

APPENDIX B—DETECTION AND IDENTIFICATION TAGGANTS AND CRIMINAL BOMBINGS— SUMMARY AND QUESTIONNAIRE

This paper is a short statistical summary of an empirical survey conducted by OTA for the evaluation of taggant effectiveness.

Using a listing of the International Association of Chiefs of Police, a systematic sample of 980 names was selected (from a total of 10,800 names on the list). Each of the subjects sampled—assumed to be both knowledgeable and interested in the problem of bombings—received a mail questionnaire covering five related areas of inquiry (see attachment). The questions probed issues such as the profile of the criminal bomber, the estimated effects of the taggants program on deterrence, detection, and conviction, and preferred location and types of detection taggant sensors.

Of the 980 questionnaires mailed out, only 114 have been returned in time for this analysis, a return rate of less than 12 percent. No assumption can be made that these 12 percent of the respondents are a random and unbiased subsample of the 980 subjects in the original sample, and most likely they represent the people most highly involved in, and motivated to deal with, criminal bombings. In that sense, the findings of this analysis must be viewed as tentative. However, these 114 questionnaires serve as a valuable instrument to bring to light some of the experiences, attitudes, and assessments of people who deal, often on a rather frequent basis, with criminal bombings. A further source of error may have been introduced by an error in the explanatory material accompanying the questionnaire. That material indicated that the taggant trace would identify the last legal purchaser, rather than indicating that the trace would provide a list of the last legal purchasers. Following is an overview of their responses.

Background of Subjects

Over half (51 percent) of the subjects worked in an urban area, with an additional 37 percent in sub-urban areas. The majority (41 percent) came from relatively small cities (population up to 25,000), with only 20 percent from metropolitan areas with a population of 500,000 and more. Due to a lack of significant differences between the subjects by place of work; and due to the relatively small number of respondents, the data will not be analyzed by the type of area and its population size.

Bomber Profiles

As estimated by the sample, a wide variety of criminal bomber types, rather than one specific type, is responsible for the total number of bombings in their jurisdictions (table B-1). Eighty-four percent of the sample thought that each type of bomber is encountered infrequently (accounting for only up to 25 percent of the bombings). Domestic terrorists, organized crime figures, and people motivated by revenge were mentioned as somewhat more frequent types (between 25 to 75 percent of the cases) and, most noticeably, revenge was seen more than any other motive as a very frequent (over 75 percent) motivation for bombings.

Similarly, the consensus of the sample was that there is a fairly evenly distributed use of the various types of explosives (table B-2). While ANFO, plastic explosives, and cast or pressed military explosives were thought to be infrequent, there was less agreement about the other types. Commercial explosives, smokeless and black powders, and to a lesser degree, homemade explosives were mentioned by the subjects as frequently, and even very frequently, used in bombings in their areas.

A potentially important question refers to the various bomber types and their preferences for types of explosives (table B-3).

While again, in general, the various bombers will use all the available explosives, when looking only at the “frequent” and “very frequent” use of those explosives, an interesting preference-profile emerges: all offenders show a preference for commercial explosives, and black and smokeless powder, but their highest use is by offenders acting out of revenge. Terrorists and organized crime use commercial explosives more often, while people committing crimes of passion or revenge opt more frequently for the powders.

An issue of some importance is the target of the bombing. As indicated by the sample (table B-4), bombers attack a variety of targets; however, there are some patterns in the attacks. Government and law enforcement facilities, transportation facilities, and residences are mostly infrequent targets, while commercial and industrial facilities, people and vehicles, and schools are very frequent targets.

Some patterns emerge when looking at the target-preference of the various bomber types (table B-5). Combining the “frequent” and “very fre-

Table B-1. --Typo of Criminal Bomber' (percent)

	Bomber type							Total
	International terrorists	Domestic terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, disgruntled employee, malicious mischief	Others	
Infrequent.	98. %	83.	86.	93.	96.	58.	90.	(321) 84.
Frequent	0	7.	11.	5.	2.	10.	5.	(23) 6.
Very frequent	2.	10.	3.	2.	2.	32.	5.	(37) 10.
Total.	(56) 14,7	(58) 15,2	(56) 14,7	(59) 15,5	(54) 14,2	(78) 20,5	(20) 5,2	381

*Based on pt 11, Q 1
 Infrequent = between 0 to 25 percent Frequent = 25 to 75 percent Very frequent = 75 to 100 percent

Table B-2.--Typo of Explosive Used' (percent)

	Explosive type								Total
	Commercial	ANFO and other non-cap-sensitive explosives	Plastic explosives	Cast or pressed military explosives	Smokeless powder	Black powder	Homemade materials	Other	
Infrequent	59. %	96.	97.	93.	68.	62.	83.	95.	(446) 799
Frequent	21.	4.	3.	6.	21.	19.	12.	0.	(65) 11,7
Very frequent. 20.	0.	0.	0.	1.	11.	19.	5.	5.	(47) 8,4
Total.	(81) 14,5	(68) 12,2	(68) 12,2	(71) 12,7	(73) 13,1	(81) 14,5	(75) 13,4	(41) 7,4	558

*Based on pt 11, Q 2
 Infrequent = between 0 to 25 percent Frequent = 25 to 75 percent Very frequent = 75 to 100 percent

Table B-3.--Most Frequently Used Typos of Explosives by Type of Bomber~ (percent)

	Bomber type					Total
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	
Commercial	15. %	32.	18.	24.	33.	(281) 33.
ANFO.	0.	0.	0.	0.	0.	(257) 0.
Plastics	2.	2.	4.	2.	2.	(260) 2.
Military explosives.	9.	8.	4.	2.	4.	(262) 6.
Black and smokeless powder	13.	11.	17.	29.	48.	(278) 37.
Total	263.	265	260.	258.	292.	1,338

*Based on pt 11, Q 2**b**
 The percentages indicate for each cell the proportion of responses estimating a frequent use (over 25 Percent) of the Particular explosive, by the particular type of bomber The numbers in parentheses refer to the frequency of all responses within the cell

Table B-4.--Typo of Bombing Targets" (percent)

	Type of target							Total
	Vehicles, people	Schools	Residences	Transportation facilities	Commercial/ industrial facilities	Gov't, law enforcement facilities	Other	
Infrequent.	73. %	77.	83.	96.	68.	91.	93.	(401) 82.
Frequent.	12.	8.	12.	3.	12.	6.	5.	(42) 9.
Very frequent.	15.	15.	5.	1.	20.	3.	2.	(47) 9.
Total.	(78) 15,9	(83) 16,9	(75) 15,3	(69) 14.	(75) 15,3	(68) 13,9	(42) 8,6	490

*Based on pt 11, II 3
 Infrequent = between 0 to 25 percent Frequent = 25 to 75 percent Very frequent = 75 to 100 percent

Table B-5.—Most Frequent Targets, by Typo of Bomber (percent)

	Bomber type					Total
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	
Vehicles, people	10. (51)	22. (51)	4. (47)	27. (56)	28. (58)	20.5 (263)
Schools	0. (56)	0. (53)	0. (49)	0. (49)	20. (59)	4.5 (266)
Residences	6. (50)	14. (49)	14. (50)	17. (52)	26. (61)	16. (262)
Transportation facilities	8. (51)	0. (49)	2. (51)	0. (50)	6. (51)	2.8 (252)
Commercial/industrial facilities	22. (51)	17. (52)	10. (50)	6. (51)	30. (64)	17.5 (268)
Government, law enforcement facilities	15. (47)	4. (49)	4. (47)	4. (49)	13. (55)	8. (247)
Other	0. (33)	0. (32)	0. (33)	0. (31)	15. (41)	3.5 (170)
Total	339	335	327	338	389	1,728

^aBased on PI110 3/b

The Percentages Indicate for each cell the proportion of responses estimating a frequent use (over 25 percent) of the particular explosive, by the particular type of bomber The numbers in parentheses refer to the frequency of all responses within the cell

quent” categories, the most common targets for terrorism are commercial and industrial establishments, followed by Government; organized crime focuses on people and vehicles, and industry and commerce; psychopaths, as expected, act more randomly, mainly victimizing residences; crimes of passion are directed against people and residences; and revenge bombings are directed against commercial and industrial facilities, and people and vehicles. It appears that the preferences for targets follow an underlying assumption about the motivations of the various bomber types.

Thefts of commercial explosives, legal purchase, and homemade supply seem to be the most frequent sources of explosives; while import and military theft are the least frequent forms (table B-6).

The most frequent source of explosives for terrorists and organized crime is theft. People acting out of revenge, and psychopaths prefer homemade explosives; for crimes of passion the offender purchases explosives legally or prepares them at home (table B-7).

Finally, a question about the tagging program brought some inconsistent responses; in estimating the expected frequency of various sources by bomber after tagging went into effect, the sample predicted a large shift toward increased use of

military (untagged) explosives through theft; and of homemade and imported explosives. However, they did not predict an appreciable decline in the theft of commercial (tagged) explosives, or their legal purchase (table B-8). Comparing tables B-7 and B-8, the sample predicted a clear shift for terrorists toward homemade explosives, and for organized crime and terrorists toward military theft, but few other discoverable patterns emerged.

To summarize, there seems to be a consensus about a wide range of motives for criminal bombings, as well as their targets, the explosives used, and their sources. The profile of the bomber, and some characteristic patterns of his modus operandi that emerge are consistent with general predictions as to the behavior rationality and psychological motivation of such offenders.

Present Law Enforcement Effectiveness

As estimated by the sample, both the arrest and the conviction rates for criminal bombings are lower than those for all other crimes (table B-9).

Estimated Utility of Identification Taggants

When asked about the utility of the program, all respondents viewed taggants as a useful additional

Table B-6.—Source of Explosives Used (percent)

	Legal purchase	Theft of commercial explosives	Blackmarket purchase	Theft of military explosives	Homemade	Importation	Total
Infrequent	72. %	57.	83.	89.	68.	98.	(309) 76.9
Frequent	11.	23.	12.	8.	18.	2.	(51) 12.7
Very frequent	17.	20.	5.	3.	14.	0.	(42) 10.4
Total	(76) 18.9	(70) 17.4	(65) 16.2	(66) 16.4	(72) 17.9	(53) 13.2	(402)

^aBased on PI110 4

Infrequent = between 0 to 25 percent Frequent = 25 to 75 percent Very frequent = 75 to 100 percent

Table B-7.--Most Frequent Sources of Explosives, by Type of Bomber* (percent)

Source of explosives	Bomber type					Total
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	
Theft of commercial explosive.	30. % (44)	29. (45)	9. (45)	5. (44)	20. (49)	18.5 (227)
Theft of military explosive.	20. (45)	9. (44)	5. (44)	2. (43)	6. (49)	8.4 (226)
Legal purchase.	7. (45)	18. (45)	11. (44)	16. (45)	32. (56)	17.4 (235)
Black-market purchase	9. (43)	19. (47)	2. (43)	5. (40)	11. (47)	9.5 (220)
Homemade.	14. (44)	11. (44)	17. (46)	14. (43)	35. (55)	19. (232)
Importation.	2. (44)	6. (46)	0. (44)	0. (43)	2. (47)	2.2 (224)
Total	265	272	266	258	303	1,364

*Based on pl 11, Q 4/b
 The percentages indicate for each cell the proportion of responses estimating a frequent use (over 25 percent) of the particular explosive, by the particular type of bomber. The numbers in parentheses refer to the frequency of all responses within cell.

Table B-8.--Estimated Most Frequent Sources of Explosive by Bomber Type, Following the Institution of Tagging Programs* (percent)

Sources of explosives	Bomber type					Total
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	
Theft of commercial explosive.	39. % (41)	41. (54)	22. (51)	17. (48)	30. (54)	29.4 (248)
Theft of military explosive.	32. (40)	37. (38)	20. (49)	14. (50)	19. (52)	23.6 (229)
Legal purchase.	14. (42)	10. (50)	25. (55)	25. (53)	20. (60)	19.2 (260)
Black-market purchase	27. (41)	22. (49)	18. (50)	14. (50)	19. (53)	19.7 (243)
Homemade.	39. (41)	24. (49)	25. (51)	25. (53)	36. (61)	29.8 (255)
Importation.	29. (42)	24. (51)	8. (48)	2. (50)	6. (51)	13.2 (242)
Total	247	291	304	304	331	1,477

*Based on Pt 11, Q 5
 The percentages indicate for each cell the proportion of responses estimating a frequent use (over 25 percent) of the particular explosive, by the particular type of bomber. The numbers in parentheses refer to the frequency of all responses within the cell.

Table B-9.--Estimated Rates of Arrest and Conviction*

Estimated rates of arrest	
For criminal bombings	24.08
For other crimes.	38.85
Estimated rates of conviction	
For criminal bombings	39.35
For other crimes.	46.82

*Based on pt III Q 1
 NOTE: BATF considers these estimates unduly optimistic. At present some 8 percent of criminal bombings are forwarded for prosecution.

clue in investigation and conviction, though they estimated it to increase arrest rates most noticeably for offenders acting out of revenge or passion and having very little effect on the arrest of terrorists (table B-10).

As for the deterrent value of taggants, it was viewed to be most effective for those acting out of revenge and least effective, as expected, for psychopaths (table B-11).

In response to a tagging program, some countermeasures by the bombers are expected. For example, the sample estimated that if packaged explosives would be tagged, but black and smokeless powders would not, an average of 55 percent of the bombers would shift to using powders.

Table B-10.--The Estimated Increase in the Arrest Rate for Criminal Bombers, Due to the Use of Identification Taggants*

Type of bomber	Increase in arrest rate			Total
	Up to 25%	Up 25-75%	Up over 75%	
Terrorists.	79. %	15.	6.	53
Organized crime	74.	13.	13.	54
Psychopaths.	60.	19.	21.	53
Crimes of passion	53.	23.	24.	55
Revenge, etc.	44.	30.	26.	61
Total.	(170)	(56)	(50)	276
	61.6	20.3	18.1	

*Based on pt IV, II 2

Table B-11.--The Estimated Deterrent Effect of Identification Taggants on Criminal Bombers*

Type of bomber	Magnitude of deterrent effect			Total
	Up to 25%	Up 25-75%	Up over 75%	
Terrorists.	80. %	11.	9.	55
Organized crime	75. "	15.	10.	60
Psychopaths.	79.	16.	5.	58
Crimes of passion	70.	19.	11.	56
Revenge, etc.	54.	27.	19.	63
Total.	(208)	(52)	(32)	292
	71.2	17.8	11.	

*Based on pt IV, (1 4)

The main consensus of the sample was that professional bombers (terrorists and organized crime) would be more likely to work on some countermeasure than would the nonprofessional offenders. The first two types would most likely shift to other kinds of explosives (not tagged) or remove the taggant if it required a reasonable amount of work. However, psychopaths and people motivated by passion or revenge were predicted most likely to do nothing in response to the taggants (table B-1 2). The most frequent countermeasure overall was shifting to another type of explosive, and the least frequent one was the removal of the taggant if it involves 10 hours/lb of explosives.

Estimated Utility of Detection Taggants

Tagging explosives would have, as estimated by the respondents, a varying deterrent effect, depending on the type of bomber. It would be most effective for those acting out of revenge or passion, least effective for psychopaths and terrorists (table B-1 3).

Taggants were also viewed as being instrumental in the direct or indirect apprehension of the bomber. It was estimated to lead most frequently to apprehension of the nonprofessional offenders, (i.e., psychopath, crimes of passion, and revenge) as expected (table B-1 4).

Table B-12.—The Most Frequent Indicated Change in Tactics by Type of Bombers, Due to the Use of Identification Taggants' (percent)

Change in tactics	Bomber type					
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	Total
Taggant removal (1 hr/lb)	40. (47)	35. (43)	18. (44)	11. (44)	17. (46)	245 (224)
Do nothing	36. (45)	37. (46)	49 (45)	52 (48)	47. (55)	44.3 (239)
Taggant removal (10 hr/lb)	23. (43)	22 (41)	10. (42)	10. (41)	9 (44)	14.7 (21 1)
Shift to other explosive	59. (42)	62. (45)	39. (44)	32. (41)	40 (47)	46.6 (219)
Shift to other unlawful activity	19. (42)	22, (40)	15, (40)	20. (39)	34 (47)	22.6 (208)
Total	219	215	215	213	239	1,101

¹Based on pt II O 6

The percentages indicate for each cell the proportion of responses estimating a frequent use (over 25 percent) of the particular explosive, by the particular type of bomber. The numbers in parentheses refer to the frequency of all responses within the cell.

Table B-13.—The Estimated Deterrent Effect of Detection Taggants on Criminal Bombers'

Type of bomber	Magnitude of deterrent effect			Total
	Up to 25%	Up 25-75%	Up over 75%	
Terrorists	85. %	9.	6.	69
Organized crime	72.	18.	10.	58
Psychopaths	90.	8.	2.	59
Crimes of passion	75.	10.	15.	67
Revenge, etc.	54.	31.	15.	67
Total	(240)	(49)	(31)	320
	75.	15.3	9.7	

¹Based on pt V, O 1

The most effective sensor to deter and apprehend bombers was judged to be the portable one, requiring no special operator (table B-1 5). The other three types were viewed as considerably less effective, especially the stationary, special-operated sensor.

Detection taggants are also expected to prompt a variety of countermeasures by the potential bombers (table B-16). The more frequently used measures, as estimated by the sample, would be shifting to other explosives (untagged), removing the taggant or sealing the package, if it is relatively easily accomplished. Terrorists and people acting out of revenge showed a clear preference for the first form; organized crime offenders for the sec-

Table B-15.—The Estimated Deterrent Effect of Detection Taggants, by Type of Sensors Used

Type of sensor	Magnitude of deterrent effect			Total
	Up to 25%	Up 25-75%	Up over 75%	
Stationary, with skilled technician	58. %	22.	20.	59
Portable, with skilled technician	41.	35.	24,	59
Stationary, no need for skilled technician	50.	28.	22.	60
Portable, no need for skilled technician	35.	25.	40.	65
Total	(lii)	(69)	(63)	243
	45.7	28.4	25.9	

¹Based on pt V O 3

Table B-14.—The Estimated Increase in the Arrest Rate for Criminal Bombers, Due to the Use of Detection Taggants-

Type of bomber	Increase in arrest rate			Total
	Up to 25%	Up 25-75%	Up over 75%	
Terrorists	72. %	21.	7.	60
Organized crime	74.	19.	7.	58
Psychopaths	60.	33.	16.	59
Crimes of passion	49.	32.	24.	75
Revenge, etc.	41.	27.	27.	75
Total	(183)	(79)	(52)	313
	58.2	25.2	16.6	

¹Based on pt V, O 2

Table B-16.—The Most Frequent Indicated Change in Tactics by Type of Bomber, Due to the Use of Detection Taggants— (percent)

Change in tactics	Bomber type					Total
	Terrorists	Organized crime	Psychopaths	Crimes of passion	Revenge, etc.	
Taggant removal, special knowledge, equipment required	33. % (45)	33. (42)	17. (35)	18. (34)	17. (43)	24.6 (199)
Taggant removal, with relative ease.	51. (41)	51. (43)	26. (35)	23. (39)	27. (44)	35.9 (206)
Shift to other explosive.	63. (41)	45. (53)	24. (42)	19. (36)	33. (45)	37.8 (217)
Shift to targets less likely to have sensors	43. (44)	24. (38)	31. (39)	18. (34)	27. (44)	29.1 (199)
Shift to other unlawful activity.	20. (40)	26. (39)	9. (35)	8. (36)	23. (43)	17.6 (193)
Do nothing	27. (37)	30. (37)	34. (35)	27. (33)	29. (38)	29.4 (180)
Total	248	252	225	212	257	1,194

Based on @ V, Q 4

The percentages indicate for each cell the proportion of responses estimating a frequent use (over 25 percent) of the particular explosive, by the particular type of bomber. The numbers in parentheses refer to the frequency of all responses within the cell.

end. Psychopaths and crimes of passion were judged to be unaffected.

Finally, the sample was asked to recommend the four sensor types (based on cost) for the various target locations (table B-17). Overall, the most frequently recommended type was the portable and less expensive sensor (33 percent); and the most frequently mentioned locations to be protected were nuclear power stations and airports (both 14.8 percent). The only location for which the portable, expensive sensor was more often (31.4 percent) recommended was nuclear power stations. The expensive, nonportable sensor was suggested to any appreciable degree for use only for airports, large Government buildings, and nuclear powerplants, while the less expensive portable set was the overwhelming preference for small Government buildings, schools, public stadiums, buses, and police stations. Apparently, the respondents based their recommendations on cost factors, coupled with the frequency and likelihood of attacks and damage in the various locations.

Summary

Even though the response rate to the mail questionnaire was low, resulting in a small and statistically nonrepresentative sample, some valuable findings emerged from the study.

In the assessment of the respondents, criminal bombings are characterized by a heterogeneity of all the elements involved: a variety of bombers, different kinds of targets, a choice of explosives, and a wide offering of sources to obtain them. No one kind of bomber is overwhelmingly responsible for a majority of the bombings; bombers do not concentrate on one type of target or use one type of explosive. However, within this complex picture, some patterns are discernible. Certain types of bombers show a preference for certain targets, explosives, and sources. Depending on their motivations, the various bomber types are also expected to respond differently to the proposed taggant program. While the sample in general estimated taggants to reduce bombings (by deterrence, appre-

Table B-17.—Type of Sensor Recommended by Location*

Location	Sensor type				Total
	Portable cost \$15,000	Portable cost \$50,000	Non portable cost \$15,000	Nonportable cost \$50,000	
Airports	29.7%	24.8	25.6	19.8	(121) 14.8
Large Government buildings,	29.5	27.5	18.4	24.5	(98) 12.
Small Government buildings	53.8	14.1	24.4	7.7	(78) 9.5
Nuclear power station	25.6	31.4	16.5	26.4	(121) 14.8
Schools	63.6	12.1	13.6	10.6	(66) 8.
Public stadiums	58.2	21.5	16.5	3.8	(79) 9.7
Bus, train depots.	56.9	11.1	27.8	4.2	(72) 8.8
Large commercial buildings,	42.2	18.3	28.2	11.3	(71) 8.7
Police bomb investigation.	57.4	31.5	6.5	4.6	(108) 13.2
None, no ability.	25.	0.	75.	0.	(4) .5
Total	(360)	(186)	(160)	(112)	818
	44.	22.7	19.6	13.7	

*Based on pt V, O 5

hension, conviction, difficulty in obtaining untagged explosives, etc.), there is evidence in their views that the taggants will be more effective with certain bomber types than with others. In addition, the taggants were also predicted to initiate a chain of countermeasures, with varying degrees of probable success.

In summary, the study points to some new direc-

tions in appraising the present scene of criminal bombings, and evaluating taggant effectiveness. The majority of the findings, which point to the hypothesized direction, should increase their validity, and the confidence in their suggestive value, though the methodological/sampling problems prevent the study from serving as a definitive, verifying answer to the issues researched.

QUESTIONNAIRE

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Congress of the United States

OFFICE OF TECHNOLOGY ASSESSMENT

WASHINGTON, D.C. 20510

JOHN H. GIBBONS
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The Congress has before it draft legislation which would require the addition of detection and identification taggants to commercial explosives. Detection taggants are material which would be detected by a suitable sensor to indicate the presence of explosives. Identification taggants are material which would survive the explosive detonation and provide information which would identify the last legal purchaser of the explosives used. The Bureau of Alcohol, Tobacco, and Firearms Control (BATF) has been supporting the development of taggants for the past several years. Testimony before the Congress has displayed a considerable diversity of opinion as to the utility, cost and safety of a taggant requirement.

At the present time considerable progress has been made in identification taggants research. Small plastic chips, consisting of several pigmented layers, have been developed by 3M which survive the detonation of most commercial explosives. The sequence of the pigmented layers provides the code to trace the explosives type, the manufacturer and time of manufacture. A record keeping network, by which the manufacturers, distributors, and retail sellers keep track of the code species would then allow law enforcement officials to trace the last legal purchaser of the explosives used in a bomb.

Research is less advanced on detection taggants. A number of approaches are being pursued. The best system so far developed consists of microencapsulated organic liquids which emit a distinctive vapor, coupled with a sensor tuned to detect those specific taggant molecules at a parts per trillion concentration level.

The Office of Technology Assessment has been asked by the Congress to analyze the proposed legislation and resolve the differences surfaced in the congressional testimony. Your response to the enclosed questionnaire is being sought as a part of the analysis of the utility of taggants. The questions bear on the issues of the profiles of the criminal bomber and the impact the proposed program would have on the efforts of law enforcement personnel to deter, apprehend, and convict criminal bombers.

The results of the study must be available to the Congress when it returns from the August recess. Would you therefore please fill out the enclosed material and return it as soon as possible. The information about where you work is necessary for demographic analysis; all individual replies will be treated as confidential information.

In answering the questions below, your estimates would be appreciated where data is not available. Please feel free to comment on any point of the questionnaire.

Indicate the approximate range of your answers by the following code:

- A - almost none, **0-5%**
- B** - **infrequently, 5-25%**
- C - frequent or usual, **25-75%**
- D** - very frequent, **75-95%**
- E** - Almost always, **95%-100%**

DATA BASE (Where you Work)

I. Population of city or county _____
 state _____

Check one: urban area _____ suburb _____ rural _____

II. Bomber Profiles

1. Type of Criminal Bombers. The term criminal bomber" can cover a large spectrum of types of bombers. What type would you estimate is responsible for the bombings in your area, over the last **4-5 years.**

- International terrorists _____
- Domestic terrorists _____
- Organized crime _____
- Psychopaths _____
- Crimes of passion _____
- Revenge, disgruntled employess, malicious mischief _____
- Others () _____

2. Types of explosives used in bombs. A variety of materials can be used as explosives. How often are the following explosives used in your area.

- Commercial explosives such as dynamites , _____
 water gels _____
- A.NFO or other non-cap sensative explosives _____
- Plastic explosives such as **C-4** _____
- Cast or pressed military explosives such _____
 as Composition B, TNT, RDX _____
- Smokeless powder _____
- Black powder _____
- Homemade materials _____
- Others _____

Please estimate how often each type of bomber in your area uses each type of explosive

	Commercial Explosives	ANFO	Plastic Ω *	Military Explosives	Black and Smokeless Powder
Terrorists					
Organized Crime		- +	- +	- +	- +
Psychopaths					
Crimes of Passion					
Revenge, Disgruntled employees, malicious mischief			- +		

3. Targets

Please indicate the frequency with which each type of target is attacked by criminal bombers in your area.

- Vehicles or people _____
- Schools _____
- Residences _____
- Transportation facilities _____
- Commercial, Industrial facilities _____

Government, law enforcement facilities _____

Other _____

Please indicate approximately how frequently each type of bomber in your area attacks each type of target

	vehicles, People	Schools	Residences	Transportation Facilities	Commercial, Industrial	Government, Law Enforcement	Other
Terrorists							
Organized Crime							
Psychopaths							
Crimes of Passion							
Revenge, Disgruntled Employees, malicious mischief							

4. Sources of Explosives

Please indicate the relative frequency of each of the following as a source of supply of explosives for the criminal bombers in your area:

Legal Purchase _____

Theft of commercial explosives _____

Blackmarket Purchase _____

Theft of military explosives _____

Home-made _____
 Importation _____

Please estimate the relative frequency of the various sources for each group of bombers in your area:

	Theft, Commercial Explosives	Theft, military explosives	Legal Purchase	Black Market Purchase	Home-made	Importation
Terrorists						
Organized crime						
Psychopaths						
Crimes of Passion						
Revenge, Disgruntled Employees, malicious mischief						

5. If explosives were tagged, would you expect bombers to alter their pattern of acquiring explosives? Please estimate the expected relative frequency of the various sources for each type of bomber in your area if a tagging program were instituted (military explosives would not be tagged).

	Theft, Commercial Explosives	Theft, Military Explosives	Legal Purchase	Black Market Purchase	Home made	Importation
Terrorists						
Organized Crime						
Psychopaths						
Crimes of Passion						
Revenge, Disgruntled Employees, malicious mischief						

III Law Enforcement Effectiveness at Present

1. In answering the following questions, please estimate to the nearest 10%

- a. What is the rate of arrests for criminal bombings? _____
- b. What percent of arrested bombers are convicted? _____
- c. What is a typical arrest rate for other crimes? _____
- d. What is a typical conviction rate for other crimes? _____

IV: Estimated Utility of Identification Taggants

1. Would the use of identification taggants provide a useful additional clue in an investigation of criminal bombings? _____

Comment:

2. In your estimation, would the use of identification taggants lead to an increase in the arrest rate for criminal bombers?

Please estimate for each type of bomber in your area.

Terrorists	_____
Organized Crime	_____
Psychopaths	_____
Crimes of Passion	_____
Revenge, Disgruntled Employees, Malicious Mischief	_____

Comment:

3. Would the use of identification taggants lead to increased conviction rates for criminal bombers? _____

Comment:

4. Would knowledge of the fact that identification taggants are used in explosives deter criminal bombers? Please estimate for each type of bomber in your area.

- Terrorist _____
- Organized Crime _____
- Psychopaths _____
- Crimes of Passion _____
- Revenge, Disgruntled Employees, Malicious Mischief _____

Comment:

5. Some people have proposed tagging packaged explosives, but not tagging black or smokeless powder. If this were done, approximately what proportion of the bombers who now use packaged explosives would shift to using powder to make bombs? _____

6. Countermeasures

The use of identification taggants in explosives could alter the current method of operation of criminal bombers. Please estimate how likely each of the indicated change in tactics would be for each of the types of bombers encountered in your area.

	Terrorists	Organized Crime	Psychopath	Crimes of Passion	Revenge Disgruntled Employees, malicious mischief
Taggant removal, if removal takes 1 hour per pound of explosives					
Do nothing					
Taggant removal if removal takes 10 hours per pound of explosives					
Shift to another type of explosives (foreign, stolen, home-made)					
Shift to another type of unlawful activity					

v. Utility of Detection Taggants

1. Would knowledge of the fact that detection taggants are used in explosives deter criminal bombers? Please estimate for each type of bomber in your area

Terrorists _____
 Organized Crime _____
 Psychopaths _____
 Crimes of Passion _____
 Revenge, Disgruntled _____
 Employees, malicious mischief _____

2. How frequently would the use of detection taggants in explosives lead to the arrests of criminal bombers either through direct apprehension of a bomber with explosives in his possession, or through an indirect means such as a clue being provided by a bomb discovered unexploded? Please estimate for each type of bomber in your area.

Terrorists _____
 Organized Crime _____
 Psychopaths _____
 Crimes of Passion _____
 Revenge, Disgruntled _____
 Employees, malicious mischief _____

3. A number of types of sensors are being investigated for use in conjunction with the detection taggant source. Please indicate the frequency with which criminal bombers are likely to be deterred or apprehended due to the use of detection taggants coupled with sensors possessing the following characteristics:

Stationary installation only; must be operated by a skilled technician .---

Sensor is easily portable, (can be used also _____
 in a fixed installation); must be operated
 by a skilled technician

Stationary installation only; requires _____
 no special operator, only someone in
 the area to react to an alarm or other
 simple indicator

Sensor is easily portable; requires no _____
 special operator

4 Counter measures

The use of detection taggants in explosives could alter the
 current method of operation of criminal bombers. Please
 estimate how likely each of the changes in tactics would be for
 each type of bomber in your area.

	4 Terrorist	5 Organized Crime	Psychopaths	Crimes of Passion	Revenge, Disgruntled Employees, Mischief
Package seal or taggant removal if specialized knowledge and equipment is required					
Package seal or taggant removal if relatively easily accomplished					
Shift to another type of explosive (Foreign, stolen, home made)					
Shift bombings to targets less likely to have sensors					
Shift to another type of unlawful activity					
Do Nothing					

5. Sensor Location

Please indicate the location where you believe detection sensors should be placed. For this question, simply check all locations appropriate for each cost and portability category.

	Sensor - portable Cost - 000	Sensor - portable Cost - \$50,000	Sensor - non-portable Cost - \$15,000	Sensor - non-portable Cost - 20,000
Airports				
Large Government Bldgs.				
Small Government Bldgs.				
Nuclear Power Stations				
Schools				
Public Stadiums, arenas				
Bus, train depots				
Large Commercial Bldgs.				
Police Bomb Investigators				
None, No-Utility				

* Sensors to be used by investigators in searching for bombs