningful relationships of the explosive incidences on a regular monthly basis. Questions such as "What are the most frequently used containers for explosives?" and "What is the geographical breakdown of dynamite stolen in the United States?" can then be answered with a minimum of programming effort.

An alternate scheme to the detection of bombs is the remote disarming of bombs. Ideally all persons, packages and luggage entering a vulnerable target would pass through a "black box" where the bomb would be deactivated. This scheme is not as outlandish as it appears at first glance. Indeed, some thought has been given to this subject by FAA scientists. In our study it was shown that a large proportion of bombing casualties and

most of the property damage is caused by bombs filled with cap-sensitive explosives. Also it is expected that most of the bombs in the really catastrophic incidents have delayed initiation and therefore contain electric blasting caps. Thus, development of methods of remote deactivation of electric blasting caps is a sound approach because most of the bombs with the highest havoc-potential contain electric blasting caps.

A word of caution: Inadvertent deactivation of electric blasting caps must be made essentially impossible, since an inadvertently deactivated blasting cap will result in misfires in its legitimate use in mining and construction. Misfires (if frequent) can generate almost as much havoc as criminal bombings.

Test results show that existing 3M identification taggants will not survive high pressure detonations (see Aerospace Report "Explosives Tagging and Control," October 1977). An analysis based on shock wave physics can suggest attenuator materials and attenuator thicknesses which will increase taggant survivability.

APPENDIX 1

COMPUTER PROCESSING OF BATF TAPE

By:
Thomas Huckins

1.0 INTRODUCTION

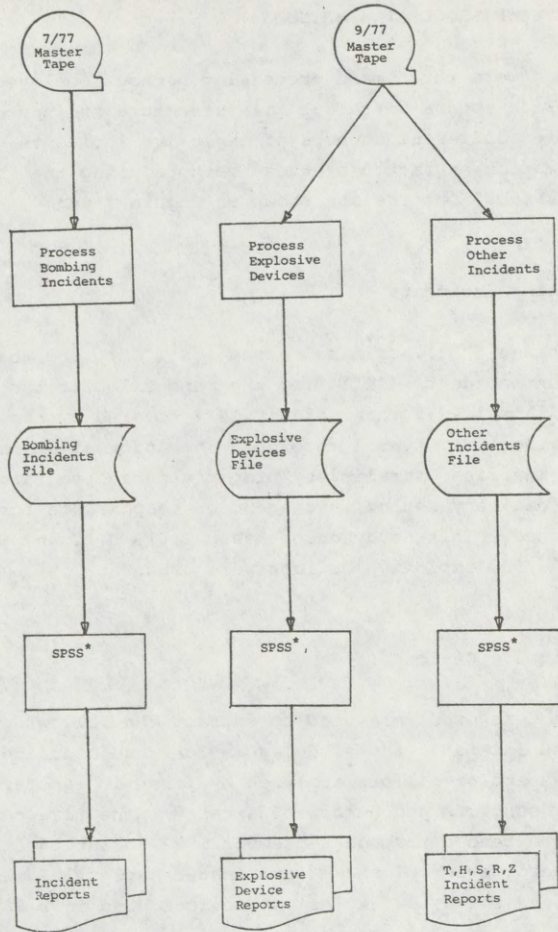
A prime source of information for characterizing the overall explosive threat in this country was provided by the Bureau of Alcohol, Tobacco and Firearms' master tape file. This file is composed of a so-called type 1 record and multiple type 2 records for each explosive incident. The information contained on these tape records is shown in Figure 1.

Considerable effort had to be expended to put a tape received from BATF into a form convenient for our study. In general, the information from this tape was restructured into subsets and placed on disks for processing and analysis using Stanford's and the University of Chicago's National Opinion Research Center's "Statistical Package for Social Sciences" (SPSS). The current version (7) of this computer software package installed on Stanford University's IBM 370-168 was used for the analysis. The computer processing flow is shown in Figure 2.

We received two master tape files. The first included data through July 1977 but did not include information on arrests. The second master tape file included arrest data and it contained bombing information through September 1977.

DEPARTMENT OF THE TREASURY – BUREAU OF ALCOHOL, TOBACCO AND FIREARMS EXPLOSIVES INCIDENT WORKSHEET																																			
CARD 1																																			
(1-13) UNIQUE IDENTIFIER														(14-19) DATE OF INCIDENT								(20) TYPE OF INCIDENT													
(21-39) VICTIMS NAME																																			
(40-53) CITY														(54-56) STATE								(56-57) SPECIFIC FACILITY CODE													
(58-59) SPECIFIC LOCATION								(60) DELIVERY METHOD				(61) WARNING				(62) MOTIVE INTENT				(63-64) NUMBER KILLED				(65-66) NUMBER INJURED											
(67-73) AMOUNT OF DAMAGE														(74-76) TIME OF OCCURRENCE								(77) EVIDENCE ANALYZED				(78) PHOTOS TAKEN				(79) JURISDICTION					
CARD 2																																			
(1-13) UNIQUE IDENTIFIER														(14) ENTRY METHOD				(15-16) MISC. IDENT. CODE				(17-20) MANUFACTURER													
(21-40) MISCELLANEOUS INFORMATION																																			
(41-46) QUANTITY								(47-48) LENGTH								(49-50) WIDTH				(51-53) DIAMETER								(54-55) PERCENT							
(56-58) LEG WIRE LENGTH				(59-60) COLOR				(61-76) DATE SHIFT CODE/LOT NUMBER																											
(77) BOMB PROFILE CODE								(78) LAB/TECH CODE																											
ATF F 3270.10 (10-76)																																			

Figure 1: TAPE RECORD INFORMATION EXAMPLE



* Statistical Package for Social Sciences

Figure 2: COMPUTER PROCESSING OF BATF INFORMATION

2.0 COMPUTER PROCESSING METHODS

There were three main processing methods employed in this study. Each used a different file structure as input to SPSS and studied different aspects of explosive incidents. The type of information extracted by these methods using the "Breakdown" and "Crosstabs" options are shown in Figure 3 and 4, respectively.

2.1 Bombing Incidents

Bombings ("B"), criminal accidents ("C"), and the non-detonation incidents ("N") from the tape file for the entire period of April 1975 through July 1977 covered by the file, were obtained from type 1 records. The information thus extracted included injuries, fatalities, property damage to targets, motive, warning, delivery method, and agencies responsible for jurisdiction and evidence. This study encompassed 2,615 B, C and N type incidents in which 2,907 explosive devices were used.

2.2 Explosive Devices

Type 2 records were used to extract the following information: filler and initiator types, delay devices and containers used, number of devices and/or fillers analyzed by forensic laboratories, and number of suspects and number of arrests. The time period of the study was extended through September 1977 to include the latest updated information of the second master tape file. Information was obtained for 3,122 explosives devices used in 2,809 B, C and N incidents.

[illegible]

Figure 3: "BREAKDOWN" INFORMATION EXTRACTION METHOD

STATISTICS FOR TARGETS VS FILLER
 FILE NAME (CREATION DATE = 10/18/77)
 *** CROSSTABULATION OF ***
 *** BY FILLER ***
 *** INITIATE ***
 *** CONTROLLING FOR ***
 *** DYNAMIC ***
 *** ALL 77 ***
 *** VALUE ***
 *** PAGE 1 OF 1 ***

10/18/77 PAGE 6

COUNT		FILLER		DYNAMITE		BLK PWD		FLSH PWD		IMPROV		ANFD		MILITARY		SMK PWD		PRIMER		UNKNOWN		OTHER		TOTAL	
ROW	PCT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
INITIATE	1	3.3	5.9	2.9	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
CAP ELTR	2	3.3	1.5	2.7	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
CAP NON	3	3.3	2.7	2.7	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
SPY FUSE	4	3.3	1.5	2.7	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
UNKNOWN	5	3.3	1.5	2.7	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
OTHER	6	3.3	1.5	2.7	3.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1
COLUMN TOTAL		17.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4

Figure 4: "CROSSTABS" INFORMATION EXTRACTION METHOD

2.3 Bombing Threats and Explosive Thefts

A supplemental study was conducted on bombing threats and hoaxes, as well as explosive thefts, seizures, and recoveries. Information from type 1 records was extracted for all of the above incident types. For the study of thefts, seizures and recoveries, additional information of filler type, filler quantity, initiator type, and initiator quantity was extracted from type 2 records. Over the time period of April 1975 through September 1977 information on 150 hoaxes, 91 threats, 943 thefts, 229 seizures and 1,464 recoveries was extracted from the tape.

APPENDIX 2

COMPUTERIZATION OF FBI MONTHLY INCIDENT SUMMARY DATA

By:
Lynne Silverman

To supplement BATF computerized data, it was decided to computerize the FBI Bomb Data Program Monthly Incident Summaries for the sample period of January 1976 through June 1977. All relevant data were coded and stored on magnetic tape for use on an IBM 370/168 at Stanford University's Center for Information Processing. This allowed easy access and permitted the use of a variety of statistical techniques in developing trends and formulating conclusions. The information extracted was:

- | | |
|-----------------|---------------------------------|
| • Year | • Warning (Yes, No) |
| • Month | • Message (Yes, No) |
| • Day | • Organized Group (Yes, No) |
| • Time | • Damage (None, Minor, > Minor) |
| • City | • Dollar Amount |
| • State | • Injury (Yes, No) |
| • Incident Type | • Fatality (Yes, No) |
| • Device | • Number Casualties |
| • Fusing | • Motive |
| • Filler | • Target |
| • Container | • Arrest (Yes, No) |
| • How Planted | • Evacuation (Yes, No) |

APPENDIX 3

MATHEMATICAL STATEMENT OF THREAT MODEL

By:

Stratton Jaquette and Chen-Hui Foo

Elements of the Threat

For the purposes of this study, two elements of the bombing threat are significant:

1. The frequency of incidents (or events)
2. The magnitude of each incident.

The magnitude of each event is in reality multi-dimensional, however for purposes of this study only certain attributes easily relatable to costs were considered. The attributes considered in the study were:

1. Property damage (dollars)
2. Injuries (number and extent)
3. Fatalities (number).

In addition , all incidents were subdivided into categories for ease in manipulating the data and for descriptive purposes. The entire set of incidents was categorized independently by several characteristics; i.e., motive, target, explosive type, etc., however for mathematical modelling purposes, the principal division made was according to target.

Model for Frequency of Incidents

It was assumed that incidents occur according to a Poisson process. This means that:

1. Incidents against one target occur independently of incidents against any other target
2. The number of incidents against any target in any time period can be modelled as a random variable with a Poisson distribution
3. The chance of an event occurring in any time interval does not depend on how long it has been since the last incident.

To the statistician, the Poisson process is fairly general as it allows for superposition of incidents of various types and allows the rate of incident occurrence to vary over time.

Quantitative Threat and Cost Model

The quantitative threat model can be stated compactly in mathematical terms that are useful for statistical estimation and analysis. The basic elements of the model are as follows:

- Let i ($i=1,2,3,\dots$) be the index of bombing targets, the primary event classification used to separate events into subpopulations
 $i=1$ for residential targets
 $i=2$ for commercial targets, etc.
- j ($j=1,2,3,\dots$) be the index for event attributes
 $j=1$ for property damage
 $j=2$ for injuries, etc.
- k ($k=1,2,\dots,12$) denotes the months January through December in a year

then let λ_{ik} = average rate of incidents against target i in month k .

Of interest is the random variable expressing the total threat in a given year. This is expressed in terms of each attribute; e.g.,

$$R_j = \text{total property damage.}$$

This is written as a triple summation, namely,

$$R_j = \sum_i \sum_k \sum_q R_{ijk}$$

where σ is the number of attacks on target i during period k

and R_{ij} , the magnitude of attribute j in an incident against target type i , is treated as a random variable for statistical purposes. Taking expected values (means), one obtains

$$\begin{aligned} A_j &= \text{expected or average value of the total attribute} \\ &\quad \text{(e.g., property damage) in the year for all sources} \\ &= \sum_i N_i A_{ij} \end{aligned}$$

where $N_i = \sum_{k=1}^{12} \lambda_{ik}$ (number of events against target i)

A_{ij} = expected or average magnitude of an incident against target i .

The magnitudes of the various attributes can be converted to a common denominator and further aggregated across attributes if each can be converted to cost, in dollars. This can be done by defining and obtaining the constants

$$C_j = \text{total dollar cost per unit of attribute } j \\ \text{(e.g., total social cost per dollar of} \\ \text{reported property damage, total social} \\ \text{cost per death, etc.)}$$

Then the total social cost of the entire threat in the expected value or average sense is

$$C = \sum_j C_j A_j$$

The variance of the total aggregate attribute experienced in a year; e.g., total property damage, and the variance in total cost can also be obtained directly.

Mean and Variance Consideration

The mean, or expected value, of a variable and the actual outcome experienced in practice may be quite different. This occurs whenever variability and unpredictability exist, and this variability is most easily expressed by the variance of the variable. Although these quantities do not define the entire probability distribution for any given population, they do provide all the essential information in some cases.

A most important result, taken from the Central Limit Theorem, is that if the entire population is composed of the sum of subpopulations or events that are independent, then the total random variable of attribute j , $R_j = \sum_i R_{ij}$ is approximately normally distributed with mean μ_j and variance σ_j^2 given by

$$\mu_j = \sum_i \mu_{ij} \quad \text{and} \quad \sigma_j^2 = \sum_i \sigma_{ij}^2$$

where μ_{ij} and σ_{ij}^2 are the mean and variances for the subpopulations.

This implies that rather definite probabilistic results can be obtained for the total, even if only uncertain results are obtainable for the subpopulations as long as the subpopulations are of approximately equal size. In particular, one obtains that the coefficient of variation (σ/μ = ratio of standard deviation to mean) for the total can be small despite large values for the components. In the data analyses below this is quite evident: individual subpopulations may have magnitudes estimated with a one sigma confidence range of $\pm 100\%$ of the expected value whereas the total may have an equivalent one sigma confidence range of $\pm 5\%$ of its expected value. Thus, wide confidence bands on individual subpopulation estimates (see Table 15 for example) do not rule out highly accurate aggregate estimates.

A second consideration in estimating the overall threat from available data is the homogeneity of the subpopulation. This can be examined by observing the empirical frequency distributions or probability functions. A homogeneous population will have a probability function of the form in curve (a) in Figure 1. As in the case with the bombing incident data, many of the distributions are of the form of curve (b), indicating that the subpopulation is not homogeneous but is in fact the sum of two populations, as indicated in curve (c).

This type of non-homogeneity is best treated by decomposing the population into two parts. Each can be treated separately, usually appealing to the Central Limit Theorem for simplifying the results.

Final Subdivision of Threat Model - Final Statement

The threat as decomposed above was further subdivided to ensure homogeneity because of the effects discussed above. Thus, each of the A_j (and random variables R_j) has been divided into two parts:

$$A_j = A_j^{(n)} + A_j^{(c)} \text{ from } R_j = R_j^{(n)} + R_j^{(c)}$$

where superscripts indicate whether the component is normal (n) or catastrophic (c). In the model applied to incident data the normal events were frequent and small, whereas the extraordinary events were infrequent, even rare, but catastrophic in magnitude.

This model contains the assumption that the normal and catastrophic processes can be viewed as being independent; i.e.,

$$A_j^{(n)} = \sum_{ik} \lambda_{ik}^{(n)} A_{ij}^{(n)} \text{ or } \sum_i N_i^{(n)} A_{ij}^{(n)}, \text{ and}$$

$$A_j^{(c)} = \sum_{ik} \lambda_{ik}^{(c)} A_{ij}^{(c)} \text{ or } \sum_i N_i^{(c)} A_{ij}^{(c)}.$$

Similarly, the variances can be treated separately but are additive.

Estimation of Threat Model Parameters

Given the models for the frequency of incidents in each subpopulation and the magnitude of each incident developed above, the empirical threat model is completed by estimating the parameters which describe these models. The following are the parameters or function needed:

Frequency of Events

λ_{ik} the rate of events against target type i
in month k

Magnitude of Event (For Each Attribute)

A_{ij} the mean magnitude of events against target
type i

Var_{ij} the variance of the magnitude of events against
target type i

Note that these need to be obtained for each subpopulation (subscripts i, j) and event categorization (superscripts n or c for normal or catastrophic). Also, the time dependence is needed; i.e., λ_{ik} is a function of time, k , and the A_{ij} and Var_{ij} may depend on time. Such time dependence is added explicitly in the notation below; i.e., A_{ijk} refers to month k and A_{ijl} refers to year l .

The procedure used to estimate the parameters in the threat model is given below. Results are contained in section 4.4. Note that the procedure below assumes yearly data.

Observations were obtained as follows from FBI and BATF data sources:

TA_{ijl} = the total magnitude of all incidents
(explosive and incendiary) against
target type i in year l measuring
attribute j

$TA_{ij\ell}^{(c)}$ = The total magnitude of all incidents (i, j, ℓ) of a "catastrophic" or unusual type (i.e., $TA_{ij\ell}^{(c)} = N_{i\ell}^{(c)} A_{ij\ell}^{(c)}$)

$TA_{j\ell} = \sum_i TA_{ij\ell}$ = total attribute j over all targets in year ℓ

$EA_{j\ell}$ = That portion of $TA_{j\ell}$ attributable to explosive bombings

$N_{i\ell}$ = Total number of explosive bombing incidents against target type i in year ℓ

$N_{i\ell}^{(c)}$ = Total number of "catastrophic" explosive bombing incidents against target type i in year ℓ

These data were available for the years $\ell = 1972, 1973, 1974, 1975$, and 1976 . Preliminary data were available for 1977 . From these data the following three quantities were estimated:

$N_{i\ell}^{(n)} = N_{i\ell} - N_{i\ell}^{(c)}$ = total number of "normal" explosive bombing events against target type i in year ℓ

$TA_{ij\ell}^{(n)} = (TA_{ij\ell} - TA_{ij\ell}^{(c)}) \times (EA_{j\ell} / TA_{j\ell})$ = total magnitude of all incidents (i, j, ℓ) of a "normal" type

$A_{ij\ell}^{(n)} = TA_{ij\ell}^{(n)} / N_{i\ell}^{(n)}$ = average magnitude of a "normal" event against i in ℓ measured in terms of j

Estimation of $A_{ij\ell}^{(n)}$ ($A_{ij\ell}^{(c)}$ Estimated Similarly)

$A_{ij\ell}^{(n)}$ data were obtained for $\ell = 1972$ through 1976 . A least squares estimator was developed to test the hypothesis that $A_{ij\ell}^{(n)}$ was not time dependent. This was done by computing the correlation coefficient (γ) between $A_{ij\ell}^{(n)}$ and ℓ using the

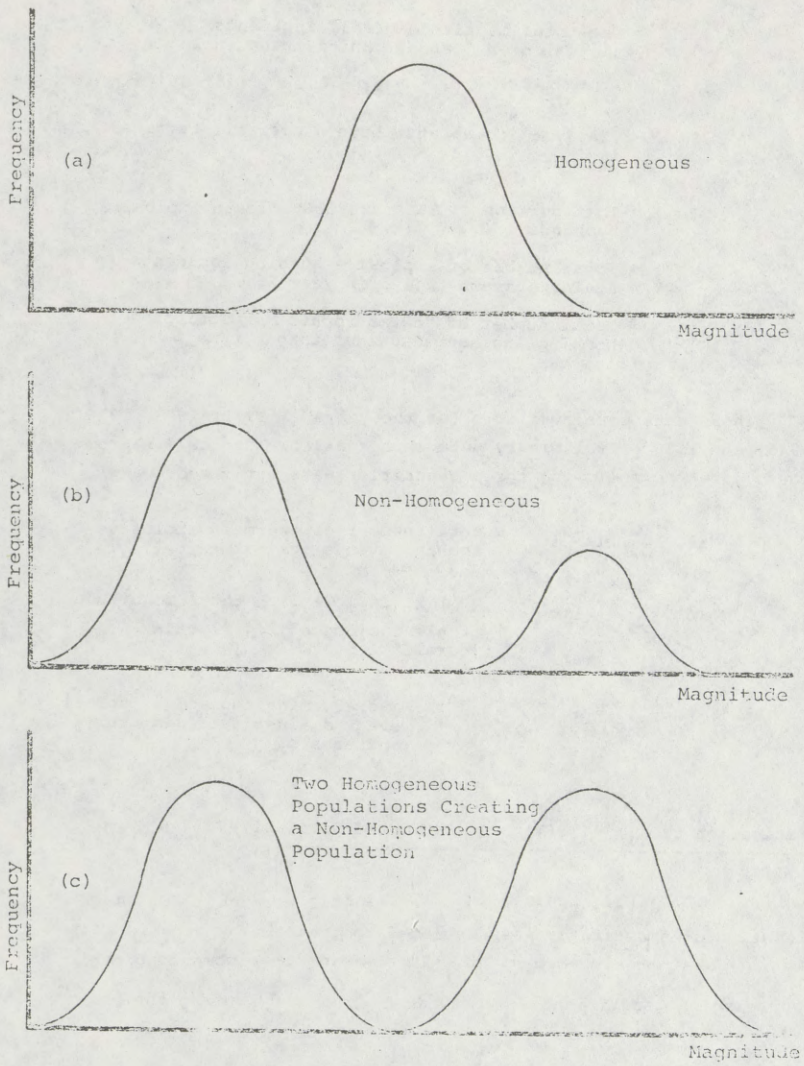


Figure 1: POPULATION PROBABILITY FUNCTIONS

least squares linear fit, and testing the significance of the trend by determining if the slope of such a line is significantly different from zero. The significance test statistic is:

$$(t_{\text{corr}}) = (\sqrt{n-2}) \frac{\gamma}{\sqrt{1-\gamma^2}}$$

where γ is the sample correlation coefficient and n is the sample size. γ , which lies between -1 and $+1$, is defined as follows:

For sample $(x_1, Y_1), (x_2, Y_2), \dots, (x_n, Y_n)$

$$\gamma = \frac{\sum_{i=1}^n (x_i - \bar{x})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

If the correlation is not significant, the prediction is that no temporal trend exists; e.g.,

$$\hat{A}_{ij}^{(n)} = \frac{1}{5} A_{ij\ell}^{(n)}$$

which is just the average value of A_{ij} over the past five years. If the slopes of the least-squares fits are significantly different from zero, the conservative predicted value was taken to be equal to $A_{ij}^{(n)}_{1977}$. An example of the method used is shown in Figure 2.

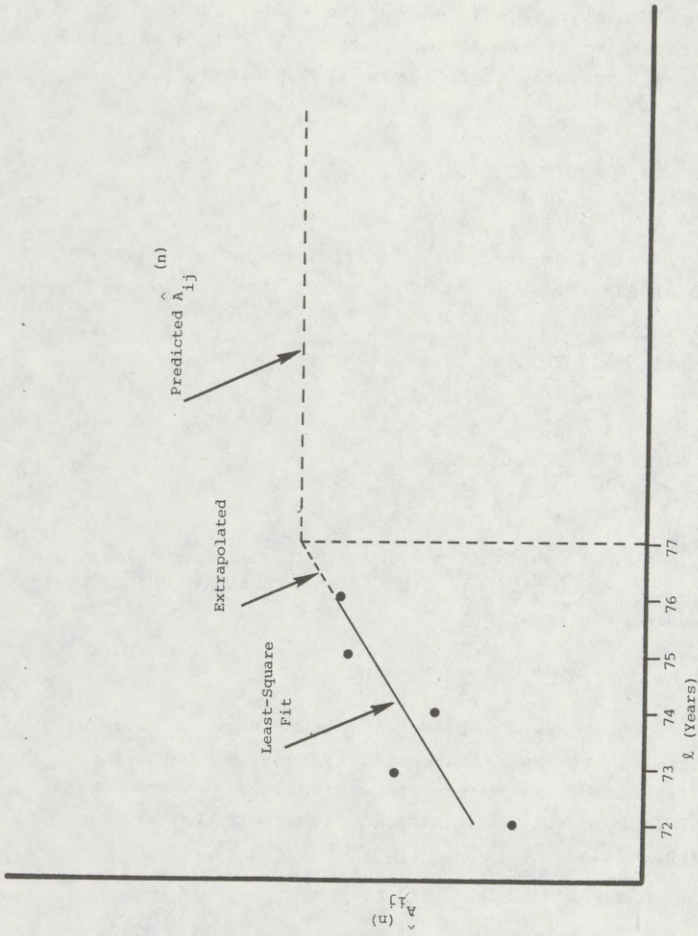


Figure 2: METHOD OF PREDICTING AN INCREASING BOMBING TREND

Estimation of $N_{il}^{(n)}$ ($N_{il}^{(c)}$ Estimated Similarly)

These are made exactly as outlined in the above paragraph using $N_{il}^{(n)}$ or $N_{il}^{(c)}$ to replace $A_{ijl}^{(n)}$ or $A_{ijl}^{(c)}$ in the above discussion.

For both A and N, the difference in estimating parameters for the normal events and the catastrophic events was that $\alpha=10\%$ * was used for normal events whereas $\alpha=0.1\%$ was used for catastrophic events. The small number of catastrophic events in the sample (60 catastrophic events for the period 1972 through 1976, zero in 1972 and 1973) and the magnitude of the events makes accurate prediction important, consequently the penalty for predicting a temporal trend falsely is severe. Thus, a more narrow level of significance was chosen for the catastrophic event parameters.

Assume that the quantity being tested is drawn from a t-distribution curve with $n-2$ degrees of freedom. In our analysis n is the number of years for which bombing data are available; e.g., $n=5$ for "normal" incidents and $n=3$ for "catastrophic" incidents.

Figure 3 shows the methodology of the t_{corr} significance test. If the t_{corr} falls within area A of the curve, the tested attribute shows a significant downward time trend. If t_{corr} falls within area B there is no significant time trend. If t_{corr} falls within area C there is a significant upward time trend.

* α = level of significance

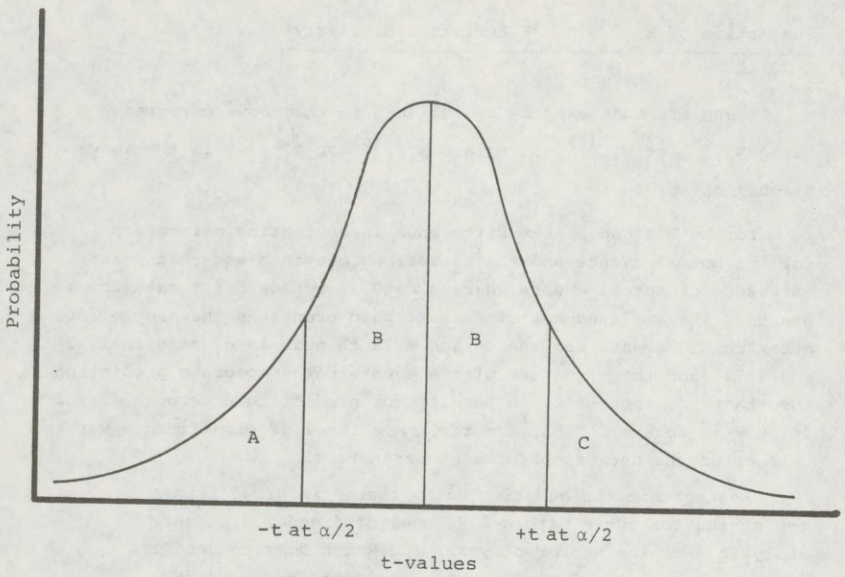


Figure 3: PROBABILITY CURVE FOR t-DISTRIBUTION WITH $n-2$ DEGREES OF FREEDOM AND SIGNIFICANCE LEVEL α

The Calculation of Confidence IntervalsCase 1: No Significant Trend

The confidence interval with significance level of α is:

$$\left(\bar{x} - C_{\alpha/2} \frac{\sigma}{\sqrt{n}}, \bar{x} + C_{\alpha/2} \frac{\sigma}{\sqrt{n}} \right)$$

$\bar{x}$ = average value or mean (e.g., $\bar{x} = \hat{A}_{ij}^{(n)}$ or $\hat{N}_{ij}^{(n)}$)

σ = standard deviation

$C_{\alpha/2}$ = cutoff point in the normal distribution with mean 0 and variance 1.

We used:

$C_{\alpha/2} = 3.3$ for "catastrophic" incidents

and

$C_{\alpha/2} = 1.64$ for "normal" incidents.

Case 2: Significant Trend

The confidence interval for "normal" incidents is:

$$\left(\hat{A}_{ij}^{(n)} - t_{\alpha/2} \sqrt{\text{Var}(\hat{A}_{ij}^{(n)})}, \hat{A}_{ij}^{(n)} + t_{\alpha/2} \sqrt{\text{Var}(\hat{A}_{ij}^{(n)})} \right)$$

$$t_{\alpha/2} = 2.353$$

$t_{\alpha/2}$ is the upper cutoff point for the Student's t distribution with $n - 2$ degrees of freedom.

Similar calculation for $\hat{N}_i^{(n)}$, $\hat{N}_i^{(c)}$, $\hat{A}_{ij}^{(c)}$.

"Raw" Data

Bombing data extracted from FBI and NBDC summary reports for the years 1972 through 1976 are presented in the following tables. These "raw" data were used in computing the bombing predictions shown in Tables 14, 15 and 16 of the text.

Target	Year			
	1972 $\bar{x} = 1972$	1973 $\bar{x} = 1973$	1974 $\bar{x} = 1974$	1975 $\bar{x} = 1975$
Private Residences	160	181	176	188
Commercial Establishments	189	161	176	158
Manufacturing Facilities	13	7	16	12
Vehicles	106	99	115	99
Aircraft	2	1	0	1
Schools	80	93	91	74
Utilities	28	37	59	44
Law Enforcement Agencies	18	23	14	16
Government Property	25	21	39	52
Transportation Facilities	11	13	12	9
Persons	11	18	20	36
Recreation Facilities	14	18	24	13
Premature Explosions	*	22	29	41
Construction Sites and Equipment	*	7	22	20
Other	57	41	68	63

* FBI did not have detailed data for this category

Table 1: FREQUENCY OF "NORMAL" EXPLOSIVE BOMBINGS ($N_{12}^{(n)}$)
(FBI Data from 1972 through 1976, Excluding Catastrophic Bombings)

Target	Year		
	$\bar{N}_{i1974}$	$\bar{N}_{i1975}$	$\bar{N}_{i1976}$
Private Residences	0	2	1
Commercial Establishments	1	8	6
Manufacturing Facilities	1	1	1
Vehicles	0	1	1
Aircraft	1	0	1
Schools	0	0	1
Utilities	2	1	0
Law Enforcement Agencies	4	2	0
Government Property	1	3	5
Transportation Facilities	1	1	0
Persons	0	1	1
Recreation Facilities	0	1	2
Premature Explosions	0	0	1
Construction Sites and Equipment	0	2	3
Other	1	2	1

Table 2: FREQUENCY OF CATASTROPHIC BOMBINGS ($N_{il}^{(c)}$)

Target	Year				
	1972 $\ell = 1972$	1973 $\ell = 1973$	1974 $\ell = 1974$	1975 $\ell = 1975$	1976 $\ell = 1976$
Private Residences	37	44	31	42	40
Commercial Establishments	55	48	52	52	33
Manufacturing Facilities	3	5	4	6	4
Vehicles	36	38	40	45	26
Aircraft	2	1	0	2	0
Schools	26	21	16	18	14
Utilities	7	6	9	6	4
Law Enforcement Agencies	13	14	8	12	7
Government Property	20	16	19	16	8
Transportation Facilities	7	16	7	3	3
Persons	5	13	17	12	32
Recreation Facilities	4	7	8	4	2
Premature Explosions	*	0	0	0	0
Construction Sites and Equipment	*	7	2	4	2
Other	9 ⁺	0	3	1	1

* FBI did not have detailed data for this category

+ We did not use 1972 data in the prediction of bombings for "other" category

Table 3: FREQUENCY OF BOMBING ATTEMPTS ($N_{il}^{(n)}$)
(FBI Data from 1972 Through 1976)

Target	Year				
	1972 Σ = 1972	1973 Σ = 1973	1974 Σ = 1974	1975 Σ = 1975	1976 Σ = 1976
Private Residences	3	4	0	5	3
Commercial Establishments	1	5	0	4	0
Manufacturing Facilities	0	0	0	3	6
Vehicles	7	0	1	1	2
Aircraft	0	0	0	0	0
Schools	0	0	0	0	0
Utilities	0	0	0	0	0
Law Enforcement Agencies	0	0	0	0	2
Government Property	9	0	0	4	5
Transportation Facilities	0	0	0	0	2
Persons	22	22	23	0	0
Recreation Facilities	6	0	0	23	37
Premature Explosions	*	26	35	0	0
Construction Sites and Equipment	*	0	0	4	21
Other	0	0	1	0	0
					2

* FBI did not have detailed data for this category

Table 4: FATALITY RATE PER 100 "NORMAL" BOMBINGS (100 x A₁₃₂⁽ⁿ⁾)
(Number of Victims Per 100 Bombings)
(FBI Data from 1972 through 1976)

Target	Year				
	1972 f = 1972	1973 f = 1973	1974 f = 1974	1975 f = 1975	1976 f = 1976
Private Residences	29	28	14	16	9
Commercial Establishments	16	16	12	9	14
Manufacturing Facilities	0	0	5	16	14
Vehicles	22+	9	7	6	4
Aircraft	0	0	0	0	0
Schools	6	10	21	6	8
Utilities	3	2	4	0	2
Law Enforcement Agencies	27	6	17	29	36
Government Property	5	18	4	3	3
Transportation Facilities	0	6	13	12	9
Persons	102	66	92	97	101
Recreation Facilities	63+	4	0	17	6
Premature Explosions	*	101	86	123	83
Construction Sites and Equipment	*	10	0	0	0
Other	17	7	2	9	17

* FBI did not have detailed data for this category

+ We suspect these "outliers" are due to some catastrophic incidents. Since detailed information is lacking, we delete these incidents in the model prediction.

Table 5: INJURY RATE PER 100 "NORMAL" BOMBINGS (100 x A_{12L}⁽ⁿ⁾)
(Number of Victims Per 100 Bombings)
(FBI Data from 1972 Through 1976)

Target	Year				
	1972 $\bar{x} = 1972$	1973 $\bar{x} = 1973$	1974 $\bar{x} = 1974$	1975 $\bar{x} = 1975$	1976 $\bar{x} = 1976$
Private Residences	2.05	3.1	3.56	4.5	3.9
Commercial Establishments	14.52	17.1	16.4	13.6	12.0
Manufacturing Facilities	7.06	145 ⁺	11.3	23.2	33.7
Vehicles	5.22	2.1	2.2	8.6	2.18
Aircraft	789 ⁺	0	0	10.0	75.0
Schools	0.97	2.2	4.7	8.8	2.52
Utilities	6.7	1.48	3.6	2.63	3.51
Law Enforcement Agencies	6.8	4.16	5.25	3.46	5.66
Government Property	29.57 ⁺	5.55	3.8	5.0	1.77
Transportation Facilities	2.36	1.7	1.3	9.0	3.26
Persons	0.15	.86	1.2	1.42	2.70
Recreation Facilities	1.0	2.06	0.73	0.018	0.37
Premature Explosions	*	0.23	0.12	2.19	0.07
Construction Sites and Equipment	*	24.6	15.0	59.8	14.4
Other	1.9	1.96	2.1	0.96	7.1

* FBI did not have detailed data for this category

+ We suspect these "outliers" are due to some catastrophic incidents. Since detailed information is lacking, we delete these incidents in the model prediction.

Table 6: AVERAGE PROPERTY DAMAGE PER "NORMAL" BOMBING INCIDENT ($A_{11\ell}^{(n)}$)
(1976 K\$)

APPENDIX 4

ESTIMATE OF THE DETERRENCE PARAMETER
IN THE BOMBING MODEL

By:

Thayer Watkins

There is very little empirical information on the relationships between crime rates and deterrent effects of the severity of punishment and the probability of arrest. Studies of the factors involved in homicide and the deterrents thereto have been carried out in attempts to clarify the controversy about capital punishment. The question of the deterrent effect of capital punishment is not relevant here, but the same studies provide estimates of the influence of arrest rates on the homicide rate. A recent study by Isaac Ehrlich, "The Deterrent Effect of Capital Punishment: A Question of Life and Death," *American Economic Review*, Vol. 65 No. 3 (June 1975), pp. 397-417, estimated the relationships between the homicide rate, the arrest rate, the conviction rate the rate of capital punishment of those convicted and other socio-economic variables. Ehrlich found (using data for 1935 through 1969) that if (all other factors are held constant) the arrest rate goes up proportionally by one percent then the homicide rate goes down proportionally by 1.553 percent. The exact magnitude of this change depends upon what other variables are included in the equations but the 1.553 ratio is representative of the results obtained from the various models.

Ehrlich's results are still controversial, particularly when they deal with the effect of changes in the execution rate on the homicide rate. Strictly they apply only to homicides. But Ehrlich's results suggest the ratio of proportional changes in the rate of decrease in bombing (or the number of bombers) and the proportional changes in the arrest rate is on the order of 1.5. This suggests that if the arrest rate were increased proportionally by 50% the proportion of bombers deterred would be 75%. This would be the complete deterrent effect due to the increase in the arrest rate. In the model being used for the cost-benefit analysis, the deterrent effect on habitual bombers and first time bombers are assumed to be equal. The deterrent effect on habitual bombers is extended over a period of time so the full result of the deterrence is not achieved for a number of years. For example, if one percent of the habitual bombers are deterred each year

then after 20 years a total of 17.4% would be deterred. In order for 75% to be deterred over a 20 year period the annual proportion deterred would have to be 7%.

Based on the above study, the deterrent effect on new bombers of a 50% increase in the arrest rate might be about 75% while that of habitual bombers might be about 7% annually. In the model used in the analysis it was not possible to separate the two effects analytically. The use of a 7% overall deterrent effect would represent a conservative estimate of deterrence. Of course, the applicability of Ehrlich's study (which itself has not gained universal acceptance) to explosive tagging may be questioned. Consequently, in concordance with our philosophy of being conservative in our estimates of program effectiveness, we will take a 5% annual deterreny as a "realistic" value.

APPENDIX 5

QUANTITATIVE COST-BENEFIT MODEL

By:

Thayer Watkins and Julius Roth

The first steps in developing the model involve the selection of appropriate symbols to be used in the standard formulae of cost-benefit analysis. This is done below.

Benefit/cost ratio	= β
Social cost of program in t^{th} year	= C_t
Social benefit of program in t^{th} year	= B_t
Social cost of "direct" bombing threat in t^{th} year	= T'_t
Social cost of "indirect" bombing threat in t^{th} year	= T''_t
Total social cost of bombing threat in t^{th} year	$T_t = T'_t + T''_t$
Discount factor in the t^{th} year	= ϕ_t
Effective annual interest rate	= r
Number of years	= τ

The benefit/cost ratio is then defined as follows:

$$\beta = \frac{\sum_{t=1}^{\tau} \phi_t B_t}{\sum_{t=1}^{\tau} \phi_t C_t} \quad (1)$$

$$\phi_t = (1+r)^{-t} = e^{-pt} \quad (2)$$

where $p = \ln(1+r)$.

The crux of the model is the quantitative definition of the benefit B_t in terms of measurable variables. To do this we must first define an additional set of symbols:

Average bombing cost per bomber	= c
Bombings per year per habitual bomber*	= h
Number of habitual bombers per bombing	= z
Fraction of habitual bombers	= x
$\frac{\text{habitual bombers}}{\text{habitual} + \text{one-time bombers}}$	

* Bombers who have bombed previously and will continue to bomb

Number of active habitual bombers <u>before</u> tagging program is implemented	=	N
Number of active habitual bombers <u>after</u> tagging program is implemented	=	N'
Annual influx of new habitual bombers*	=	g
Fraction of bombings <u>before</u> program for which there is at least one arrest	=	a
Fraction of bombings <u>after</u> program for which there is at least one arrest	=	na
Deterreny rate of program on habitual bombers	=	δ
Fraction of new (habitual-bombers-to-be) deterred by program	=	σ
Annual social cost of bombings by habitual bombers	=	T_h
Annual social cost of bombings by one-time bombers	=	T_s
Annual social benefits of program due to the decrease of bombings by habitual bombers	=	B_h
Annual social benefits of program due to the decrease of bombings by one-time bombers	=	B_s
Annual social benefits of program due to discovery of bombs via detection tagging	=	B_f
Fraction of bombs detected before they explode via detection tagging	=	f

With these variables the following differential equations give the program's cost benefits generated solely by its increased arrest rate and deterrent effect on habitual bombers. The net rate of change in the number of active habitual bombers is equal to the new bombers that are not arrested minus the number of arrests of the active habitual bombers. Thus, before the program:

$$ahzN = \text{number of bombers arrested annually}$$

and

$$\Delta N = -ahzN\Delta t + (1-a)g\Delta t$$

* Bombers who have not bombed previously but will bomb more than once.

and in the limit of $\Delta t \rightarrow 0$

$$\frac{dN}{dt} = -ahzN + (1-a)g \quad (3)$$

After the program:

$\delta N \Delta t$ = number of active habitual bombers deterred

$N' - \delta N' \Delta t = N' (1 - \delta \Delta t)$ = number of habitual bombers not deterred

$g \Delta t$ = number of new bombers deterred

$g(1 - \sigma) \Delta t$ = number of new bombers not deterred

na = fraction of habitual bombers arrested

σ = fraction of new bombers deterred by program

Then, as above

$$\Delta N' = -nahz(1 - \delta \Delta t)N' \Delta t - \delta \Delta t N' + (1 - na)(1 - \sigma)g \Delta t$$

or

$$\frac{dN'}{dt} = -[nahz + \delta]N' + (1 - na)(1 - \sigma)g \quad (4)$$

in the limit of $\Delta t \rightarrow 0$.

In both these equations the negative term represents the "removal rate" of bombers and the positive term represents the net influx of new bombers.

The projected social costs of bombings (without tagging program) are approximately constant from year to year. This implies that there is no time variation in the number of bombers and that $\frac{dN}{dt} = 0$ in equation (3). This condition determines that

$$g = \frac{ahzN_0}{1-a}$$

where N_0 is the number of active bombers before the program is implemented.

Equation (4) can be written as

$$\frac{dN'}{dt} = -AN' + D$$

where

$$A = nahz + \delta$$

and

$$D = (1-na)(1-\sigma)g = (1-na)(1-\sigma)\frac{ahz}{1-a}N_0$$

or, by multiplying through by e^{At}

$$e^{At}\left(\frac{dN'}{dt} + AN'\right) = De^{At}$$

which reduces to:

$$d(e^{At}N') = De^{At}dt$$

Integration gives:

$$N'(t) = N_0 e^{-At} + \frac{D}{A}(1 - e^{-At}) \quad (5)$$

The annual social cost of bombings due to "habitual" bombers without the program is

$$T_h = c(hzN_0 + g) \quad (6)$$

The corresponding social cost with the program is

$$T'_h = c[hzN' + (1-\sigma)g]$$

The annual benefit, B_h is

$$T_h - T'_h = chz(N_0 - N') + c\sigma g \quad (7)$$

Since the number of bombers prior to the program is N_0 substitution of equation (5) into equation (7) gives

$$B_h(t) = chz(1-e^{-At})(N_0 - \frac{D}{A}) + \frac{c\sigma ahz}{1-a}N_0$$

and further substitution and rearrangement leads to:

$$B_h(t) = chzN_0[(1-e^{-(nahz + \delta)t})(1 - \frac{(1-na)(1-\sigma)ahz}{(1-a)[nahz + \delta]} + \frac{\sigma a}{1-a})]$$

but from equation (6)

$$T_h = chzN_0 + \frac{c ahz}{1-a}N_0 = chzN_0(\frac{1}{1-a})$$

Thus, B_h reduces to

$$B_h(t) = T_h[(1-e^{-At})(1-a - \frac{(1-na)(1-\sigma)ahz}{nahz + \delta} + \sigma a)] \quad (8)$$

If a new variable α is defined as $\alpha = ahz$, equation (8) can be further simplified to:

$$\begin{aligned} B_h(t) &= T_h[(1-e^{-(n\alpha + \delta)t})(1 - \frac{\alpha(1-\delta) + \delta a(1-\sigma)}{n\alpha + \delta})] \\ &= T_h[1-e^{-(n\alpha + \delta)t}][1 - \frac{(1-\sigma)(\alpha + \delta a)}{n\alpha + \delta}] \end{aligned} \quad (9)$$

The discounted value of benefits $\int_0^T \delta_t B_h$ is more accurately written as

$$\int_0^T B(t)e^{-pt}dt, \text{ where } p = \ln(1+r),$$

or

$$T_h[1 - \frac{(1-\sigma)(\alpha + \delta a)}{n\alpha + \delta}]\int_0^T (1-e^{-At})e^{-pt}dt = T_h[1 - \frac{(1-\sigma)(\alpha + \delta a)}{n\alpha + \delta}]\int_0^T (e^{-pt} - e^{-(p+A)t})dt$$

and finally

$$\int_0^T \delta_t B_h = T_h[1 - \frac{(1-\sigma)(\alpha + \delta a)}{n\alpha + \delta}][\frac{1-e^{-pT}}{p} - \frac{1-e^{-(p+n\alpha + \delta)T}}{p+n\alpha + \delta}] \quad (10)$$

Equation (10) gives the cost benefits that are realized over a period of τ years because of the increased arrest rate and deterrent effect on bombers that bomb more than once. We must also take into account the costs and program benefits attributable to one-time bombers. By definition, the social costs of one-time bombers are not directly affected by the arrest rate; i.e., they have already bombed and will bomb no more whether or not they are arrested. However, they can be deterred by the program. Thus, if v is the number of one-time bombers before the program, $T_s = ch'z'v$ where T_s is the annual social cost of one-time bombings, h' is the number of bombings per year per one-time bomber ($= 1$ by definition of one-time bombers), and z' is the number of one-time bombers per bombing. After the program, the social cost, T_s , becomes $T'_s = ch'z'(1-\sigma')$, where σ' is the fraction of one-time bombers deterred by the program, and $\Delta T_s = B_s = ch'z'\sigma'$, but $ch'z'v = T_s$, therefore B_s is simply $\sigma'T_s$ and

$$\sum_1^{\tau} \theta_t B_s = \sigma' T_s \sum_1^{\tau} \theta_t \quad (11)$$

We must further consider the benefits to be derived from detecting bombs before they explode. Let f be the fraction of bombs detected (before they explode) as a direct result of the detection tagging program. Then the benefit B_f attributable to pre-explosion detection is simply

$$B_f = f(T_h + T_s)$$

and

$$\sum_1^{\tau} \theta_t B_f = f(T_h + T_s) \sum_1^{\tau} \theta_t = f T \sum_1^{\tau} \theta_t \quad (12)$$

It is probable that direct and indirect social costs of bombings will be affected somewhat differently by the tagging program. It is to be expected that in the first few years of the program indirect costs are likely to be reduced to a lesser degree than direct costs. For example, investigative costs and

court costs may actually increase because of better investigative leads provided by the tagging program. For some years after program implementation, the cost of security guards is also likely to be unchanged since only a very minor portion of their time is truly bomb-devoted. Of course, direct costs (fatalities, injuries and property damage) will be directly reduced by the increased arrest rate and deterrent effects of the program.

In view of the above considerations, we should apportion somewhat different benefits for direct and indirect social costs. This is conveniently done by assigning a factor θ , $0 < \theta < 1$, to the indirect cost terms in equations (10), (11), and (12). For example, in equation (10) T_h now becomes

$$T_h = T'_h + \theta T''_h$$

Finally, by combining equations (10), (11), and (12), and assuming $\sigma = \sigma'$, we obtain the overall cost benefit of the program:

$$\begin{aligned} \sum_1^{\tau} \theta_t B_t &= x(T' + \theta T'') \left[1 - \frac{(1-\sigma)(\alpha + \delta a)}{n\alpha + \delta} \right] \left[\frac{1 - e^{-p\tau}}{p} - \frac{1 - e^{-(p+n\alpha+\delta)\tau}}{p+n\alpha+\delta} \right] \\ &+ (1-x)(T' + \theta T'') \sigma \sum_1^{\tau} \theta_t + (T' + \theta T'') f \sum_1^{\tau} \theta_t \end{aligned} \quad (13)$$

where x = the fraction of habitual bombers, and subscript t has been deleted in the T' and T'' terms because current projections indicate that both T' and T'' do not vary with time.

A quick check of the validity of equation (13) is obtained by examining it under limit conditions of no program ($\delta = 0$, $f = 0$, $\sigma = 0$ and $n = 1$) or a program that is 100% effective ($n\alpha = 1$ or $\sigma = 1$, or $f = 1$). With no program we should obtain

$$\sum_1^{\tau} \theta_t B_t = 0$$

and with a 100% effective program

$$\sum_1^{\tau} \beta_t B_t = (T' + \theta T'') \sum_1^{\tau} \beta_t$$

With $\sigma = 0$ and $f = 0$, the last two terms of equation (13) are obviously zero and the first term is also zero because the term

$$1 - \frac{(1-\sigma)(\alpha+\delta a)}{n\alpha+\delta} = 1 - \frac{\alpha}{\alpha} = 0$$

Thus, equation (13) gives the correct result for this limit condition.

For the other limit condition it will be simpler to examine equation (5) first and then proceed to equation (9). In the limit of large t , $N(t)$ of equation (5) approaches

$$D/A = \frac{(1-na)(1-\sigma)ahzN_0}{[nahz + \delta](1-a)} = \frac{N_0(1-na)(1-\sigma)\alpha}{(n\alpha+\delta)(1-a)}$$

Now, if $\sigma = 1$, and the other terms are finite*

$$N'(t) = \frac{N_0(1-na)0\alpha}{(n\alpha+\delta)(1-a)} = 0$$

which is the expected result since all habitual bombers have been deterred. Similarly, for $na = 1$, $D/A = 0$ and consequently $N'(t) = 0$, which is the expected result since all habitual bombers have been arrested.

Equation (9), for $\tau = \infty$, becomes:

$$B_h = T_h \left[1 - \frac{(1-\sigma)(\alpha+\delta a)}{n\alpha+\delta} \right]$$

* The argument still holds if $\delta = 0$ or $\delta > 0$.

Now, for $\sigma = 1$

$$B_h = T_h$$

which is the expected result.

For $na=1$, $\delta=\sigma=0$ since all habitual bombers are arrested and there is no deterrent effect. Then

$$B_h = T_h \left[1 - \frac{\alpha}{n\alpha}\right] = T_h \left(1 - \frac{1}{n}\right) = T_h (1-a)$$

This somewhat unexpected result shows that it is more effective to deter bombers than arrest them because "habitual" bombers, by definition, have to commit one bombing before they are arrested!

APPENDIX 6

FATALITY COSTS

By:
Thayer Watkins and Lynne Silverman

In 1976, thirty-nine people lost their lives in explosive incidents and 176 were injured. A reduction in bombing incidents will, therefore, result in fewer casualties and produce, at the same time, a more quiescent atmosphere and a less fearful public. The social costs associated with the rise of death and injury can be estimated using available occupational and wage information.

It is well known that some occupations involve a higher risk of injury or death and, therefore, persons employed in these jobs can command somewhat higher wages than employees in less risky occupations. But other factors, in addition to risk, affect the pay differentials in different jobs. Education, geographic location, and union membership are several important determinants of wage rates. A statistical technique called multiple regression analysis can be used to determine the significance of the relationship between wage rates and various factors that affect the level of pay.

Such an analysis was carried out by two economists at the University of Rochester; Richard Thaler and Sherwin Rosen. Using data obtained from the 1967 Survey of Economic Opportunity which gives the earnings, education, occupation and other relevant socio-economic characteristics of a sample of U. S. households, 904 adult males were chosen for their investigation. The influence of some of the factors used by Thaler and Rosen to explain differences in wage rates are given in Table 1. They actually estimated the influences based upon several different assumptions. The results given in Table 1 are for the comprehensive case. The correlation coefficients indicate increases in weekly wages in 1967 dollars which would result from a unit change in the dependent variable.

The statistical results obtained by Professors Thaler and Rosen indicate that the wage rate will be \$5.20 per week higher for a job having an increased chance of a fatality of one out of 1,000. The average number of weeks worked in 1966 for the individuals in the same job was 49.4 weeks. Therefore, if the risk of death were decreased by one out of 1,000, then these individuals would be willing to work for approximately \$260 less ($50 \times \5.20).

<u>Independent Variable</u>	<u>Correlation Coefficient (Measured in Different Units)</u>	<u>Standard Deviation of Coefficient</u>
Risk	5.20	2.19
Urban	15.71	2.95
Northeast*	-4.29	3.67
South*	-8.90	3.74
West*	10.30	4.18
Age	3.81	0.83
(Age) ²	-.0468	.0097
Education	3.27	2.40
(Education) ²	-.021	.128
White	22.93	4.50
Union Membership	27.16	3.23
Full-time	-0.86	12.60
Hours Worked	1.41	.12
Socioeconomic Status 1	4.68	5.17
Socioeconomic Status 2	-17.17	3.34
Socioeconomic Status 3	-20.69	5.53

* All relative to the northcentral region

Source: R. Thaler and S. Rosen, "The Value of Saving a Life," in N. Terleckyj, Household Production and Consumption (New York: Columbia University Press, 1975), pp. 265-298

Table 1: MULTIPLE REGRESSION ESTIMATES OF THE
DETERMINANTS OF THE WEEKLY WAGE RATE, 1967

Or collectively, a group of 1,000 individuals would pay \$260,000 so that one life would be saved. The implication is then that saving lives has a value of \$260,000 each for those persons subject to the risks.

Since this analysis was done in 1967, the figures must be adjusted upward to reflect the rise in prices. During the last ten years prices (including wages) have risen approximately 81%. Thus, the converted value of saving a life for our analysis would be approximately \$470,000. This is the value that an individual places on a reduction in the risk of death. But in addition, family and friends also suffer. The magnitude of this component is, of course, very difficult to measure.

Thaler and Rosen found that for the married man the increase in risk of one out of 1,000 increased the weekly rate to \$7.91 per week, rather than \$5.20 for the single individual, or for 50 working weeks per year, \$395. The higher value for the married man reflects indirectly the concerns of people that care for an individual and, therefore, is equally applicable for all persons both married and unmarried, for there would also be a value to the parents of reducing the risk of fatality to their children.

Although a much larger increment for the value of reduced risk to family and friends is justified, we assume a social cost of risk equal to 50% of that experienced by the individual - \$7.80 or $\$5.20 + \2.60 , which closely approximates Thaler and Rosen's estimate for married men. The yearly value of \$395 must now be increased to reflect the 81% inflationary rise in prices since 1967. As in the previous example, we see that a reduced risk of one out of 1,000 will be approximately \$750 per year, or equivalently \$750,000 for each life saved.

APPENDIX 7

ESTIMATE OF THE SOCIAL COSTS OF INJURIES

By:

Lynne Silverman and Thayer Watkins

The assessment of injury costs in equivalent dollar amounts is clouded with philosophical and moralistic issues of a highly controversial nature. Of course, any injury would have a cost at least equal to the expenses associated with medical treatment plus the value of earning lost during the period of disability. But, in addition, there is a cost that, unfortunately, is not easily measured. Any injury has a concomitant effect of disordering one's life - a burdensome inconvenience not only to the individual but also to family and close friends. An analogous conceptualization more familiar to the general public would be the legalistic terminology "pain and suffering".

The categorial subdivision of injuries used in this economic analysis is determined to a large degree by the detail available in the Federal Bureau of Investigation's Monthly Incident Summaries. Table 1 gives the distribution of injury types for a sample period of January 1976 through June 1977.

Injuries involving a loss of limb, while only 9.5% of total injuries, account for 94.1% of all associated costs. This is certainly congruent with our expectations, for in addition to medical treatment, the individual faces a permanent adjustment in life style. Perhaps former employment is no longer feasible. This could involve not only lost earning power but also the psychic rewards from satisfying employment. And even though job status or expected future earnings remain unchanged, the mundane functions of daily life become more burdensome than before the injury. To estimate a lower bound to these costs permanent disability ratings were applied as shown below.

Due to the paucity of data regarding specific casualties, some generalizing assumptions were made in assessing the social costs of injuries.

1. If the type of injury was not given in the data, it was assumed to be minor in nature, minor being defined as:

An injury of such nature that it would require medical examination and/or treatment by a physician. While a person's usual activities would be curtailed for a limited period, the injury would not require extended hospitalization or bed-stay.

2. Injuries necessitating hospitalization assumed an average length of confinement of 8.7 days.*
3. Injuries categorized as severe were assumed to require hospitalization two times greater than the average length of stay.
4. Lost wages were calculated using an average wage of \$6.00 per hour.
5. Hospital costs were estimated at \$200 per day; physician's visits at \$25.00 per visit.
6. Disability payments were calculated using standard ratings at age 39, from the State of California Schedule for Rating Permanent Disabilities, and present value calculated using a 6% discount factor. Given this, the costs per injury were assigned as follows:

<u>Table 1</u>	
<u>Injury Type</u>	<u>Social Costs</u>
Minor	\$ 108
Hospitalization	2,700
Severe	6,800
Loss of Limb	272,000
Severe and Loss of Limb	316,000

Total injury costs based on the above estimations are presented in Table 2.

As becomes immediately apparent, any projections will be extremely sensitive to the trend exhibited by injuries involving loss (es) of limbs.

Using our model prediction, described in Section 4.4 and assuming

* Source: American Hospital Association, Statistical Abstract of the United States.

a distribution similar to the period 1976 through June 1977, social costs would approximate:

Table 2

		<u>Yearly Cost</u>
Minor	135	14,580
Hospitalization	23	61,985
Severe Injury	43	191,970
Loss of Limb	12	1,560,468
Severe and Loss of Limb	<u>9</u>	<u>1,382,760</u>
	222	\$3,311,763

APPENDIX 8

THE SOCIAL COST OF DISRUPTION AND
DISLOCATIONS OF BOMBING

By:
Thayer Watkins

When a bomb explodes some damage is immediate such as death, injuries, and physical destruction, but there are also other economic costs to society of having the bombed facility out of service. Society may also lose the services of this facility for a period of time, and customers may have to accept less preferred or costlier services. For example, if a store is closed because of bombing its customers must incur the inconvenience of going to another store and that store's customers must suffer the inconvenience of increased crowding. A bombing thus denies society the effective services of some labor and capital resources and increases the costs to customers of obtaining the goods and services they desire. As will be shown, the social cost of service disruption by bombing is at most two to three million dollars.

The loss of production and the loss of the services of labor and capital are two closely related aspects of the same thing. When facilities cannot be used to produce goods or services, production is lost, but the expenses of raw materials and utilities are also not incurred. The net loss is the value of the production less the cost of products and services purchased from other firms; this quantity in economics is called the value-added by the firm.

A bombing incident in a manufacturing firm illustrates the magnitude of the problem. The bombing killed one individual, injured several others, and did physical damage estimated at about \$300,000. There were over 16,000 man-hours of labor lost which had a value of approximately \$76,000. However, executives had to work overtime handling the problems created by the bombing. The facilities were idled for about 27 hours. The estimated loss in production was \$406,000 and the loss in profits was \$132,000. The loss in value-added amounted to about \$208,000. Thus the indirect economic damage done by the bomb amounted to about 70% of the direct physical damage ($\frac{208,000}{300,000} \times 100$).

Another industrial firm experienced a bomb explosion causing \$84,000 worth of damage. The estimated labor time lost amounted to 92% of the physical damage. The value of the production time lost was estimated at \$90,000 which is 107% of the physical damage. Therefore, for the estimates of bombed manufacturing facilities, we will assume the indirect damage equal to 100% of the physical damage. This suggests that since in 1976 the total value of the physical damage to manufacturing facilities was \$613,000, the economic value of the loss in value-added was the same order of magnitude.

Estimates of the dislocation costs for the other industries are given below. In some cases little direct information is available so that order of magnitude estimates have to be based on plausible guesses.

Electrical power along with telephone communications, transportation and computer services constitute vital services the disruption of which would halt significant amounts of other production. There may also be other vital services such as in finance. But electrical service is clearly a very critical component of the economy.

The crucial parameters for bombing disruptions to utility services were determined to be the frequency of bombing, the extent of disruption (number and type of customers) and time of disruption. The data source of the estimates obtained is the FBI Bombing Incident Summary Reports for 1975, 1976 and the first half of 1977.

In 1975, there were 34 actual bombings of utilities, including telephone, water, power and gas, all but one using explosives. The total damage, according to FBI estimates, was about one quarter of a million dollars. There were no injuries or fatalities. In 1976, the number of actual explosive bombings of public utilities and facilities, not counting telephone facilities, was 15. The estimated property damage was about \$16,200. The average explosion of this type cost \$1,080. From January through May 1977, there were 12 explosive bombings causing \$455,300 damage with an average of damage of \$37,900.

From the monthly FBI bombing reports it is not possible to ascertain definitely whether there was disruption of services in particular cases. It is clear from a review of the bombings of public utility facilities that the incidents in which disruption of services was intended were concentrated primarily in California, Tennessee and Kentucky. Over the 18-month period from January 1976 through June 1977, there were 19 bombings and another four attempted bombing incidents in which disruption of electrical services was intended. There were five definite and 10 probable disruptions of services. Treating half the doubtful cases as definite disruptions there would have been 10 per year.

The worst case of disruption of electrical service occurred in 1975 in the San Jose, California area. Thirty-five thousand people, approximately 10,000 households, lost service for several hours. Less extensive disruptions occurred in March and April 1977 in which 3,000 customers in Marin County, California lost service for two hours and 7,500 customers in Sonoma, California also lost service. It is difficult to describe an average or typical incident of the disruption of service with this small sample, but a figure of 7,000 residential customers with services disrupted for one hour would be a plausible figure to use.

If the average customer would have utilized 10¢ worth of electricity during those two hours (this is likely to be an over-estimate) the loss of sales to the electrical utility would be \$700. Only about half of this would be value-added and therefore the loss to the electrical utility of their contribution GNP would be \$350 per incident. There were 20 explosive bombings of utilities in 1976, not all of them involved electrical power but if the electrical power case was applicable to the other utilities the social cost would have been only \$7,000 for the nation for the year.

The approach used in estimating dislocation costs assumed that the power outage destroys the total value of the time of the customers during the incident.

If the average value of time is \$3.00 per hour to the people that are affected and there are four people per household affected, then the social cost of the time wasted would be \$840,000. This is certainly an over-estimate so it is clear that the social cost of electrical power disruption by bombings is considerably less than a million dollars per year.

The loss of electrical power to commercial and industrial establishments may mean the cessation of production or of idling the time of labor and equipment. The units of the loss could be measured in the value of the labor and capital resources which were not utilized or equivalently, the loss of value-added by the firm. At this point there is no information available on the average number of commercial and industrial establishments experiencing a power outage or the average number of employees affected. However, if one assumes that the previous estimate of 10 per year involved only businesses it appears that the total disruption costs are still less than a million dollars per year. This is not an insignificant figure, but it is small compared to the other social costs of bombing.

For five cases of bombings in retail establishments, there were no instances of the facilities being put out of service. In the five cases, there were a total of 22 employees in the establishments at the time of the bombings along with a total of 11 customers. In four out of five cases, the bombing occurred after 9:00 PM and the stores were closed; in the remaining case, the bomb detonated just before closing on a Sunday night. The bombing is likely to have disrupted the various after hours operations which must be carried out by the retail establishment. If the average time of disruption is two hours and the cost per employee hour was \$10.00 then the average bombing of a retail establishment would entail about \$88.00 of disruptive cost. This is very low compared with the physical damage of \$5,793 in these five bombing incidents. Thus, indirect costs of disruption are of the order of 1 to 2% of the damage costs. The dislocation costs imposed upon customers in these five incidents turn out

to be even smaller. The average number of customers in the stores was 2.2 and raising this to 3 to take into account the customers who arrived after the bombing and assuming a half hour of time lost at \$5.00 per hour means a loss in the average bombing incident of less than \$4.00. This loss figure is largely a consequence of the time chosen for detonation by the bombers.

In 1976, there were two explosive bombings of aircraft. A figure of 400 people having to wait two hours, with an average value of time of \$6.00 per hour would mean a cost to customers of \$4,800 per incident. Thus, two incidents would have a social cost of \$9,600.

Bombings of schools have the potential for catastrophe, but most are minor. A typical bombing incident of a school involves a few thousand dollars worth of damage. A school of 1,000 students and 60 staff closed down for three hours would, if staff time and student time were valued at \$5.00 and \$1.00 per hour respectively, cost \$3,900. Added to this would be the value of the facilities being idled, which would be roughly equal to the value of the staff time. Therefore, an average incident would have a social cost of \$4,200. The 75 bombing incidents of schools would involve a social cost of about \$90,000 for staff and facilities, and \$225,000 for student time, for a total of roughly \$300,000.

In fiscal year 1976, there were 736 bomb threats and scares to the Postal Service which resulted in 8,000 hours of employee time loss. There were 16 actual bomb explosions. The 8,000 hours lost due to evacuations were partly due to threats and partly due to evacuations which occurred before and after an explosion. There is little reason to separate the time loss involved in evacuation into components. What is more important here is the loss of resource services due to some essential equipment and facilities being inoperative during the period of repair. This could also involve the additional cost of providing service with alternative facilities.

In order to estimate the order of magnitude of this cost let us assume that the \$1.2 million of property damage results in 10 times this amount of capital being out of commission for 10 days. The annual capital cost for this amount of capital is on the order of one million dollars, assuming 260 working days per year. A 10 working day period would involve a cost of about \$4,000. The labor time loss would be of the same order of magnitude. Thus, the social cost of the disruption of governmental services is on the order of \$10,000. If the period of disruption of services is 100 working days, or if each dollar of damages puts \$100 of capital out of operation, then the cost would rise an order of magnitude. A figure of \$100,000 will be used as an estimate even though this is likely to be an over-estimate.

The indirect cost of the bombing of transportation facilities is primarily the value of the time of passengers. The bombing of transportation facilities can cause great inconvenience to passengers. An airport bombing may cause several hundred hours of waiting. If there are 800 passengers tied up for two hours, each having a value of their time of \$5.00 per hour, the cost of a disruption would be \$8,000. For nine disruptions that would be \$72,000.

As with the other categories, the social cost of the loss of services of transportation facilities is offset if customers obtain alternative service. Thus, if the customers go to the trouble and expense to go to other transportation facilities then the social cost of the loss of the transportation facilities is not so great as the value of the capital services of the facilities.

In conclusion, the social costs of the disruptions and dislocations resulting from explosive bombings is at most of the order of two to three million dollars for 1976. This is a significant quantity but relatively small compared with the other components of the costs of bombing activities.

APPENDIX 9

INCARCERATION COSTS

By:
Julius Roth

Let m be the number of jailed bombers at time t . Assume that the rate at which prisoners are released (served their sentence) is km where k , the release rate constant, has the dimensions of inverse time. If the arrest rate is assumed to be substantially equivalent to the conviction rate, the influx rate of convicted habitual bombers is approximately

$$ahzN_0 + ag = \frac{ahzN_0}{1-a}$$

(see Appendix 5 for symbol definitions and derivations), and the influx rate of one-time bombers is approximately $ah'z'v$ then

$$\Delta m = -km\Delta t + \frac{ahzN_0}{1-a}\Delta t + ah'z'v\Delta t$$

or, in the limit of $\Delta t \rightarrow 0$

$$\frac{dm}{dt} = -km + a\left[\frac{hzN_0}{1-a} + h'z'v\right] \quad (1)$$

This equation can be integrated readily. However, the exact solution still leaves us with too many unknown quantities. A simplifying assumption that will provide an approximate answer is that $\frac{dm}{dt} = 0$; i.e., a steady state condition exists. Then

$$m = \frac{a}{k}\left[\frac{hzN_0}{1-a} + h'z'v\right] \quad (2)$$

According to the discussion in section 6.3 of the main text,

$$x = \frac{v_0}{N_0 + v_0} \approx \frac{1}{4} \quad \text{and} \quad 1-a \approx 1$$

and equation (2) then becomes

$$m = \frac{a}{k}(N_0 + v_0)\left[(1-x)hz + \frac{1}{4}h'z'\right]$$

or

$$m = \frac{a(N_0 + v_0)}{k}\left[\frac{3}{4}hz + \frac{1}{4}h'z'\right] \quad (3)$$

Now, if $hz \approx h'z'$ (actually hz is somewhat greater than $h'z'$),

$$m \approx \frac{a(N_0 + v_0)}{k} \quad hz = \frac{(N_0 + v_0)}{k} \quad (4)$$

Our projections indicate that the annual number of bombings plus attempts stays constant at about 1,200. If we assume that on the average the number of bombers who commit these bombings is also 1,200 then $\alpha(N_0 + v_0) \approx 120$ since $\alpha = 0.1$. If the average sentence for convicted bombers is about three years*, then $k \approx 1/3$ and $m \approx 360$. Thus, on the average there are about 360 bombers in jail in any given year. According to the California Department of Corrections the annual costs per prisoner in California are \$9,000. These costs include guard costs, prison maintenance but not amortization. Although the national average cost per prisoner is probably lower than the California cost we will use the \$9,000 figure in our estimates. Thus, the total incarceration costs are approximately $360 \times 9,000 = 3.2M\$$.

* The maximum sentence for the illegal use of explosives is 10 years.

APPENDIX 10

ACTUAL CASE HISTORIES OF BOMBING INCIDENTS
FOR WHICH DATE-SHIFT CODE TRACING WAS VERY HELPFUL
(Verbatim Copy of BATF-Furnished Information)

1. In January 1976, two cases of dynamite were stolen from a construction company in Georgia. The following month, an automobile was destroyed by a bomb occurring at a local college facility. Three suspects were arrested by BATF, and it was determined that about three sticks of dynamite had been used. During the investigation two cases of dynamite, less three sticks, were found to be in possession of the suspects. The dynamite was traced directly to the theft that had occurred at the construction company. A further trace was made of dynamite with the same date-shift code and all was accounted for. This eliminated the possibility, raised by the defense, that the dynamite found in subjects possession had not been stolen. Two of the subjects were tried and found guilty for this offense in State court. One received 20 years confinement, another 10 years, and the third received six months for contempt.

2. During the months of October and November 1974, a large quantity of dynamite was sent to a firm in West Virginia. The identification of this dynamite indicated that this was the only shipment of this type of dynamite manufactured on a certain date in 1974. Records further indicated that 10 cases of that explosive went to a mine in West Virginia.

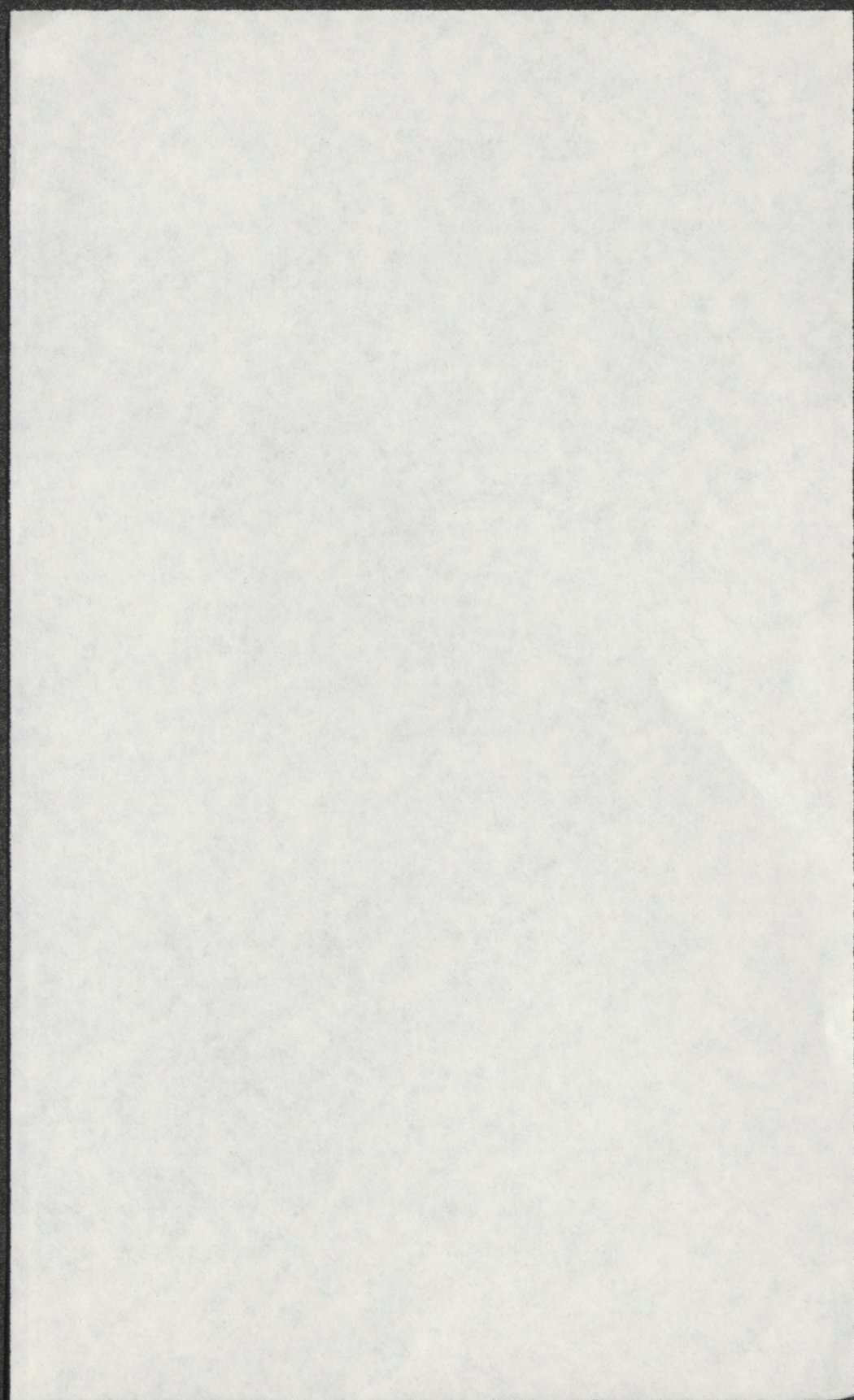
In July 1976, a "booby trap" dynamite bomb had been found by local police attached to the door of a local restaurant. The tracing of the dynamite revealed that the same dynamite had been sold to mines in the area with none of the mines being authorized to sell explosives. Additional investigation revealed that a quantity of the same dynamite was found and linked to a suspect who was an employee of a particular mine, and was suspected of constructing the "booby trap" bomb. Conviction followed.

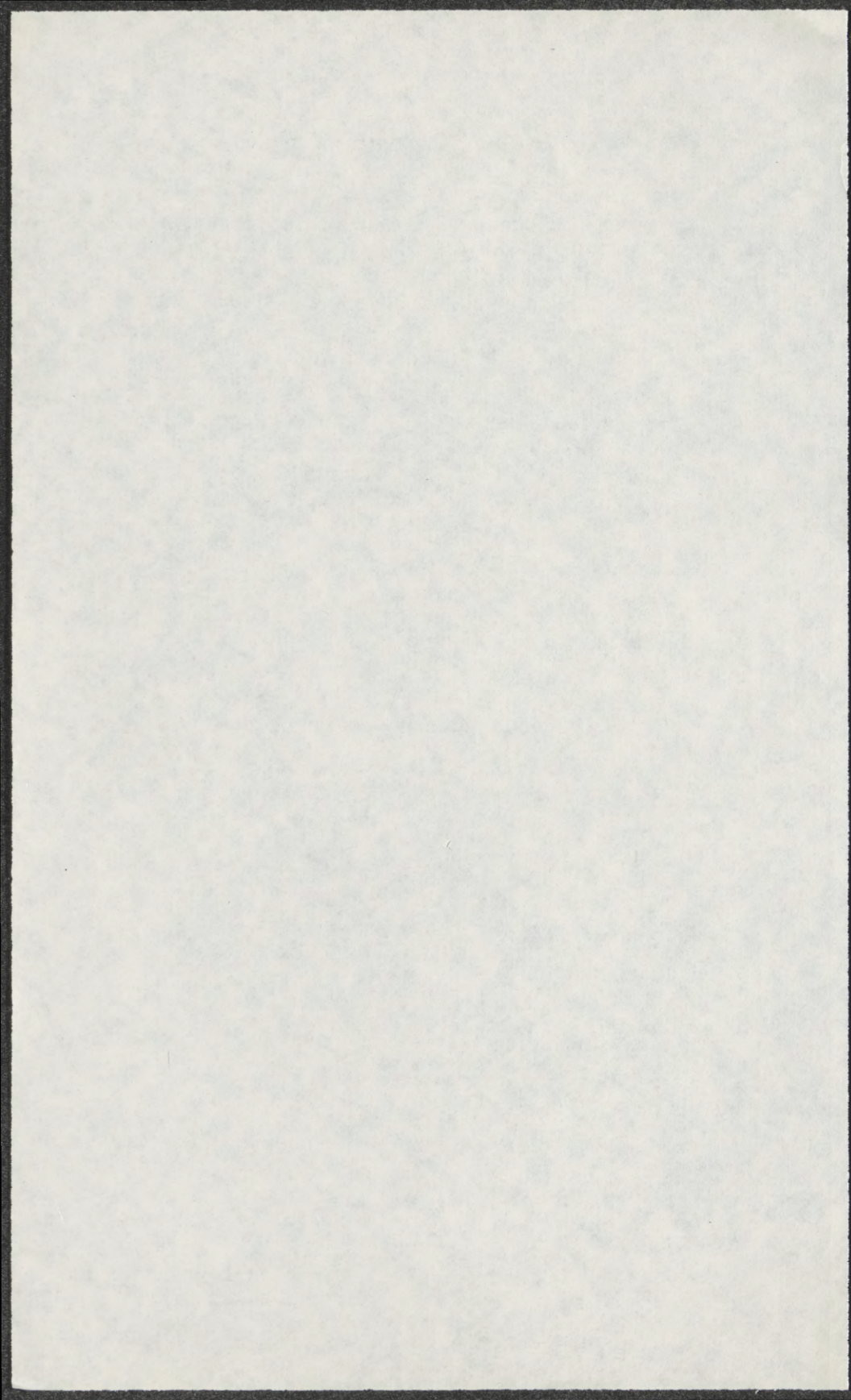
3. In October 1974, over 1,000 pounds of various types of high explosives were stolen from the magazines of a quarry in Western Oklahoma. More than 16 individual recoveries of the stolen explosives were made in Oklahoma, New Mexico, Colorado, South Dakota, Kansas and Wisconsin. In all of these recoveries which involved destructive devices as well as bulk explosives the materials were traced to the quarry theft. In this case the presence of date-shift codes led to the solution of several significant bombings and the identification of suspects involved.

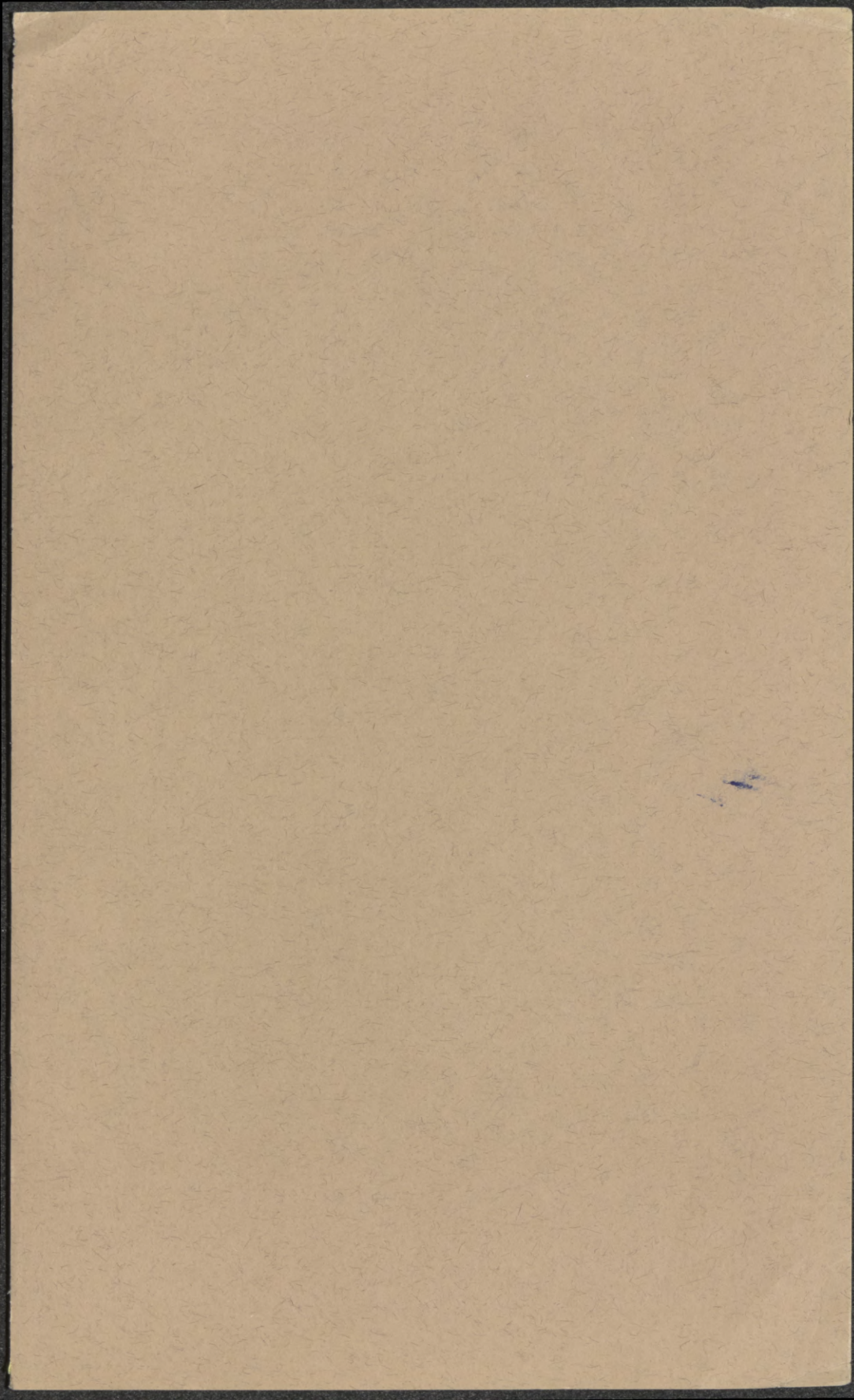
4. In September 1974, a partially completed apartment complex was bombed in Birmingham, Alabama. A total of eight bombs had been planted and six actual detonations occurred. The two remaining unexploded bombs were deactivated and the components were then traced. Twelve sticks of dynamite were used to make the two deactivated bombs.

The entire shipment of this particular date-shift code of explosives was shipped by the manufacturer to a pipe company in Lafayette, Louisiana. A breakdown of company sales revealed that one case went to a company in Baton Rouge, Louisiana who would not be a normal user of explosive materials. The investigation then centered on this company.

The suspect in this case had business interests in Baton Rouge which further heightened the likelihood of the trace, which proved very fruitful. As a result of this the bombing was solved with three guilty pleas. A \$750,000 arson in Baton Rouge, Louisiana was solved at the same time along with arsons in Birmingham, Alabama which were committed by the same individuals. Without the explosives trace, the bombing and arsons would have gone unsolved.









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