

# **Appendix III**

## **Non-State Adversaries**

Appendix III

NON-STATE ADVERSARIES

Table of Contents

	<u>Page</u>
A. <u>The Potential Nuclear Non-State Adversary</u>	
1. Introduction . . . . .	1
2. Causes of Increased Concern About the Potential Nuclear Non-State Adversary . . . . .	5
3* Growth of International Terrorism . . . . .	10
4. Will Terrorists Go Nuclear? . . . . .	17
5. Organized Crime as a Potential Non-State Adversary . . . . .	28
6. The Record of Nuclear Incidents . . . . .	35
7. Nuclear Hoaxes . . . . .	44
8. Response Planning for Threats . . . . .	57
9. Approaches to the Study and Analysis of the Non-State Adversary . . . . .	65
10. How Many Attackers -- How Many Defenders? . . . . .	69
11. Employee Surveillance and Reliability in Relationship to the Potential Nuclear Non-State Adversary . . . . .	78
12. Conclusions on the Nature of the Nuclear Threat of the Non-State Adversary . . . . .	87
13. Footnotes . . . . .	94
14. Bibliography . . . . .	97
15. Annex- Incidents Involving Large Numbers of Deaths 1968-1976 . . . . .	99
B. <u>Nuclear Non-State Adversary Actions (Nuclear Terrorism), With Special Reference to the Rand Corporation Draft of January 6, 1977</u> . . . . .	101
1. Most Nuclear Maleficence is Not Difficult Technically . . . . .	102

Table of Contents, Continued

	Page
2. Probability of Successful Attempts . . . . .	103
3. A Perspective to the Topic . . . . .	109
4. Attaining Closure on Sustainable Nuclear Policy . . . . .	113
5. Reviewer Comments on Rand First Draft of January 6, 1977 .	116
6. References . . . . .	125
c. <u>Civil Liberties Implications of U.S. Domestic Safeguards</u> . . .	127
1. A General Perspective on Civil Liberties Issues . . . . .	129
2. Projections of the Size of the Plutonium Recycle Industry	134
3. An Analysis of Likely Safeguard Measures and Their Civil Liberties Consequences . . . . .	137
4. A Presentation of Three Positions Widely Held in U.S. Society as to the Civil Liberties Risks of Plutonium Recycle . . . . .	149
5. Observations and Comments on the Three Positions . . . . .	164
6. Footnotes . . . . .	173
7. Bibliography . . . . .	175

APPENDIX III-A  
THE POTENTIAL NUCLEAR NON-STATE  
ADVERSARY

The RAND Corporation  
Brian Michael Jenkins  
Joseph L. Krofcheck

I. INTRODUCTION

This report discusses the potential nuclear non-State adversary. This somewhat awkward term is meant to encompass any individuals or nongovernment groups who seek to acquire a nuclear capability -- a nuclear explosive or dispersal device -- and those who might help them. Nuclear non-State adversaries include those who might attempt to steal a nuclear weapon; to pilfer or steal nuclear material to sell, ransom, or use to make a nuclear explosive or dispersal device; to illegally purchase, fence, or smuggle nuclear material or otherwise participate in a nuclear black market; or who claim to possess nuclear devices to extort concessions or cause alarm. The Office of Technology Assessment, for the purpose of this report, has also included in the definition of the nuclear non-State adversary those who might undertake malevolent actions against nuclear facilities. This would include those who might threaten or actually attempt to sabotage a nuclear reactor or other nuclear facility or transport vehicle, or who might seize temporary control of a nuclear facility. Appropriately we should limit this to serious sabotage resulting in the potential release of toxic radiological materials and exclude token acts of violence and minor incidents of vandalism or sabotage that do not imperil the public, although we want to examine the latter for indications of trends in the direction of more serious sabotage.

These adversaries are often referred to collectively as criminals and terrorists although all are criminals in that their actions violate an existing law -- for example, against arson, theft, extortion. The term criminal, however, generally implies a purely profit motive while the term terrorist implies political objectives. The spectrum of potential adversaries who might somehow participate in the actions described above actually is much broader. It may include:

a. criminals, who are considered to be primarily profit-motivated and theoretically apolitical. They may or may not be part of organized

crime, and they are more likely to be interested in theft than sabotage. They are likely to avoid publicity. They are skilled burglars and armed robbers. They are willing to use armed force, but try to avoid taking too many risks of armed confrontation and capture.

b. terrorists, who are considered to be primarily politically, not profit-motivated. They may be interested in sabotage of facilities or the theft of SNM to build bombs or dispersal devices and to do or threaten damage. They are probably more interested in using nuclear terror to obtain concessions than in causing destruction for its own sake. They might seize political hostages at a facility or engage in extortion. They desire publicity. Their capabilities include knowledge of tactical operations, weapons, and explosives. They are probably not as skilled in the techniques of theft as professional criminals, but are likely to be more heavily armed and more willing to take risks and to engage in gunplay.

c. "eco-guerrillas," whose desire would be to halt nuclear programs or construction at specific sites by demonstrating inadequacies of security, threatening damage, or carrying out low-level acts of sabotage.

d. disgruntled employees, who might be a potential danger during periods of labor strife,

e. lunatics, who are those individuals with personal motives of revenge, for example, of saving the world, or following God's instructions. A bomb threat or nuclear hoax is the most likely form of action.

f. foreign agents and saboteurs, who might become an adversary in anticipation of war or during wartime. In peacetime, they are more likely to be concerned with intelligence than sabotage. On the other hand, they conceivably might secretly instigate terrorist or criminal groups to engage in acts of sabotage to disrupt nuclear power programs or turn nuclear weapons into political liabilities.

g. political factions within government, who are included for the sake of completeness. This category of adversary really approaches the level of diversion by a government.

The non-State spectrum of potential actions ranges from simple hoaxes to the construction and detonation of a homemade nuclear explosive device which could kill thousands of people.

At the low end of this spectrum are bomb threat calls, hoaxes, token acts of violence not aimed at producing serious casualties or damage, but which, if publicized, could disrupt essential routines, alarm the public, and discredit nuclear programs and safeguards measures. However, these actions pose little direct danger to public safety.

Further up the scale are actions that could result in serious damage, perhaps the disabling of a nuclear facility, and could endanger on-site personnel, although they would not necessarily pose a threat to public safety.

At the high end of the spectrum are actions, the ultimate consequences of which could be civilian casualties and significant material damage and radioactive contamination. It is the latter we are most concerned with here.

The threat posed by the non-State adversary has become an issue of considerable discussion and debate. Many see it as the principal argument against increased reliance on nuclear energy in the United States and the spread of nuclear technology abroad. Others counter that the danger of criminals or terrorists going nuclear is grossly exaggerated, and that adequate safeguards can be provided. Much of this debate is theological. Arguments are advanced about the inherent malevolence of Man or the perfectibility of social institutions. Whatever position one adopts must be accepted largely on faith for there is virtually no evidence.

Apart from a handful of low-level incidents, none of them involving any deaths, no incidents of nuclear terrorism have occurred. No nuclear facilities have been seriously sabotaged to the point that public safety was in peril (in France two nuclear reactors were damaged by bombs in 1975, and in 1973 in Argentina a reactor under construction was briefly occupied by urban guerrillas), no overt thefts of nuclear weapons or of weapons grade material have occurred, and insofar as anyone knows,

no amounts of special nuclear material are known to have been secretly diverted, although large quantities are unaccounted for. But this is negative evidence; the lack of a history of incidents does not allow the inference that no such event will occur, especially in light of the increased level of violent crime and political violence and increased public attention to nuclear issues.

This report examines some of the reasons **why**, despite the lack of any serious incidents, the threat posed by the non-State adversary has in recent years become a topic of increasing public concern. It looks at the worldwide increase in terrorism and explores the various reasons why political extremists might be attracted to nuclear targets or use nuclear material as well as at some of the disincentives. The report then looks at the incidents that have occurred thus far involving nuclear facilities or material as well as at nuclear hoaxes. The report identified current schools of thought on the subject, the areas of apparent consensus, and the areas of continuing debate. It discusses the specific problems of employee surveillance and response planning and concludes with general observations on the potentiality of nuclear actions by non-state adversaries.

II. CAUSES OF INCREASED CONCERN ABOUT  
THE POTENTIAL NUCLEAR NON-STATE ADVERSARY

If there is an unwritten law of human behavior that no serious preventive measures will be taken until after the first catastrophe occurs, that law does not apply in the area of nuclear safeguards. Concern about the potential non-State adversary grew in the late 1960s although no criminal or politically-motivated terrorist had ever carried out any action against nuclear programs or involving nuclear material. Concern has continued to grow, although, apart from a handful of minor incidents, no serious action has occurred. Judging by the number of hearings, studies, reports, and articles on the topic, and by the increased security measures, the possibility that terrorists or criminals might carry out some action is being taken seriously. This is not to say that security measures are adequate. Nor is it to say that all those in government agencies and the private components of the nuclear industry equally accept the notion that there is a real threat, or that they have enthusiastically supported measures to improve security. They have been embarrassed by some obvious deficiencies that have been revealed, and in some cases they have been forced to adopt new security measures. Many, however, still view their problem as one of compliance, not one of security against a threat they are not convinced exists. Asked what he regarded as the biggest threat to his nuclear facility, one director of security replied, "A dedicated and determined band of NRC inspectors."

The fear that some subnational group or private individual might "go nuclear" is not a new one, as Roberta Wohlstetter pointed out in her recent article in *Survival*. "In a memorandum to President Truman of 25 April 1945, Henry Stimson predicted that 'the future may see a time when such a weapon may be constructed in secret and used suddenly and effectively with devastating power by a willful nation or group

against an unsuspecting nation or group of much greater size and material power."<sup>1</sup>

The current concern seems to result from a confluence of several developments in the late 1960's and early 1970's. Foremost among these is the rapid growth, actual and projected, of nuclear power plants and the attendant fuel-making, reprocessing and nuclear waste disposal facilities. Increased demands for energy, the impact of the Arab oil embargo in 1973, the rapid rise in oil prices, all have given impetus to developing nuclear power as an alternative source of energy. In the United States, at the end of 1974, it was anticipated that there would be over 1000 nuclear reactors in the country by the end of the century. The 1975 OECD and IAEA projections anticipated over 2000 nuclear reactors world wide by the year 2000. (See Volume 1, Chapter X, page 244).

Reactors produce plutonium as a by-product. With the increase in the number of reactors will come an increase in the worldwide production of plutonium, the stuff atomic bombs are made of. In 1975, the annual worldwide production of plutonium was 20,000 kilograms. By 1983, it has been estimated that annual production will reach 70,000 kilograms (plus or minus 15-20 percent to provide for uncertainties).<sup>2</sup> By the year 2000, annual plutonium production may reach **400,000** kilograms, a quantity roughly sufficient for 40,000 bombs. The proliferation of nuclear facilities with the increasing availability of and traffic in plutonium will, it is feared, provide numerous opportunities for sabotage and theft.

Although diversion of plutonium by a government for military purposes may be more likely than diversion or theft by a non-State, it is the latter which may be perceived as the more worrisome problem by the general public. That Argentina or Pakistan may eventually acquire a nuclear weapon does not seem to cause great alarm (except perhaps to citizens of neighboring countries). People have come to accept the presence of nuclear weapons and have grown accustomed to living with the possibility of nuclear war. One nation more or less with nuclear weapons does not seem to make a lot of difference. In contrast, the

possibility that some band of criminals or terrorists may acquire a nuclear capability causes a great deal of anxiety. This is no matter of remote debate by military deterrence strategists. Crime and terrorism affect people very personally at a daily-life level. They come to us nightly in the form of human dramas on our television screens in which the audience participates as vicarious victims.

Concurrent with the expansion of nuclear power, the environmentalist movement gained strength and was something new. The word "environmentalist" does not even appear in dictionaries that are ten years old. "Environmentalists," although they were not called that, have always existed in America primarily as a local phenomenon to preserve a specific piece of landscape. A national environmental movement is a relatively recent development and represents a new and powerful voice in modern society. Environmentalists have challenged some of the basic tenets of modern society: continuous economic growth, industrial expansion, the concept of progress itself which had somehow come to be synonymous with technological advance. Although at first nuclear power seemed to be a solution to environmentalists concerns about the pollution resulting from the use of fossil fuels, many began to question the effects of nuclear power on the environment. They worried about thermal pollution, the amount of radiation emitted during normal operations or that might accidentally be released, the disposal of radioactive wastes. The initial focus on the adverse side effects of nuclear energy shifted to concern about accidents. How safe were nuclear reactors? What would happen if the system designed to meet emergencies failed? Later, they gave increasing attention to the possibilities and consequences of deliberate malevolent actions by terrorists or criminals. Man's malevolence became a major philosophical premise of the foes of nuclear energy, or, as David Comey put it, "No longer is one calculating the chances of malfunctioning machines; one is guessing the probability of malfunctioning human beings. One does not have to be a psychiatrist to realize that probability is high: one need only read the newspaper."<sup>113</sup> Nuclear power is bad because man is bad.

This struck a responsive chord in the public mind. There is undeniably a degree of anxiety in the mind of the public concerning nuclear

power. Nuclear power is guilty of original sin. The nuclear age began with a bomb not a power plant, and the word "nuclear" recalls Hiroshima not Indian Point. Nuclear power is the most potent, and to many the most sinister, force known to man. However, nuclear power plants (light water reactors) are not nuclear bombs. Successful sabotage could theoretically result in a release of radioactive material, but a reactor cannot be turned into a nuclear bomb. Only recently has some of the public come to understand this point.

If people are already uneasy about nuclear power and worried about terrorists, it is not difficult to frighten them with a forecast of some kind of nuclear action by terrorists. The mere proximity of the words "terrorist" and "nuclear" induce fear.

If there was any doubt about man's maliciousness, it could be dispelled by reading the newspapers or turning on the television -- news or drama. There is no convincing evidence that violence on television or in the movies causes people to be violent, but it may affect one's view of the world. Those who are regularly exposed to violence on the screen tend to see the real world as a more violent place.<sup>4</sup>

It is, however, not simply the portrayal of violence that altered perceptions in the 1960s. Crime, particularly violent crime, often random, needlessly violent crime, increased by epidemic proportions. Political violence in the form of international terrorism also increased in the late 1960s and by the early 1970s had become a serious worldwide problem. Assassins, kidnapers, and bombers were no longer remote figures associated with the Russian Revolution and wartime serials. They regularly kidnaped government officials and businessmen, hijacked airliners, gunned down passengers in airline terminals, murdered Olympic athletes, set bombs off in restaurants and railroad stations. Their violence was no longer confined to guerrilla struggles in remote colonies or insurgences in Third World countries. Terrorists crossed national borders to carry out their attacks on virtually every continent. No country was neutral, no citizen safe.

Events of the past fifteen years also have made it difficult not to have lost some confidence in our social, political, and economic institutions. Social mores were challenged. Basic lifestyles were changing. Within 13 years, five men have held the office of president: one was assassinated, one virtually abdicated, one resigned in disgrace, and one was not elected. In addition to one successful assassination of a president, there were two more attempts against a president's life, and two presidential candidates were shot, one fatally. American military involvement in the war in Indochina led ultimately to disaster. At home, news from Indochina triggered and provided the rationale for violent protests, bombings, and ultimately the appearance of genuine domestic terrorist groups. For the first time, it seemed (though not in reality for the first time) that there was political violence in the United States. Looking back, the passage to America's third century was a very rough ride.

This turbulence was not a uniquely American phenomenon. Japan and the nations of Western Europe suffered from bad cases of political scandal and upheaval, and also from domestic political violence unprecedented since the thirties. Corporations too were shown to have lied, misled, bribed, and yielded to blackmail.

Such revelations do not inspire confidence in claims by government or industry that nuclear safeguards are adequate now, or that the increased measures of security considered necessary to protect nuclear programs would not be abused or that governments indeed would be able to prevent diversion or theft or protect their citizens against nuclear terrorists. There was and is reason for doubt and fear. Doubt and fear are selling well anyway. There seems to be a popular market for doom, whether the "light doom" of, for instance, the Club of Rome, or the "heavy doom" of those who warn people to have a year's supply of food and a shotgun at home, or the religious groups who firmly believe that Armageddon is just around the corner.

### III. GROWTH OF INTERNATIONAL TERRORISM

Terrorism can be described as the use of actual or threatened violence to gain attention and to create fear and alarm, which in turn will cause people to exaggerate the strength of the terrorists and the importance of their cause. Since groups that use terrorist tactics are typically small and weak, the violence they practice must be deliberately shocking.

Repeatedly, during the last few years, small groups of extremists have demonstrated that by using terrorist tactics they can achieve disproportionate effects. They attract worldwide attention to themselves and their causes; they arouse worldwide alarm, and can create international incidents that national governments are compelled to deal with, often before a worldwide audience.

Terrorism has in recent years become an international phenomenon. Modern jet air travel provides terrorists with worldwide mobility and convenient targets. Mass communications give them access to worldwide audiences through the almost instantaneous broadcasting of the violent dramas they create. New weapons have increased their capacity for violence, while society has become increasingly vulnerable because of growing dependence on complex systems and often fragile technology (civil aviation is an example) or technology, such as nuclear energy, that is potentially dangerous if exploited malevolently.

International terrorism is simply terrorism that has clear international consequences. It includes incidents in which terrorists go abroad to strike their targets (as in the Lod Airport massacre), or select victims or targets because of their connections to a foreign state (as in the assassination or kidnapping of a diplomat), or attack international lines of communication and commerce (as in the hijacking of an airliner).

International terrorism took a sharp upswing in the late 1960s. Latin American guerrillas moved into the cities and adopted terrorist

tactics as a means of gaining international attention; the Palestinians initiated an international campaign of terrorism against Israel; and small terrorist groups appeared in Japan, Western Europe, and the United States. Once the utility of **terrorist** tactics was demonstrated, new groups -- South Moluccans, right-wing Cubans, etc. -- were **inspired t.** employ them and instructed how.

The following figures illustrate this increase. The first, reprinted from an unclassified CIA report "International Terrorism: Diagnosis and Prognosis," shows the total number of international terrorist incidents that occurred between 1965 and 1975. <sup>5</sup> The second is based on figures compiled by The Rand Corporation: using slightly different criteria from those of the CIA, which accounts for the slight difference in totals, it shows the total number of international incidents by year from 1968 to the end of September, 1976. Both figures show a peak in the years 1973 and 1974, a decline in 1975, and an increase again in the first nine months of 1976.

The third figure, a record of the casualties incurred in these incidents, shows a similar increase to the year 1974, a decline in 1975, and a ris<sub>e</sub> again in 1976.

These are incidents of international terrorism only. Local incidents of terrorism -- the murder of Irishmen by Irish extremists in Northern Ireland, for example -- are not included (although incidents in which IRA extremists planted bombs in London were arbitrarily counted; although not international, they did represent an effort to carry out the Irish struggle "overseas") .

To respond to the concern that these increases did not reflect an increase in international terrorism but only improved reporting of a continuing phenomenon as governments became more disturbed about the problem, the following graph of "major incidents" of international terrorism was compiled (Figure 4). The criteria for inclusion as a major incident were that the incident resulted in at least one fatality, if a hostage incident that it involved a government official or diplomat, or if a hijacking that the hijacker demanded more than simply changing the destination of the airplane. These criteria excluded the numerous

# INTERNATIONAL AND TRANSNATIONAL TERRORIST INCIDENTS

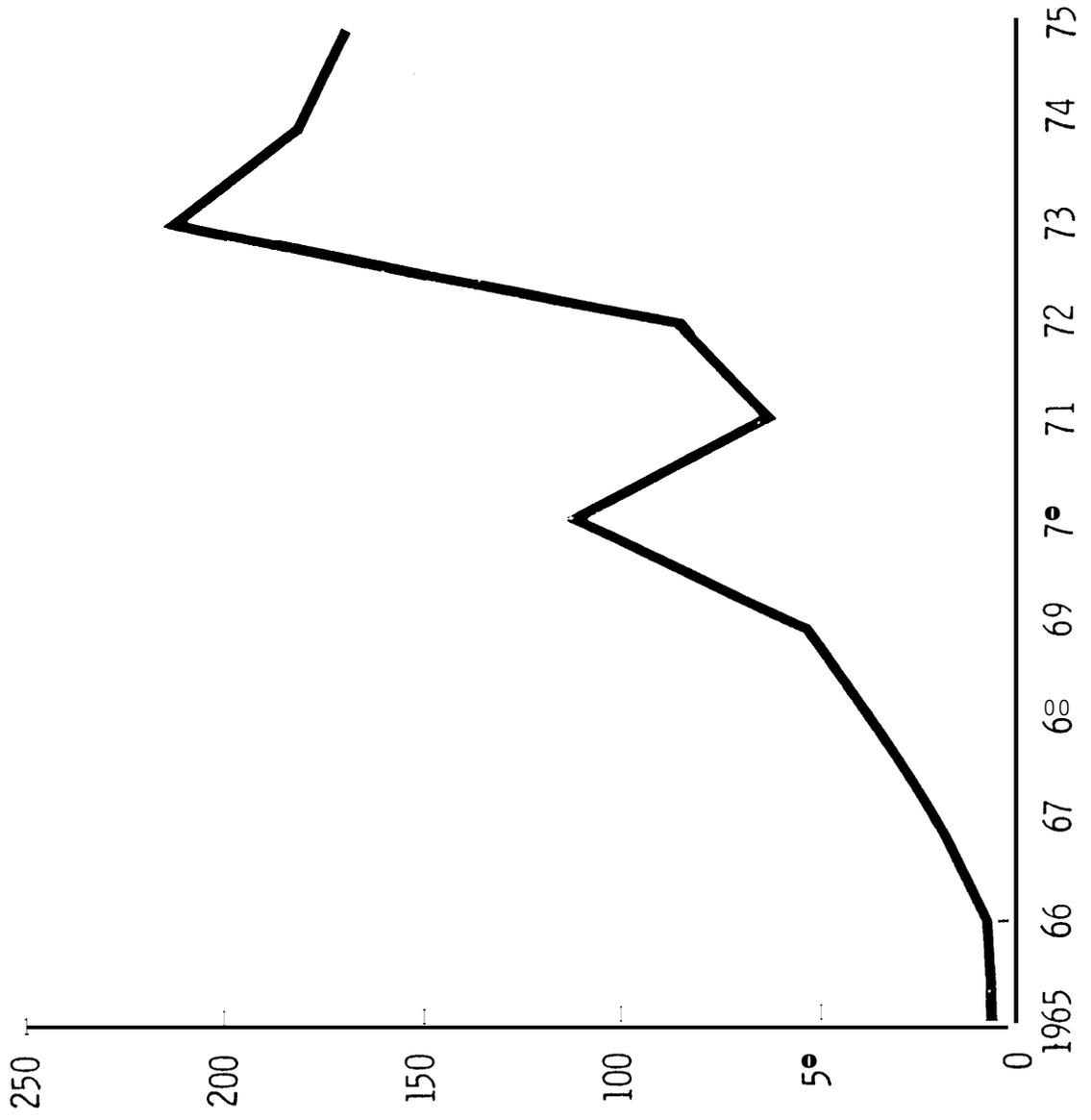


Fig. 1

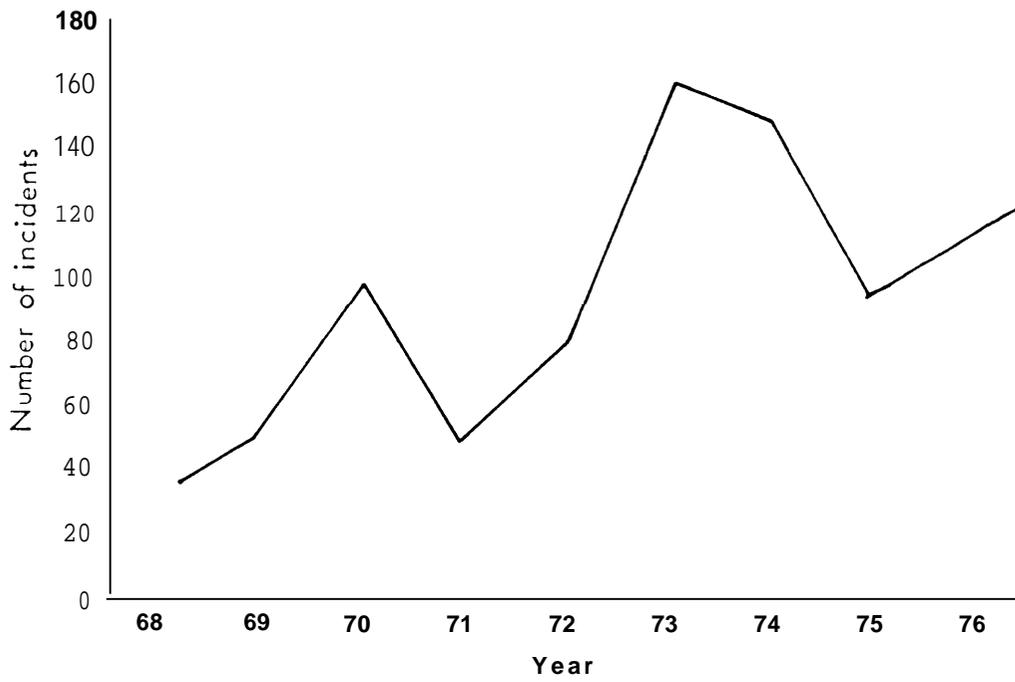


Fig.2 -- Total number of incidents of international terrorism

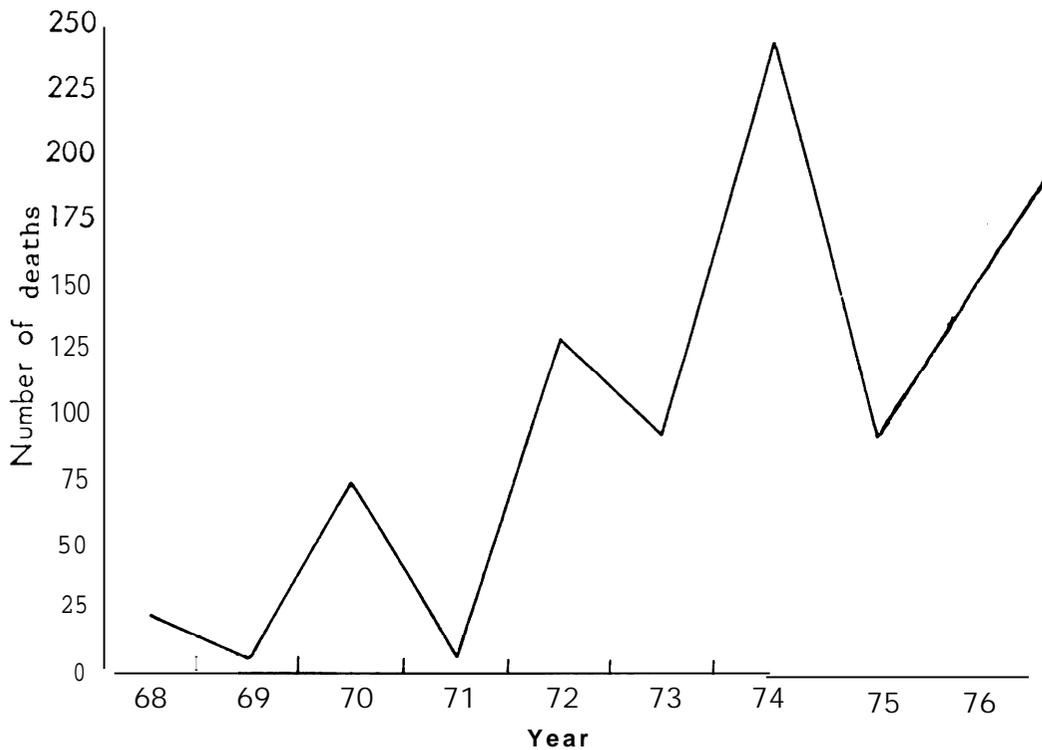


Fig. 3 -- Total number of deaths in incidents of international terrorism

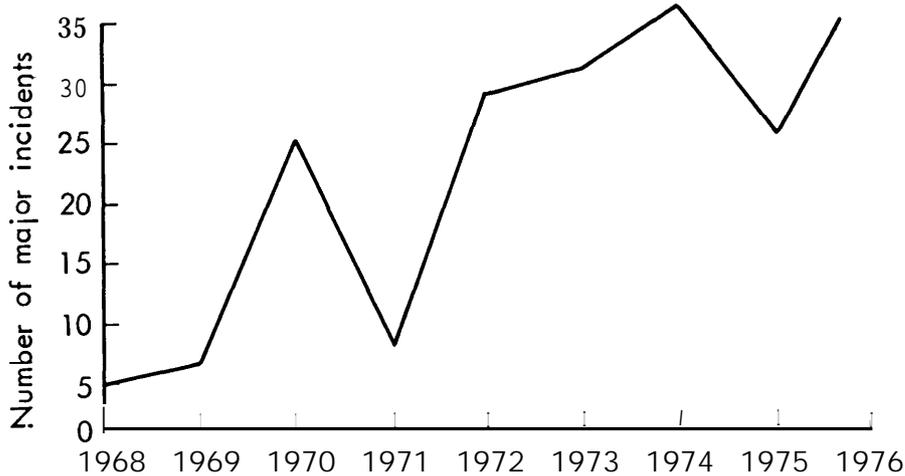


Fig.4— Major international terrorist incidents

token acts of violence -- little bombs planted in front of embassies, numerous kidnappings of business executives, and a lot of hijackings to Havana. Even by thus excluding most bombings, the category which has shown the greatest increase, the overall trend is still upward.

Some observers have found encouragement in an apparent decline of international terrorism in the last year. Judging from the figures presented here, however, it would be dangerous to conclude that international terrorism has leveled off or might even be declining; the data for 1976 show no such decline. If decrease there was, it is in the eyes of the audience, for terrorism is largely a matter of perceptions. It is not measured solely by the number of incidents or body counts. Neither sum accurately reflects the amount of terrorism, which comprises not only the actions of terrorists but also the effects -- the publicity, the shock, the terror -- that these actions generate.

To illustrate the point, fewer incidents of international terrorism occurred in 1972 than in 1970; however, two particularly shocking episodes in 1972, the Lod Airport massacre in May and the Munich incident

in September, appalled the world and provoked many governments to undertake serious measures to combat terrorism. In the United States, it led to the creation of the Cabinet Committee to Combat Terrorism.

Similarly, many people labeled 1975 as the "year of the terrorist." Certainly, 1975 seemed to surpass previous years in the number of dramatic and shocking episodes, particularly in Western Europe, and thus closer to us. Two attempts to shoot down airliners at Orly Field in Paris, the kidnapping of a candidate for mayor of West Berlin, the seizure of embassies in Stockholm, Kuala Lumpur, and Madrid, the IRA bombing campaign in London, the assassination of Turkish ambassadors in Austria and France, the hijacking of a train in The Netherlands, the takeover of the Indonesian consulate in Amsterdam, and the seizure of the OPEC oil ministers in Vienna, all combined to produce a spectacular effect. However, measured by the number of incidents and by the number of casualties, international terrorism had, in fact, declined in 1975. Fewer incidents of terrorism occurred than in 1973 or 1974, and fewer persons were killed than in 1974.

To repeat, there were no fewer incidents of international terrorism in 1976 than in 1975, and 1976 was no less bloody. The primary difference was that 1976 saw more assassinations and murders and fewer hostage incidents. A hijacking, kidnapping, or other kind of hostage incident may be in the news for days, even weeks; murder is usually in the news for a day. Probably more people recall that Croatian terrorists hijacked an airliner on which no one was killed than recall that Cuban extremists planted a bomb aboard an airliner that killed 73 passengers.

The actual amount of terrorist violence overall has been exaggerated -- evidence of its success in gaining worldwide attention. Measured against the world volume of violence, terrorist violence is trivial. About a thousand persons have died in international terrorist incidents since 1968; another two thousand have been injured. If we add the casualties of domestic political violence (as in Belfast or Buenos Aires), the total number of deaths may ascend to ten thousand at the most. More than twice that many are murdered every year in the United States. Since 1968, six million people in the world have died in 13 wars.

But terrorism is more appropriately measured by the amount of attention it receives, by its ability to create national and international crises, by the enormous costs of protection against terrorist attacks, by the alarm it creates, and the consequences these have for society. Terrorist tactics are calculated to rivet attention and create alarm. In this they succeed. This point is important when examining the incentives and disincentives to nuclear action by terrorists.

While any forecasts about terrorism in the future are conjectural, some trends are discernible. Although few terrorists have reached their stated long-range goals, and in that respect terrorism is a failure, terrorism has proved useful in getting publicity and occasionally obtaining some political concessions. These limited tactical successes may encourage terrorists, who are typically short-sighted politically, to continue to use terrorist tactics. Terrorism is likely to persist and perhaps increase as a mode of political expression.

Terrorists will remain highly mobile, able to strike targets anywhere in the world. Recent developments in explosives, small arms, and sophisticated man-portable weapons will provide terrorists with an increased capacity for violence. They appear to be getting more sophisticated in their tactics, their weapons, and their exploitation of the media. They will continue to emulate each other's tactics, especially those that win international publicity. Terrorist groups appear to be strengthening their links with each other, forming alliances, and providing mutual assistance. One result is the emergence of multinational freelance terrorist groups that are willing to carry out attacks on behalf of causes with which they are sympathetic, or to undertake specific operations or campaigns of terrorism on commission from client groups or governments. Nations or groups unable or unwilling to mount a serious challenge on the battlefield may employ such groups or adopt terrorist tactics as a means of surrogate warfare against their opponents. The problem of terrorism will continue to require a major diversion of resources to internal security functions. We have already witnessed this development in the area of civil aviation, and we are now seeing the same thing in the nuclear industry.

IV. WILL TERRORISTS GO NUCLEAR?

There is no discernible trend in the direction of nuclear action. To date, no terrorist group has demonstrated that they possess nuclear weapons material or radioactive wastes, or has claimed they have such material to extort concessions. Apart from a few incidents of sabotage in France, political extremists have not attacked nuclear facilities, and there is no evidence that they have sought to acquire special nuclear material. In attempting to predict whether in the future terrorists will go nuclear, we must consider a spectrum of potential nuclear actions that terrorists could carry out. We can then discuss these in terms of capabilities and intentions.

Only a telephone call or a postcard are needed to carry out a nuclear hoax. An individual can do it. Acts of sabotage can be carried out by one person but success requires some limited technical knowledge and involves some risks. The seizure of a control room or other portion of a nuclear facility could conceivably be carried out by one man, but is more likely to involve several. Seizures of embassies or other buildings, which we have seen terrorists do, seem to require a minimum of three men to guard any hostages, maintain a lookout, negotiate, sleep, etc. The operation also requires reconnaissance, some planning, the acquisition of weapons, and the penetration of the security apparatus. But it still would be within the range of many small groups, for example, a group the size of the "Symbionese Liberation Army." The overt theft of a nuclear weapon or special nuclear material would require a small armed assault, quite possibly the use of automatic weapons and explosives, a means of escape, and possibly a hideout. While such an operation could conceivably be carried out by a small group - **say**, a half-dozen people -- it is likely to require more in various supporting roles.

The manufacture (as opposed to the design) of a nuclear bomb is a complex operation demanding considerable effort and continued success through a number of difficult steps. It would require the accumulation of sufficient fissionable material (either by diverting small amounts over a long period of time in order to avoid detection or by overt thefts),

the acquisition of convention explosives, a means of moving the radioactive material and storing it, a place to manufacture the bomb without mishap, its delivery, and its detonation. It would take weeks or months to do and the entire task would require a number of people, including a few with technical knowledge. (See Chapter VI of Volume I).

Acquiring sufficient fissionable material is seen as the principal obstacle to fabricating a clandestine nuclear explosive device. With sufficient material, there is a consensus that a crude explosive device can be made. For plutonium and uranium-233 about 5-10 kilograms are needed; for U-235 about 15-30 kilograms. Light water reactor fuel, which is 3 percent enriched uranium-235, cannot be made into a fission explosive device.

Plutonium and fully enriched uranium-235 are the most practical materials for the clandestine fabrication of a bomb. (Uranium-233 is a by-product of high temperature, gas-cooled reactors which have not yet come into widespread use.) Highly enriched  $^{235}\text{U}$  can be found in government weapons programs and also is used as fuel for research reactors and nuclear-powered naval vessels. Plutonium is also found in the present nuclear fuel cycle, although it is currently not being commercially separated in the United States (it is in several countries in Europe and Japan), and is available in larger quantities than either  $^{233}\text{U}$  or  $^{235}\text{U}$ .

It has been asserted that commercial plutonium is useless for making bombs. This is not correct. See Chapter VI of Volume I for a discussion of the design and construction of Nuclear Fission Explosive Weapons.

The notion that someone outside of government programs can design and build a crude nuclear explosive is much more plausible now. In the beginning, the secrets of fission were closely guarded. However, much of the requisite technical knowledge has gradually come into the public domain. A growing number of technically competent people understand this material, and, even without detailed knowledge of nuclear weapons design, theoretically could design and fabricate a nuclear explosive. Its detonation and performance would be uncertain. Its yield would be low, probably in the tenths of a kiloton range.

A former designer of nuclear weapons asserts that "under conceivable circumstances, a few persons, possibly one person working alone who possessed about 10 kilograms of plutonium and a substantial amount of high explosive, could, within several weeks design and build a crude fission bomb."<sup>6</sup> Three noted scientists, in a statement to the National Council of Churches, maintained that it was impossible for a single person to make a bomb. "At least six persons, highly skilled in very different technologies, would be required to do so, even for a crude weapon."<sup>7</sup> They may put it beyond the grasp of any "bright lunatic," but the perimeters of the debate are still significantly limited. It could be done. See the conclusions of Chapter VI, Volume I.

For a dispersal device, the technical and material requirements are less. Some plutonium, or a quantity of some other available radioactive material, spent fuel for example, and a mechanism for dispersal would suffice.

Assuming for the moment that it could be done; that there exist in the world today groups that possess or could acquire the resources necessary to carry out the actions described, we are left with the question of motivations and intentions.

A nuclear capability would give terrorists unprecedented destructive power. The detonation of even a crude nuclear device in a populated area would kill tens of thousands of persons. This is orders of magnitude greater than the casualties involved in the largest terrorist incidents to date. Deliberate attempts, outside of war, to kill large numbers of people in a single act are rare, and instances in which politically motivated terrorists have deliberately attempted to kill large numbers of people are very rare. In no single incident in the past half century have terrorists killed more than 150 persons and incidents involving more than 20 deaths are extremely rare.

If we exclude acts that took place during wars, battles with or raids by guerrilla groups which produced heavy casualties, or instances of mass executions of government collaborators by revolutionaries or of suspected enemies of the state by governments, then in the past half century there have been perhaps fewer than a dozen instances in which terrorists have deliberately sought to kill a large number of civilians (that is, something approaching a hundred). Such incidents would include the detonation of a bomb at the Sofia Cathedral in Bulgaria in 1925 which killed 128 and wounded 323; the bomb planted by the Irgun at the King David Hotel in Jerusalem in 1946 in which more than 200 were killed or injured (although there is some evidence that the terrorists made an attempt to have the hotel evacuated before the explosion); the bombs placed aboard an aircraft in which 47 were killed one time and 88 another, the Lod Airport massacre in 1972 in which 25 were killed and 76 were wounded; and some of the bombings in the United Kingdom in which large numbers were injured but few were killed. The most recent incident of "mass murder" occurred on October 6, 1976, when a bomb placed aboard a Cubana Airlines jet exploded causing the airliner to crash; 73 persons were killed. Anti-Castro Cubans claimed credit for the act.

Apart from these rare incidents, the record of modern international terrorism shows that terrorists have, for the most part, not sought to carry out mass murder. Of 861 incidents of international terrorism that

occurred between 1968 and October 1976, 178 (or 21 percent of them) involved one or more deaths. The rest were token acts of violence, for example, small bombs planted outside embassies, or hijackings without casualties, or other acts that did not result in any deaths. Of the 178 incidents in which one or more persons were killed, more than half (95 of them) involved one death; 26 resulted in two deaths. Approximately 11 percent of the incidents with deaths, or about two percent of the total number of incidents of international terrorism, involved 10 or more deaths, many of these the result of shoot-outs between terrorists and members of security forces, both of whom are included in these totals. Figure 5 illustrates the number of incidents with deaths and the number of deaths.

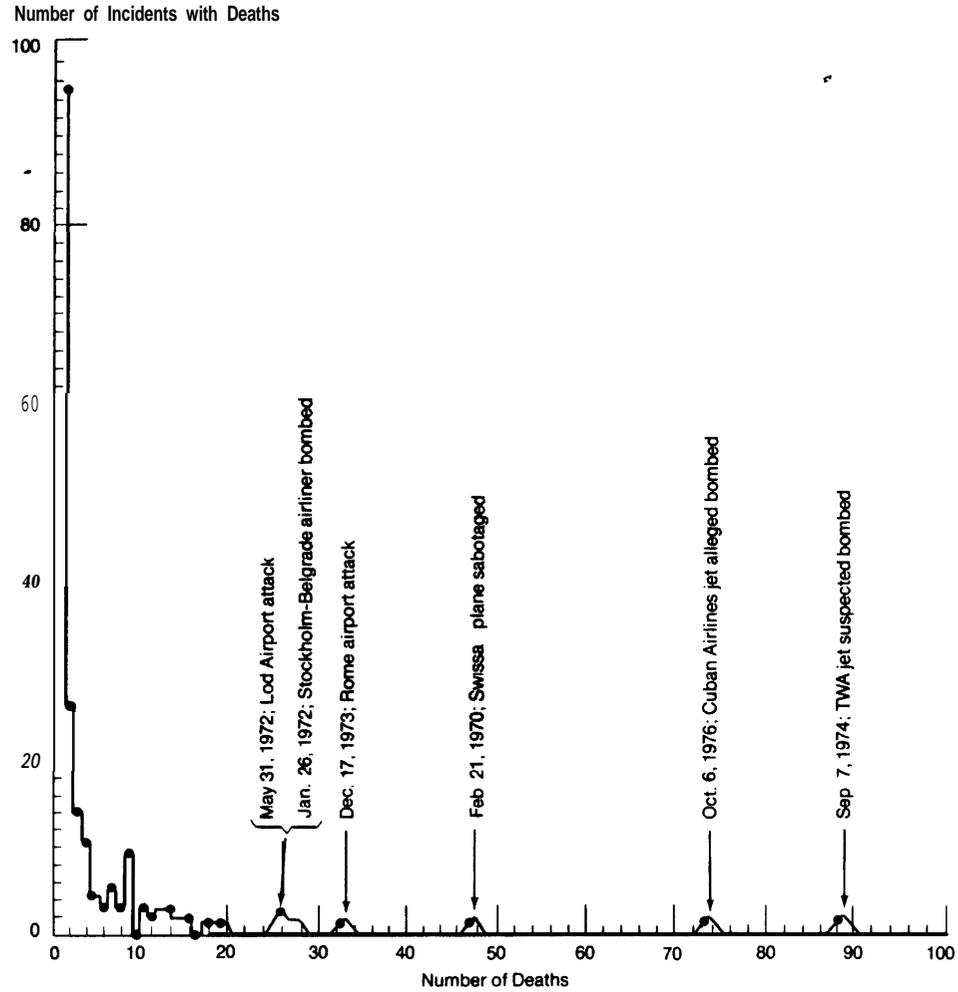
To repeat, these are incidents of international terrorism. Local contests could be more bloody, but a preliminary examination of politically-motivated violence in places like Argentina, Northern Ireland, and in the United States shows little evidence that terrorism equals mass murder. The vast majority of the incidents involve none or one or two casualties.

It is apparent that if any of several large known terrorist groups had wanted to kill hundreds or even thousands using chemical, biological weapons, or simply conventional explosives, they could have done so. If we were to examine all past incidents aimed deliberately at causing widespread casualties -- such as attempts to poison water supplies -- we would probably discover the perpetrators for the most part to be deranged individuals or tiny groups sharing serious mental problems. As an example, two youths were arrested by police in Chicago in 1972. They had planned to poison the city's drinking water with typhoid bacteria. The youths were organizers of a "group" which planned to inoculate its own members against the disease "to form the basis for a new master race" after the rest of the population had been wiped out. It is noteworthy that the police discovered the plot after being tipped off by a person whom the boys attempted to recruit.

Mass murder may be considered counterproductive for terrorists. It could alienate sympathizers and potential supporters, provoke

Figure 5

Figure V-3.  
**Number of Deaths per Incident of Terrorism  
Involving Any Deaths 1966-1976 (October 6)**



(See appendix II I-A for more information on the death incidents )

Based upon data supplied by the RAND Corp

(See Annex to Appendix III-A for information on the high-death incidents. )

severe crackdowns that public opinion would demand and support, and threaten the survival of the organization itself. For these reasons, any scheme of this type is likely to create disagreement and dissension within the organization contemplating it, thus exposing the operation and the organization to betrayal. In sum, mass murder appears unlikely to be contemplated by groups capable of making elementary political judgments.

While we cannot rule out the possibility of a "large-scale Led," the wanton killing of large numbers of civilians, the detonation of a nuclear device in a populated area appears unlikely, at least on the basis of the historical record. And the reasons cannot be explained in terms of limited capabilities. Political extortion based on some type of nuclear threats, a real one or a clever fabrication, seems more attractive to terrorists. possessing a nuclear device, it seems terrorists could demand anything. But the idea of nuclear blackmail has some weaknesses.

The whole area of motivations, incentives, demands and conceivably negotiations in the area of nuclear blackmail by non-State adversaries merits systematic examination, which it has not received. At present, we can do no more than speculate about the types of demands non-State adversaries can, cannot, and are most likely to make. It does not seem logical that non-State adversaries would resort to nuclear means to make demands that they have a good chance of achieving without escalating the threat to that level or making the investment and taking the risks necessary to obtain SNM and fabricate a nuclear device. If current tactics are successful most of the time they are unlikely to alter them. If there is an easier way, they will take it. If they can fabricate a nuclear threat without fabricating a nuclear device, they will prefer it. Therefore, nuclear blackmail to obtain a few million dollars ransom or spring a few prisoners does not seem likely. If they really possess a nuclear capability, it seems reasonable that they would certainly ask for something more than they can get now by less difficult means.

However, it is not entirely clear how the enormous capacity for destruction associated with a nuclear weapon could be converted into commensurate political gains. Even with a nuclear device, terrorists

could not make impossible demands. They probably could not permanently alter national policy or compel other changes in national behavior. To do so would require at a minimum that they maintain the threat. It is not clear under what conditions and how long they could do so without being discovered. They could not create a homeland, at least not without at the same time offering the victims of the blackmail a set of hostages of their own. They probably could not persuade a government to liquidate itself. To carry out a coup d'etat with a nuclear bomb still requires that the conspirators at some time surface to take control. Then they become vulnerable. They could not realistically expect to be given more nuclear weapons by claiming or even demonstrating that they had at least one. What then could they demand?

They might be able to deter certain acts by threatening nuclear action. As a hypothetical example, Palestinian leftists, with a credible nuclear capability, conceivably might have been able to deter Syria from invading Lebanon.

We must also consider bizarre demands such as the release of all prisoners in Oklahoma or the distribution of food to the poor. It is difficult to see how the satisfaction of these demands would be seen to contribute to the achievement of the threatening group's goals. However, they could be operating within a mind-set that is totally alien to our own. No one would deny that such individuals, conceivably even some small groups whose members share these characteristics, do exist in the world. However, we are now dealing with the lunatic fringe, not the ~~large ter-~~rorist groups who are conceived to have the capability for nuclear theft and the fabrication of nuclear weapons.

Indeed, there seems to be an inverse relationship between intentions and capabilities. At the one end are those who in the name of some bizarre cause, are willing to threaten or cause mass casualties. Individuals or groups that make universal appeals--in the name of "brotherhood," "economic justice," or "world peace"--generally lack any real constituency. Such a group would not necessarily be constrained by fears of alienating world opinion. The group's members would place themselves above world opinion. An essential ingredient of such a group's philosophy would

permit the negation of existing human values, allowing widespread and indiscriminate murder. They might claim divine inspiration (or at least tacit approval by God) to destroy the wicked or the weak--"the good will survive"--or might adhere to a racist ideology that would permit genocide. We are describing here the authors of most hoaxes, and of the few mass murder schemes that are known to have occurred. Individuals with mental or emotional disorders, and a certain charisma, have on occasion managed to become heads of state--Adolph Hitler--or at least of gangs--Cl]arl(~s Manson. Fortunately, most such individuals usually lack the capability to successfully carry out their intentions.

At the other end, we have the large political organizations who probably can muster the resources to carry out such operations but who must carefully weigh the benefits and risks: they are compelled to make political judgments that impose constraints. The same is true of large criminal organizations which must make economic judgments.

There is some theoretical crossover point where intentions meet capabilities. As the opportunities for nuclear theft increase, that point may move toward the lunatics. This perhaps is the most frightening consequence of nuclear proliferation.

The primary attraction to terrorists in "going nuclear" may not be that nuclear sabotage or possession of nuclear devices would enable terrorists to cause mass casualties, but rather that almost any nuclear action by terrorists would attract widespread attention and cause widespread alarm. The words "nuclear" and "terrorist" in close proximity achieve a synergistic effect. A terrorist group might threaten to start fires in highrise office buildings and send authorities a set of blueprints and a book of matches to demonstrate its capability. But a terrorist believed to have a nuclear device is automatically a successful terrorist.

It would not be necessary for terrorists to take risks and make the investment necessary to steal SNM and fabricate a nuclear explosive or dispersal device to create an alarming situation. With a degree of imagination and intelligence, terrorists could do things that demand less technical skill and less risk on their part but still achieve the desired publicity or intended coercive effect. A well-publicized hoax could be as alarming as if the terrorists actually possessed a real weapon, provided that there is no way of verifying that it is a hoax.

Terrorists who seized control of a nuclear weapons storage site or a nuclear power reactor might present little threat to public safety but the situation would be frightening. Despite the assurance of scientists and engineers (who in such a situation can be relied on to disagree with each other), few would want to test their capabilities. The same would be true of terrorists who claimed to possess a nuclear device bolstered their credibility with the enclosure of a small sample of SNM. It might be their entire stash; they might not be able to fabricate a weapon; the device might not work, but again, few would want to run the test.

If we were to lay all of the potential scenarios of malevolent acts involving nuclear facilities or nuclear material out in order of increasing consequences (see Figure 6), the curve representing potential casualties and destruction would sweep up sharply as we move through the list. This curve would begin with the hoax which would directly endanger no one but which if publicized might cause panic, move through the seizure of hostages at a nuclear facility which might directly endanger the hostages but probably would not result in widespread casualties, through contamination scenarios which might jeopardize the health of hundreds of people, and finally end with the manufacture and detonation of a nuclear explosive device which potentially could kill thousands. Terrorists typically have operated at the lower

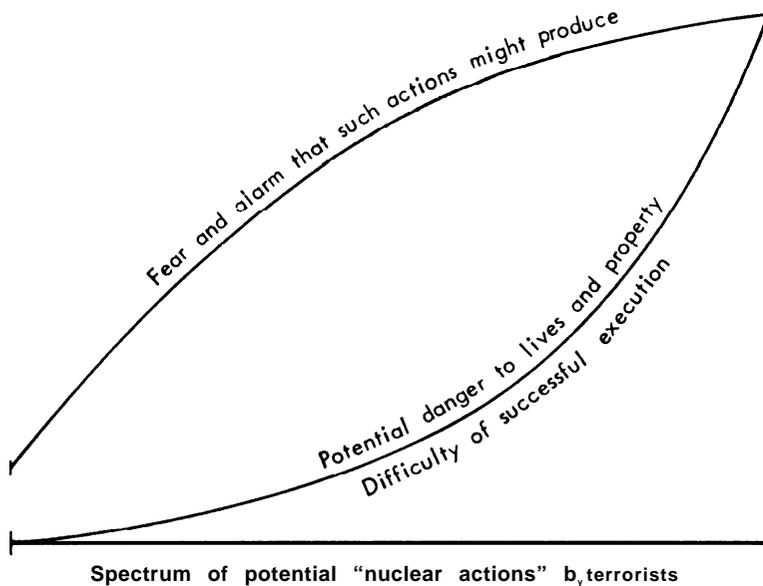


Figure 6

end of the spectrum where the actual number of casualties is low, but the dramatic impact, the fear and alarm they create is high.

In sum, the possibility of low-level but alarming incidents in which nuclear facilities or nuclear material figure as the backdrop or prop for terrorist action certainly exists. The possibility also exists for some alarming mass hostage situations in which there is considerable uncertainty about the capabilities and willingness of the authors of the threats to carry them out. Mass murder schemes still seem to be the product of individual lunatics.

v. ORGANIZED CRIME AS A POTENTIAL NON-STATE ADVERSARY

Ten years ago, the members of the Lumb Panel examining nuclear safeguards for the Atomic Energy Commission identified organized criminal as well as terrorist groups as potential threats to nuclear programs. In discussing criminal adversaries, they had in mind the thefts and illegal diversions that take place in other internationally-traded commodities. If whole shiploads of wheat could be diverted, why not nuclear material? The members of the Panel no doubt also had in mind the theft of the fuel rods from the Bradwell nuclear plant in England, which took place in 1966. A report on the incident is listed in the bibliography of the Panel's own report.

Whether organized crime should be counted among the potential sub-national nuclear threats remains a matter of some debate. Organized crime here is defined as an organization dedicated to illegal activities; its existence transcends any single act; the organization survives its members. It is more like a business corporation than a gang. Organized crime should be distinguished from individual groups of criminals that organized themselves to carry out specific crimes. In the United States organized crime is generally considered to be a nationwide alliance of twenty-some "families" of criminals (not all of the members of the families are actually related). The families are variously referred to as the Mafia, the Mob, Cosa Nostra, or "the syndicate." In addition to the Mafia families, there are non-Mafia criminal syndicates, though by comparison these appear to be of lesser importance. The Mafia families are linked to each other and to non-Mafia syndicates by understandings, agreements, and treaties, and by mutual deference to a "Commission" made up of the leaders of the most powerful families.

Members of organized crime allegedly "control all but a tiny part of illegal gambling in the United States. They are the principal loan sharks. They are the principal importers and wholesalers of narcotics. They have infiltrated certain labor unions. . . have a virtual monopoly on some legitimate enterprises, such as cigarette vending machines and boxes. They own a wide variety of retail firms, restaurants and bars, construction companies, trucking companies, food companies

meatpacking companies, laundries, linen-supplies, garbage collection routes, and factories. They are alleged to own or indirectly control a large share of the legal gambling in Las Vegas. More recently, they have moved into the manufacture and wholesale distribution of pornography. They also reportedly control a large share of prostitution. The annual take from these enterprises is estimated to be in the area of \$50 billion with about half of that as net profit.

In addition to organized crime in the United States, there are, of course, similar criminal syndicates in other countries and these to varying degrees have connections with each other and with organized crime in the United States. There are also "families" of smugglers who each tend to specialize in certain commodities, and there are illegal international arms traders who conceivably could become involved in the transfer of intact nuclear weapons or SNM. All of these organizations collectively could be considered as part of a vast international network of organized crime. There is, however, no known central directorate.

Although some of the most spectacular criminal capers, the Great Train Robbery in England, the Brinks Robbery in Boston, were not carried out by members of organized crime as described above, it is generally thought that only organized crime, with its vast resources and connections, has the organization, capital, access to the skills, and international connections necessary to steal, fence, smuggle special nuclear material, organize and operate an international black market in stolen nuclear material, or acquire the material and fabricate its own weapon. Or, it is believed that at least at some point, even a band of independent thieves would have to seek organized crime's approval for a nuclear heist, fence the stolen material to organized crime, or seek the assistance of organized crime in some manner. This presumption is challengeable.

At issue is not the capability of organized crime to steal nuclear material or fabricate a nuclear device, but their interest in doing so. L. Douglas DeNike suggests, "Armed with plutonium or high level waste in storage, organized crime might demand federal assurances of non-interference with their operations. Punishment for non-cooperation might be

the loss of Washington, D. C., as a habitable center. Nuclear thieves could demand large sums of cash, control over policy or special concessions from national governments."<sup>10</sup> Willrich and Taylor offer a similar view:

... .possession of a few fission explosives or radiological weapons might place a criminal group rather effectively beyond the reach of law enforcement authorities. A criminal organization might use the threat of nuclear violence against an urban population to deter police action directed against its nuclear theft operations. The organization might also use nuclear threats to extort from the government a tacit or explicit relaxation of law enforcement activities directed against a broad range of other lucrative criminal operations."<sup>11</sup>

Willrich and Taylor, however, go on to point out that "criminal groups primarily interested in money are likely to be politically conservative, and that they would not develop a black market in a commodity such as nuclear material which could have revolutionary political implications. Moreover, a large nuclear theft might prompt a massive governmental crackdown and lead to a widespread public outcry, whereas the continued existence of organized crime on a large scale might depend on the susceptibility of some government officials to corruption and on a degree of public indifference."<sup>12</sup>

Jenkins agrees that:

Extortion is a classic crime and nuclear programs certainly open new avenues for extortion. Plutonium and certain other fissionable materials would be highly marketable commodities raising the possibility of a profitable black market traffic in these items. . however, one should be cautious about overestimating the attractiveness of engaging in nuclear extortion or trafficking in fissionable material to the criminal underworld, especially to organized crime. . . organized crime is a conservative service-oriented industry. It provides gambling, prostitution, and narcotics, The profits from the provision of these services are good and, perhaps more important, steady.. There is a willing market for such services, and despite the social harm they cause , they may not be perceived by the public as a direct threat to individual or collective security. Indeed , the

existence of organized crime depends a great deal on tacit public acceptance or at least indifference and therefore it has tended to avoid criminal ventures-- for example, in this country kidnappings for huge ransoms-- that are likely to arouse public anger. Nuclear blackmail would bring tremendous heat on the organization and provoke crackdowns that could interrupt the flow of large steady profits from socially more acceptable crimes.<sup>13</sup>

James E. Lovett is very skeptical of the likelihood of organized crime involving itself in nuclear diversion.

Organized crime will attempt nuclear diversion under one and only one condition, that it will bring more money. Organized crime has no use for nuclear material either as a blackmail threat or as a potential defensive or offensive weapon system. Nuclear material is of value to it only if it has a buyer.<sup>14</sup>

Lovett, however, concedes that a non-weapon State or a terrorist group might employ an organized crime syndicate to divert nuclear materials in return for financial payment. But a non-weapon State or wealthy enough terrorist group would not necessarily have to rely on *organized* crime. They could also recruit a band of independents.

In 1969, the Atomic Energy Commission asked Wright, Long & Company to study the possibility of nuclear cargoes being hijacked by the Mafia and other organized groups. Since the researchers were likely to have little direct contact with members of the Mafia, they used an indirect approach, interviewing police chiefs. The study itself is classified but speaking before a meeting in Los Alamos, New Mexico, one of the investigators said that "the Mafia appeared more interested in cigarettes and television sets than in uranium and plutonium." He noted, however, "It is possible. . . that some foreign tyrant might offer a deal of some kind to any racketeer who would divert enriched uranium." Hijacking trucks was something organized crime is skilled at. Ominously the researcher told the audience that "on a list of 735 so-called Mafia members, 12 are or were owners of trucking firms, two are truck drivers and at least nine were union officials." 15

In private discussions with Jenkins, law enforcement officials generally found it hard to imagine organized crime going into nuclear extortion or theft. "It would bring too much heat on them." "They work with the people in power not against them." "In a case of nuclear theft or nuclear blackmail, judges are likely to become rather liberal in authorizing wiretaps, searches, and arrests. They wouldn't like that." "Their annual take is in the billions. What do they need nuclear for?" If not nuclear extortion or theft, would organized crime fence stolen nuclear material? If there was a market for it, possibly they would so long as it was not likely to be used where they lived.

The authors of the 1975 study by the Mitre Corporation, seven of the twelve of whom were former FBI officials disagree that organized crime's alleged conservatism in politics or business would dissuade it from action involving nuclear material. In a florid style that characterizes the entire report, its authors concluded:

A veritable army of criminals and hoodlums in this country is waiting and willing to undertake any activity, including murder, if the profit justifies it. Their ruthlessness and sophisticated techniques and methods have been convincingly demonstrated in thousands of skillfully executed crimes. . . . They have corrupted and compromised men in all walks of life. They have links with many foreign countries. Their greed knows no bounds.

. . . . They are interested solely in acquiring more money and power for themselves and there is no evidence that they have or ever had any motivation such as patriotism. . . . There is little question that, for a sufficient amount of money, members of organized crime would take a contract to acquire special nuclear material for another party.

.\*.. Organized crime shows little interest in its public image and would not be likely to be deterred from stealing nuclear material because the public might be outraged.

If there is any area of consensus within the debate, it is that no one who has commented on the topic seriously believes that organized crime lacks the resources, skills, patience and force necessary to steal

special nuclear material or engage in an illicit international trade of the commodity. Putting it another way, no one views current safeguards as sufficient to deter or prevent nuclear theft by organized crime. The deterrents, if there are any, lie elsewhere in fears by the leaders of organized crime that such actions would provoke public outrage and lead to severe responses that would seriously damage organized crime's other profitable enterprises. The idea that organized crime would attempt to deter such countermeasures with a nuclear threat is apparently accepted by only DeNike. Willrich and Taylor point out that "like nuclear war between nations, if the deterrent failed and a criminal group either used nuclear weapons or failed to use them, the group itself would probably not survive the crisis as an organization."<sup>17</sup>

At the same time, even those who believe that the risks to organized crime of involvement in nuclear theft or nuclear extortion probably exceed the perceived benefits appear unconvinced that if a worldwide market for nuclear material develops, and if the price is right, organized crime, without becoming directly involved in the theft of nuclear material might act as a "fence" or broker for the stolen goods.

It seems not surprising that the attraction of nuclear material to organized crime is its intrinsic monetary value as a commodity, not its strategic attribute, which only increases the handling risks. Thus, the possible involvement of organized crime in nuclear theft or illicit trade in nuclear material would seem contingent upon (1) the continued expansion of the nuclear industry worldwide--a seeming certainty; (2) a restricted market in special nuclear material, which will keep the value of the commodity high; (3) the consequent necessity and profitability of an illicit trade; (4) a sufficient number of suppliers and buyers to sustain a market as opposed to an occasional one-shot deal; and (5) sufficient laxness in the area of security and safeguards to allow a sufficient seepage of material for trade.

If the deterrents to nuclear theft or other nuclear action by organized crime lie in its natural concern about its other investments and its own survival, that may be an approach to explore. The question might be asked, apart from increasing security and safeguards, which many at

present consider to be woefully inadequate measured against the capabilities attributed to organized crime, what could be done to insure that the leaders of organized crime fully understand that any involvement in nuclear action, like an armed attack upon the nation itself, would inevitably provoke an unprecedented attack on organized crime which it would not survive.

VI. THE RECORD OF NUCLEAR INCIDENTS

Between 1969 and 1975, there were 288 recorded threats or incidents of violence at nuclear facilities in the United States. This figure does not include nuclear hoaxes. The vast majority of these (240) were bomb threats against government or licensed nuclear facilities. Twenty-two were incidents of arson, attempted arson, or suspicious fires. Most of the arson incidents occurred in office buildings where the Atomic Energy Commission rented space, or were directed against university research facilities such as the Lawrence Radiation Laboratory at Berkeley, California. Ten of the arson incidents took place at this location. The same facility also received five bomb threats. Investigators believed the perpetrator or perpetrators to have been an individual, perhaps a former employee with a personal grievance, or militant students.

The most serious incident of arson occurred at Consolidated Edison's nuclear generating plant at Indian Point, New York. On November 4, 1971, a fire caused \$10 million in damage to the facility, but did not affect the reactor. Later, in a letter to the New York Times, a group calling itself "Project: Achilles' Heel" claimed that "Indian Point guerrillas" were responsible for the incident. The letter implied that the action had been motivated by concern for the environment; however, the arsonist who was later apprehended turned out to be a former employee of the company who was undergoing psychiatric treatment at a local veterans' hospital. The fire delayed the plant's opening for three months.

There were four incidents in which bombs or explosives were found at nuclear facilities. Again, research facilities were the principal target. There were 10 actual bombings. Eight of the bombs exploded at federal office buildings or university research facilities, and it is not clear in all cases that nuclear programs were the target. (One, for example, exploded at the High School in Oak Ridge, Tennessee; it is not at all clear why this incident is included in the government's list

of incidents other than the school's proximity to the government's research facilities at Oak Ridge.)

However, in two episodes, the targets clearly were nuclear. On December 7, 1971, two bombs exploded near the experimental linear accelerator at Stanford University in California causing heavy damage to the electronics equipment that controls the facility. A caller later claimed credit for the explosions, but no manifesto were issued and no suspects were ever arrested. It was, however, a period of student unrest and there had been other incidents of violence on campus by student militants.

The other action was carried out by an avowed foe of nuclear power. On February 22, 1974, a 400-ft. meteorological instrument tower at a proposed nuclear power plant site in Montague Center, Massachusetts, was toppled by a saboteur who simply loosened the turnbolts on the tower. The perpetrator, who turned himself in to the police, claimed in a written statement that his action was motivated by opposition to the future construction of a nuclear power plant at the site and to the danger this would impose on the community. "I held no malice toward the tower itself. . . ," he wrote. "Symbolically, however, it represented the most horrendous development this community could imagine."

The remaining incidents consist of forced entries and intrusions, shots fired at guards or at transmission towers, or deliberate breaches of security. In one incident, a student with a record for doing odd things cut through a fence to gain access to the area around a university research reactor simply to prove that it could be done.

The only known diversion of nuclear material in the United States occurred at the Kerr-McGee fuel fabrication plant in Oklahoma. On November 5, 1974, a plant employee who had previously complained that working conditions at the plant were unsafe, was found to have been contaminated with plutonium. Put on administrative duties the following day, she was, when routinely checked, found again to be contaminated. A further check of her apartment, 25 miles from the plant, revealed some contamination, and her roommate was also found to have a low level

of contamination on her body. Urine and fecal samples taken after the first contamination also revealed contamination but not at levels consistent with that found later during an autopsy.

She was

killed in an automobile crash eight days after the first incident while on her way to a meeting with a union official and newspaper reporter. Her death left numerous questions unanswered and the episode was investigated by the Nuclear Regulatory Commission and the Government Accounting Office.

A month later at the same facility, uranium dioxide pellets (containing low-enriched uranium) were found on the grounds of the Plant outside the production area. There was no way they could have gotten there accidentally. The perpetrator was suspected to be a plant employee who wished to embarrass the company. While neither incident involved more than minute quantities of nuclear material, they did raise serious questions about the security of the facility and the possibilities of a more serious diversion.

None of these incidents, with the exception of the fire at the Lawrence Radiation Laboratory, the fire at Indian Point, the bombing of the Stanford linear accelerator, and possibly the removal of nuclear material from the Kerr-McGee facility could be called "serious." There were no casualties; public safety was not imperiled. (Douglas DeNike in "Radioactive Malevolence" states that in August 1971 an intruder entered the grounds of the Vermont Yankee nuclear power plant and fled after wounding the night watchman.<sup>18</sup> This would be the only casualty. Curiously, the incident is not included in the lists released to the public by the Energy Research and Development Administration and the Nuclear Regulatory Commission.) With the exception of the Indian Point, Lawrence Laboratory, and Stanford incidents, all could be classified as minor incidents -- bomb threats, token acts of violence, low-level sabotage, etc. Many are nuclear incidents only in the administrative sense, for example, office buildings, campus science buildings.

There is no evidence that such incidents are occurring with increasing frequency. They go up sharply in 1970, probably due to better

reporting, and remain relatively steady until 1975 when the total number of incidents again increases, again perhaps due to better reporting. (Figures for 1976 are not yet available.) They tell us that the nuclear industry is not immune to the bomb threats that have become commonplace in all businesses and industry, to arson, to incidents of low-level sabotage, and to an occasional bombing. The Bank of America and Safeway Stores fare no better.

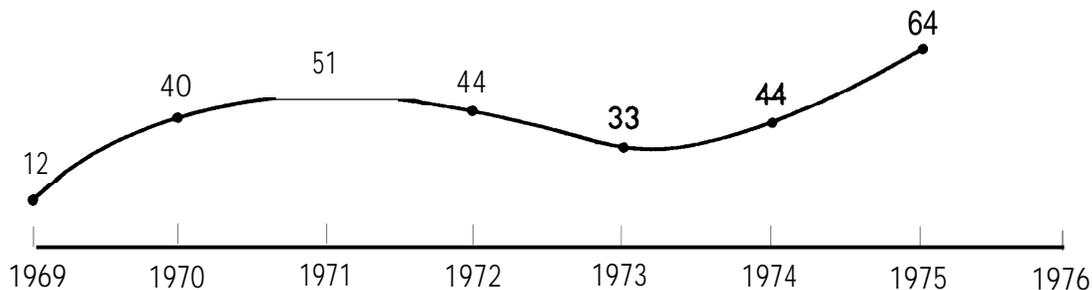


Fig.1 —Threats and incidents at nuclear facilities in the United States

The government list is not complete. It is unbelievable that no incidents of any type took place before 1969. There is the omission of the Vermont incident referred to by DeNike. During the summer of 1974 there were some incidents of low-level sabotage at the Zion nuclear power plant in Illinois which are not included in the list. They appear to have been the work of angry employees. There were also several bomb threats reported at the Zion plant in 1974, but the list mentioned only one that year. It appears that not all bomb threats are reported. The list makes no mention of several known thefts of radioactive material. (Not all such threats come under NRC or ERDA jurisdiction.)

In August 1973, 21 capsules of radioactive Iodine-131 were stolen from a hospital in California. In June 1974, a device was stolen containing strontium-90 which is used to measure the density of roadbeds. The thief, who was never apprehended, was in clear danger because prolonged exposure to strontium-90 can be fatal. In August 1974, nine

radioactive radium needles were stolen from a hospital in California. This theft was carried out by a night porter who worked at the hospital. He was later apprehended. In September 1974, approximately 100 radioactive copper plates were stolen from the Lawrence Radiation Laboratory. They had just been removed from the laboratory's cyclotron. No perpetrators were apprehended. In December 1974, two cesium-137 gauges were stolen from a plant in New Jersey. These were found in damaged condition after an anonymous phone call led to their location. Other such thefts are known. Often it is reported that burglars involved in these thefts may not always know what they are stealing and may ditch the instruments or material when they are found not to be marketable.

Several more serious incidents of theft have occurred abroad. In November 1966, twenty uranium fuel elements in canisters were stolen from the Bradwell nuclear power station in the United Kingdom. The theft was carried out by two men, one of whom worked at the plant. Both were later arrested and the fuel elements were recovered. They said that a man in London had offered them "twenty quid" for the elements. The London connection was never identified. The rods contained only low-enriched uranium and could not have been used to make a bomb.

In April 1974, a uranium smuggling operation was uncovered in India. All of the details of the incident are not available, but it appears from the rather sketchy press accounts that uranium was being removed from the Jaduguda plant in Bihar, India, and was being smuggled to Nepal. From Nepal, it was smuggled to Hong Kong where reportedly Chinese or Pakistani agents took delivery. It is believed that as much as \$2.5 million worth of uranium may have been involved. The plot came to public attention when five persons involved in the operation were arrested in India and 3.5 kilograms of low-enriched uranium were recovered. In October of the previous year, a scientist attached to the plant disappeared. It was speculated that his disappearance had something to do with the smuggling ring. Another man believed somehow connected with the operation was killed near Katmandu. The episode is

extremely interesting for it reveals the possible existence of an embryonic international black market for nuclear material.

There are no complete chronologies of incidents involving nuclear facilities or material elsewhere in the world. From the reports of the incidents that are known, they do not differ markedly from those in the United States and consist mainly of bomb threats, hoaxes, incidents of vandalism and low-level sabotage. In the last few years, however, a few more serious incidents have occurred in Europe.

Several serious incidents of sabotage occurred in France in the last two years. On May 3, 1975, two bombs exploded at a nuclear power station under construction in Fessenheim, France. The explosions started a fire which damaged a nonoperative area of the nuclear reactor complex. The reactor itself did not contain fissionable material. In the months preceding the bombings there had been some local opposition to the construction of nuclear power stations in the area. The bombings, however, could also have been politically motivated. Shortly before the bombs exploded, a caller identifying himself as a member of the "Meinhof-Puig Antich Group" warned everyone at the site to evacuate the area. The "Meinhof-Puig Antich Group" had never been heard of before. Ulrike Meinhof was one of the leaders of the anarchist Baader-Meinhof Gang in West Germany. Puig Antich was an anarchist executed by the Spanish government. It is possible that anti-nuclear extremists used the cover of political extremism to gain publicity for their act.

Two more bombs were detonated at French nuclear facilities in June. A group calling itself the "Garmendia-Angelo Luther Commando," also previously unheard of, claimed credit for the incident. Again, the group may have been a political cover for foes of nuclear power. One bomb was placed at Framatome's main computer center in Courbevois, France; it destroyed half of the input terminals. The second bomb was planted at Framatome's workshop in Argenteuil and caused some damage at the valve testing shops.

In August 1975, two bombs exploded at a nuclear power plant at Mt. D'Arree in Brittany, France. The bombs caused minor damage to an inlet for cooling water for the reactor and to an air vent on the building in the power station. The reactor itself was not damaged, but it was ordered shut down pending an investigation. No one claimed responsibility for the attack, but police suspected that the attack had been carried out by a Breton separatist group responsible for other acts of sabotage in the area.

In early November **1976**, a bomb exploded at the Paris offices of Cerca, a manufacturer of nuclear fuel elements. The blast caused heavy damage but no casualties. Responsibility for the attack was claimed by a man identifying himself as a member of the "Commando of Opposition by Explosives to the Self-Destruction of the Universe" -- COPEAU.

Less than a week after the Paris blast, two bombs were detonated at the Margnac Uranium Mine in Southwestern France. The bombs destroyed four pump compressors causing an estimated \$2 million damage. The mine would have been flooded had not workers been able to get emergency pumps working within three hours. At any rate, the mine, which accounts for about one-eighth of France's annual production, was put out of action for about two months. COPEAU claimed credit and warned of further action.

Further incidents of violence against nuclear programs in Europe may be anticipated. Demonstrations against the construction of new nuclear power stations in West Germany, where anti-nuclear forces appear to have merged with extremist political movements, have resulted in violent confrontations with police. (We are not quite sure here whether political radicals have adopted the anti-nuclear cause, or political radicals and anti-nuclear forces overlap in membership or what the nature of the leadership of the demonstrations is, if any.) On one occasion, police used water guns and tear gas to prevent some 3000 demonstrators armed with clubs, rocks, and Molotov cocktails from storming the construction site. A number of people were arrested and injured.

In Sweden, where nuclear power has met similar resistance, a bomb containing **44** pounds of dynamite was found next to a nuclear power

station at Ringhals in November 1976. A note to a local newspaper told police where to locate the device. The note, which was signed "M," said, "This is the last warning. Next time we will level the station to the ground." The bomb, which was defused by police, would have damaged transformers but not the two reactors.

There have been two incidents involving the use of radioactive material as contaminants. On April 16, 1974, an anonymous caller in Austria calling himself a "justice guerrilla" warned that certain train coaches had been deliberately contaminated with radioactive material. Investigators found strong but not lethal traces of radioactive material of a type normally used for medical diagnosis (Iodine-131). The episode attracted widespread publicity in Austria and provoked a number of hoax calls and threats. The "justice guerrilla" who was later arrested, turned out not to be a member of any extremist group as was first feared, but rather an individual with a history of insanity. He intended his actions to be a protest against the treatment of the mentally disturbed in Austria.

In October 1974, Italian government officials announced that they had discovered a plot by rightwing terrorists to poison Italy's aqueducts with radioactive waste material stolen from a nuclear research center in Northern Italy. The alleged threat was associated with revelations of a planned assassination and political coup by rightwing elements. An engineer at the research center was named as a conspirator, but the allegations were never substantiated and the case became tangled in legal technicalities. Whether the alleged plot, which received widespread publicity in Italy, was real has never been determined.

A single incident is known to have occurred in Latin America. On March 25, 1973, fifteen members of the People's Revolutionary Army, a Trotskyist urban guerrilla group in Argentina, occupied an atomic power plant under construction at Atucha, 62 miles north of Buenos Aires. They overpowered the guards, painted slogans on the walls, raised their own flag over the facility, and stole weapons, but they made no demands for the release of hostages and did not attempt to enter the reactor area or damage the facility itself.

What can we conclude from these incidents? For the most part, they were not serious: only one incident involved a minute quantity of plutonium (the Kerr-McGee episode); public safety was not imperiled. Most were low-level incidents -- vandalism, token acts of violence, low-level sabotage, minor thefts. We can safely predict more of such incidents as the nuclear industry continues to expand. The publicity surrounding the incidents was not that extensive. In only a few incidents did the incident attract international attention. The perpetrators were diverse. They included disgruntled employees, common thieves, political extremists, foes of nuclear power, and a few authentic lunatics. Their motives included protest, greed, revenge, or desire for attention. The perpetrators included insiders, external groups, and combinations of confederates.

For the most part, however, the perpetrators were probably individuals; a few were small groups. The smuggling ring in India with contacts in at least three countries shows the most organization.

The combination of anti-nuclear elements with political extremists, as in France and Germany, seems to be the most dangerous combination, that is, the one most likely to lead to violence. Further violence and perhaps some escalation seems possible, particularly in Europe. On the other hand, there is no evidence in these incidents that any criminal or terrorist group has made any attempt to acquire special nuclear material or radioactive waste for use in an explosive or dispersal device. And no individual or group has demonstrated such a capacity.

VII. NUCLEAR HOAXES

"On 27 October 1970, the Orlando Police Department received a note threatening the City of Orlando, Florida, with destruction by a 'hydrogen bomb.' The note was accompanied by a diagram of the bomb. The anonymous author of the threat demanded \$1 million in cash and a guarantee of safe passage out of the country. The city was given 24 hours to comply -- or risk annihilation. Authorities judged the threat to be a hoax, and police later apprehended a 10th grade student who admitted authorship. There was no nuclear device." 19

This threat and others, including those made in other parts of the world, exemplify that portion of the spectrum of adversary actions classified as hoaxes. For the purpose of this report a nuclear hoax is defined as a threat to cause harm by detonation of either a radiologic dispersal device, a homemade atomic bomb, or a nuclear weapon, but where the threatener lacks the capacity of which he boasts or the dedication necessary to carry out the threatened action. Although persons have made threats alleging that they indeed had a nuclear capability, there is no evidence to date that any of them actually possessed such a capability. While it is theoretically possible that someone had a nuclear device, but for some reason changed his mind and decided not to follow through with the threatened action, there is no basis in fact to believe that this has been the case. None of the threats to use nuclear material studied to date have proven credible. Therefore, they have all been classified as nuclear hoaxes.

Nuclear hoaxes have been seen in the form of extortions containing a range of demands from political concessions to \$40 million in cash. However, the threat was not always coupled with a demand. In some

cases it was in the form of a warning that damage would be done using a nuclear capability. Excluding the cases of extortion for money, justifications for the threatened damage were often given (such as opposition to nuclear development or testing and protest against U.S. participation in the Vietnam war). Other reasons or justifications given were vague, irrational, or poorly developed, and in a few cases no reason was given.

Whether the threat was an extortion device or a **warning, the** apparent intent of the perpetrators could be generally categorized under one of three major headings: expressive, disruptive, or coercive. Some threats appeared to be poorly thought out, nonspecific, and often irrational and confused. It was as if the author of the threat was struggling with an intrapersonal problem which he externalized and which took the form of a threat to cause harm, using the fantastically devastating force of a nuclear bomb. The delivery of such a threat especially if it lacked provision for communication between the adversary and the recipient of the threat seems to have been for the purpose of expressing a strong feeling? making a political statement, or eliciting some sort of reaction.

The second category of hoaxes is made for *disruptive* purposes. These hoaxes, as a group, were more organized than the first type in design, rationale, and content. **They** specified targets, dates, nature of the action threatened, nuclear capability, time frame (how much time t-he recipient had to comply with the demands), and if demands were made, t-hey were more carefully described. Since the adversary committing a hoax lacks the capability to follow through with his threat, one cannot be certain of his level of dedication. Even a hoax, however, inflicts a certain cost on a sector of society in the form of investigation, public anxiety, work stoppage, etc. There is a similarity between this type of hoax and a "conventional" bomb scare in that both threats are structured to force a response by the recipient which usually results in disruption of the normal state of affairs for persons involved with the threat-.

The third type of hoax may be described as coercive in that the perpetrator is serious in his intent to carry out an extortion using a nuclear threat as the means for coercive compliance to his demands. Since he lacks the capability stated in his threat, the perpetrator must rely upon the way he has structured his message and implemented the threat to "con" the "extortionee" into compliance. Since his intent is to have his demands met, provision is usually made for communication with the extortioner to ensure compliance. The major problem faced by the perpetrator who is "conning" the extortioner is to convince the extortioner that he, the perpetrator, has the nuclear capability and level of dedication necessary to carry out the threat if his demands are not met.

It is difficult to determine the motivation for making a nuclear threat. Without direct observation and study of perpetrators who engaged in nuclear threats, one must be cautious about attributing motives to these adversaries. Those who would engage in nuclear threats may be different from, or a special subset of, non-State adversaries. An assumption prevalent in the literature is that the non-State adversary would use nuclear capability if it were available to him, based mainly upon the logic that any adversary might utilize new technical advances for his purposes. The advantages and constraints associated with a nuclear capability are more complex than just increased destructive capability and the adversary who would contemplate the use of this level of force may have completely different perceptions of the world and different values or political objectives than have been demonstrated by adversaries thus far. It is sufficient for this section to raise questions about "nuclear" motivation and insert a caution against projecting the use of a nuclear capability by what are generally regarded as non-State adversaries. (The foregoing is not meant to imply that there are not persons who would carry out a nuclear threat if the means to do so were available to them.)

Based upon a study of nuclear hoaxes, apparent motivation can, like apparent intent, be classified into three categories: political, criminal,

psychotic. A careful reading of threat messages and study of the related circumstances indicates mixed motivation in most of the cases studied. In addition to the likely presence of more than one motive in a given hoax, there is also the possibility that the initial motivation will change as the event unfolds. Existing data do not permit the conclusion that a nuclear hoax extortion, which initially appeared to be politically inspired, was in fact just that and not of criminal origin. For classification purposes, a political motive was ascribed to the perpetrator when he demanded that certain political actions be taken or concessions made. In cases of political extortion, the coercion was directed against the U.S. Government (except for a couple of instances when certain foreign governments were cited to share with the U.S. the possible consequences if the threat demands were not met). There were no instances of a threat made against one government where compliance was demanded from a second government.

Demands for money, with or without safe passage to a foreign country, were assessed as a criminal motivation (personal gain) especially if there were no associated political demands. However, some of these cases had threat messages that demonstrated disordered thinking by the author.

A significant percentage of the nuclear hoax messages were disorganized in content, contained irrelevant statements or had other bizarre features. This group was evaluated as having a *psychotic* motivation. Some of these threats were implemented in such a way that the identity of the perpetrator was not difficult to establish--several of the perpetrators identified had a history of diagnosed major mental illness or hospitalization.

An interesting question for which there is not yet a good answer is, does the adversary perpetrate a hoax because he has *no* nuclear capability? If he had the capability to carry out a nuclear threat, would he choose to make a "real threat" rather than a hoax? Interpretation of available data is that there are those who would carry out a real nuclear threat if they had the capability. For example, in August of 1974, a large explosion at the Los Angeles International Airport killed three

persons and wounded thirty seven others. Shortly thereafter, the Los Angeles Police Department received a taped message

listing a series of

demands which were to have been met or further bombings would occur. Demands ranged from easing restrictions on U.S. immigration laws to liberalization of sex laws. Because he was attempting to draw attention to injustices suffered by immigrants, the selected list of targets spelled out the word ALIEN, the first target, an airport corresponding to the letter "A." He was subsequently named the "Alphabet Bomber" by the press.

It was later learned that prior to the airport bombing he had placed an incendiary bomb in the car of a police commissioner and set fire to his home. There were additional acts of fire bombing that he committed which served to demonstrate his dedication to carry out his threats. He had access to all of the ingredients to make nerve gas at the time he was arrested by the Los Angeles Police Department. There is little doubt in this author's mind that he would have used it or any other capability which could cause much destruction if it had been available to him.

These hoaxes demonstrate that persons are at least thinking seriously about using nuclear material as the coercive basis of a threat. It also appears that while the psychotic individual ~~is~~ more attracted to a nuclear threat than the politically or criminally motivated person, his ability to acquire SNM and carry out such a threat is greatly ~~compromised~~. However, there have been instances (such as the Alphabet Bomber) when a person, although basically psychotic, has had the knowledge and skill to use materials available to him in a rather spectacular and destructive manner.

To date, it would appear that those who are dedicated enough to carry out a real nuclear threat have not been able to gain access or to acquire the necessary nuclear material. The nuclear hoax offers an alternate way for ~~this type~~ Of person to pursue his objectives still within the context of a nuclear threat. Neurologic or bacteriologic agents as the

basis of a "massive threat" have not been popular thus far, although more easily available than nuclear material. Why the threatened use of nuclear material rather than these other agents as a basis for threat is an interesting question that should be studied. It is important to note that the hoaxes studied were all threats to use nuclear material. However, it is interesting that none of these *were* double threats-- that is, threats to use nuclear material against a nuclear target. If a future threat is made to use nuclear material against a nuclear target, it would represent a significantly different type of threat.

It is obvious and logical that if the intent of an adversary is to damage or destroy a target that he would alert the target only in those instances when he was so confident of his capability to cause such damage that an alert could not neutralize his action. Therefore a warning-type threat is either a hoax or the perpetrator has laid his plans in such a manner that even with prior notification he believes no measures can be taken to stop his action. An extortion threat includes prior notification and the implication that the target cannot protect itself because the adversary has successfully placed at risk something highly valued (such as human life). In addition, the threat is created to be dramatic and cause high levels of fear in those associated with the target. Placing human life in the balance or causing terror are *tactics* used by adversaries. In both cases, the terrorist (especially the political terrorist) and the perpetrator of a hoax, as initiators of these acts, have limited resources compared to the level of possible consequences. The use of tactics which terrorize tend to compensate for the lack of resources and maximize the capability possessed by the adversary. The observations about the types of adversaries who have made nuclear hoaxes, their motivations and objectives, strongly suggest that hoaxes will continue to be used by individuals who lack sufficient capability to mount real threats, but who wish to carry out an action within the means available to them.

It is a serious and often a difficult problem to assess the credibility of nuclear threats and to distinguish a real threat from a hoax.

In December 1976, the Canberra Police Department investigated "... a threat to explode nuclear devices in Australia's two largest cities as a protest against continued mining and export of uranium." "The bomb threat was contained in letters to Prime Minister Malcolm Fraser and Labor opposition leader Gough Whitlam. . . from a group of environmentalists calling themselves the Group of Six." The messages "further threatened to contaminate water supplies in the two cities if attempts to explode nuclear devices failed." The police states: "We have no option but to take it seriously."<sup>20</sup>

The development of procedures and techniques to assess credibility and differentiate a real threat from a hoax have been and continue to be the responsibility of ERDA and NRC. The FBI by federal statutes is the lead investigative agency in all cases where threats are made involving radioactive material. The nuclear aspects of threat assessment have been delegated to the Energy Research and Development Administration (ERDA).

Current assessment of a nuclear threat consists of both a technical evaluation of all information related to the alleged nuclear device by ERDA nuclear scientists and a psychological evaluation of the threat message and the context in which it originated by the FBI backed up by ERDA capability.

ERDA is currently involved in augmenting and enlarging its capability for nuclear threat assessment and increasing the parameters for evaluation. This will also be available for direct support, at the field level, of the FBI's investigative responsibilities of an incident and of the deactivation of any device by explosive ordnance disposal teams which may be associated with a threat.

As part of the total threat assessment process, an inventory of SNM is carried out, when relevant; however, there is some question as to the significance of a finding that "all SNM is accounted for." Because of the problem of measurement and checking SNM or any other substance, an unavoidable error is introduced into the accounting procedure. This error produces a calculation which is referred to as the "MUF" factor

(material unaccounted for). Only a very small percentage of the total material is reflected in this measurement error. If, however, that material is special nuclear material, that small amount "unaccounted for" could be extremely significant. The inference is drawn that the adversary does *not* have the nuclear capability of which he boasts if the inventory check shows that all SNM is accounted for. This appears to have been the case thus far.

In any event, the usual approach has been to rule out the possibility of a *credible* threat. If the assessment found that the threat was *not* credible, an assumption was usually made that it was a hoax. Positive criteria for diagnosing a hoax are being developed. When this has been accomplished, the "default" approach (i.e., if the threat is not found credible, it must be a hoax) will be replaced by specific criteria for establishing that a threat is in fact a hoax.

Because of the diversity of motives and objectives attributed to perpetrators, it is not useful to identify any particular hoax as typical of the group. However, there are certain characteristics shared by nuclear hoaxes which can provide a basis for a composite hoax:

*Targets* identified in the various hoaxes ranged from capitals of several countries, including the United States, to major U.S. cities. Federal buildings and certain large corporations and banks were also named as targets. Some hoaxes specifically identified the target while others made general references to "a big city in the U.S.," for example. Multiple targets were spelled out in a small percentage of the cases.

Associated with the demand was usually an explanation or *justification* for the threatened action and ranged from concise specific statements to long and rambling diatribes. A few hoaxes specifically made reference to nuclear matters as being the cause of the perpetrator's concern.

Representatives of the news media and law enforcement agencies and certain major political figures were the most frequent *recipients* of threat messages.

The U.S. Mail Service was the most frequently used means for delivery of the message. In a few instances the threat was made via telephone and on one occasion the caller was apprehended while still talking to the recipient of his threat in a distant state.

In a little over two-thirds of the cases studied, the perpetrators alleged an *identity* and two-thirds of these claimed to be a group.

The amount of time granted by the perpetrator for compliance with his demands or before the alleged device would be detonated ranged from one day to several months with two to 15 days the most frequently mentioned period.

The perpetrator did not *validate* his allegations of possessing a nuclear capability by sending a sample of his SNM or by demonstration by detonation. However, he usually attempted, in some way, to convince authorities that he did in fact possess the alleged device. In a few instances, crude drawings of the device were included with the threat message which were easily assessed by experts as not capable of fission.

In a few of the cases, the *media* carried stories dealing with things nuclear within a two-week period prior to receipt of the threat. In one instance, the diagram of the alleged nuclear device included with a threat was similar to the diagram of an atomic bomb contained in an article of a national news magazine. The perpetrators who seemed to be set off by media stories about nuclear matters demonstrated a significant degree of

disorganization and confusion in the content of their hoax message. Some of these individuals had a history of mental illness.

The cost of evaluating, investigating and reacting to nuclear threats is not insignificant. An increasing number of persons are acquiring information and technical expertise in nuclear matters as a result of the growth of the nuclear industry. If one such person were to initiate a hoax, it would be difficult to negate its credibility from a technical and behavioral assessment only. In instances of non-nuclear extortion, where the perpetrator did in fact possess the capability or valued commodity (such as a kidnapped victim or prized painting) which was the basis for his coercive threat, the extortionist usually did provide evidence of that fact and thereby removed all questions as to whether the basis for coercion was real.

In those cases, the question of the adversary's determination to carry out the threat, should his demands not be met, became a critical aspect of threat assessment. If we are unfortunate enough to encounter an adversary who demonstrates that he actually has the capability which he describes and his threat is therefore verified as credible, then the ability to assess motivation, intent and dedication will become essential in order to conduct successful communications or negotiations--should that prove necessary.

At this time, we are still concerned with distinguishing between real threats and hoaxes. A great deal of emphasis is placed upon evaluating technical aspects of the threat and accounting for current supplies of SNM. Even if it were possible to rely heavily on inventory methods and ignore the problems of "MUF," we still have the problem of a possible foreign source of SNM being used in a threat mounted in the U.S. The emphasis of U.S. nuclear security has been on nuclear materials under direct control of the U.S. at home and abroad. The production of SNM or high-level wastes by foreign governments potentially constitutes a source of supply of nuclear material to the non-State adversary of both

the domestic and foreign variety. An effective security system must deal with the possibility of a foreign source of nuclear material and any comprehensive system of nuclear threat assessment must also recognize that even if all U.S. sources of nuclear material are accounted for, the adversary could have imported material from abroad,

In a spectrum of adversary actions, hoaxes can be viewed as entry level acts used by the emerging or relatively unsophisticated adversary. However, this does not mean that a hoaxer will graduate to a perpetrator of a real nuclear threat. Just as symbolic bombing is used by adversaries because it is easy to do, does not require a high degree of exposure or risk of death or capture (except in the assembly, transport and placement of the explosive) allows a wide range of target selection, multiplies limited capabilities into large payoffs in terms of publicity, and is very difficult for law enforcement to prevent, so too nuclear hoaxes allow an adversary with limited capability to levy a cost on the social system in excess of what his real capacity is (see Figure 6). If one were to project the gradual increase of sophistication and capability in adversary capability which has been observed over time in other situations, we can assume a similar learning curve in the production and use of hoaxes as weapons to create high levels of fear in the public or to attempt to disrupt growth or development of the nuclear industry.

To date, no adversary in the U.S. has been successful in using the media to escalate the public's fear or alarm associated with a nuclear hoax. It is not difficult to conceive how the media could be compelled to inform the general public of a nuclear threat and thereby increase the amount of fear and disruption. Cooperation of the media with law enforcement in this regard is an essential part of a reasoned response to a nuclear threat. The alleged purpose of a nuclear threat is to cause harm to a large number of people, destroy cities or render large areas of land unusable; however, some of those things can be done without the use of atomic devices. It seems then that the choice of a nuclear capability with which to threaten harm has an added dimension which other capabilities lack; that is, the culpability to instill fear and terror in the general population who may not be the direct target of the adversary threat.

Relationship of Effectiveness of a hoax with its Purpose

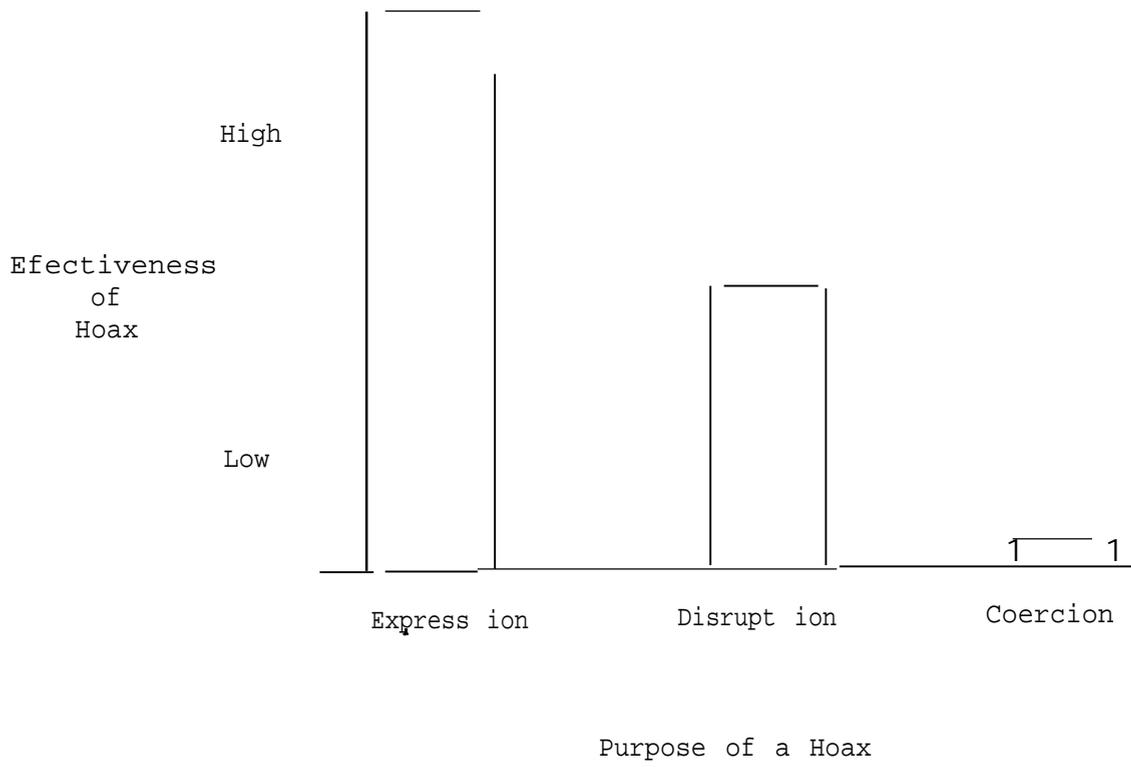


Figure 7

While it may be possible to anticipate adversaries who would use nuclear terror **as a** means of coercing a political response from a nation or as a means of obtaining large sums of money, it would be extremely difficult to predict what psychotic person may be attracted to nuclear power as a capability for widespread damage whatever his irrational beliefs. It seems that the attractiveness of a nuclear threat (real or hoax) for an adversary with political or criminal motivation is use as a tactic of terror rather than terrible destruction.

VIII. . . RESPONSE PLANNING FOR THREATS

A major problem area not addressed by the literature surveyed for this report is response planning for a nuclear extortion or nuclear warning threat. Other facets of adversary actions are discussed but the problems associated with threats to cause damage using nuclear material have not received adequate attention, at least in the open literature. A nuclear extortion or a nuclear warning is that threat where an adversary claims to have the nuclear means to cause great damage either by detonation or dispersal of nuclear material. The significance for this section on Response Planning is that an adversary *claims* to have a capability to inflict damage and not whether his threat is **credible or a hoax**. The determination of validity of a nuclear threat is discussed in the section on nuclear hoaxes (section VII).

An element common to both these types of threats is notification prior **to the** threatened **act**, but only in the case of extortion is it theoretically possible to avoid the destruction **alleged by the adversary**. The situation where an adversary claims responsibility for a nuclear act already carried out is not discussed here. However, because of the magnitude of possible destruction and disruption, the motivation for initiating such an act, its purpose, and post-event consequences warrant careful study.

The focus of this section is on extortion (those threatened acts where prior notification is given and the opportunity exists to exercise options either to neutralize the threat or to take damage-limiting action). Obviously, if the threat is a hoax, it is extremely important to **assess it as** such before protective measures, for example massive searches or wide scale evacuations, are implemented.

Preemptive action directed at potential nuclear non-State adversaries does not appear to be a feasible approach for protection of the public at this time. Although there is little disagreement that it would be better to stop an adversary before he can make a threat or take action, it is difficult to acquire the information about such potential adversaries. The problems associated with identifying individuals or small

closed cells of adversaries operating within society but not necessarily having the dominant values and beliefs of that society and the problems associated with conducting an investigation without violating laws protecting personal privacy create real barriers to developing the option of preemptive action. The arguments for rights of personal privacy versus the rights of society to be protected from harm should be balanced by an assessment of the availability of plutonium and other SNM in a world economy increasingly in need of energy. Another possibility which should not be overlooked is the use of a foreign source of nuclear material to launch an adversary's threat in the U.S. (The author is not addressing those debates dealing with societal risks where the location of nuclear power facilities near population centers is postulated as a threat.)

In addition to preemptive action, another general category of response planning is the prevention or deterrence of adversary actions to steal, by force or guile, SNM or to sabotage facilities (SNM in transit is recognized as a target with peculiar characteristics). The emphasis in this category of response planning appears to be placed upon defensive capability and tactics designed to defeat, contain, or delay an adversary once an action has started to allow time for additional assistance (response forces) from local law enforcement to arrive at the scene. One aspect of response planning as it relates to nuclear extortion is to consider including nuclear threats--both extortions or warnings--in the *Atomic Weapons and Special Nuclear Materials Rewards Act* (Public Law 93-377; 88 Stat. 472). Currently, the legal basis for prosecuting a person who perpetrated a nuclear threat rests mainly upon whether an extortion has been committed. PL 93-377 does "not" contain a provision for payment of a reward to assist in dealing with nuclear threats. It is beyond the scope of this section to deal with legal issues; however, the usefulness to law enforcement of including nuclear threats in the *Atomic Weapons and Special Nuclear Materials Rewards Act* should be considered, if it has not already been done.

A third category of response planning, which is the primary concern of this section, is the response to a threat to use nuclear material as part of an adversary action. The capability to assess whether a nuclear

threat is real or a hoax is extremely important to the development of a response plan for these types of threats. Deployment of special search teams or the evacuation of even a very limited area within a city, such as a multi-story office building, is both costly and disruptive. The initiation of damage-limiting procedures in response to a threat is in itself a major decision, potentially containing serious consequences.

If a nuclear extortion threat is assessed as credible and not a hoax and the target is identified as a large U.S. city, decisionmakers could be faced with a mass extortion/mass hostage situation. Although the adversary may not directly restrain any citizen from leaving the city, an adversary who threatens to detonate a nuclear device in a large city, for all practical purposes, has created a mass hostage situation. The task of carrying out an orderly evacuation of a major U.S. city is laden with numerous problems.

There are those who believe that successful evacuation of a large urban area as a means for protecting its citizens from consequences of nuclear mishap is not realistic when all facets of the problem are examined. David D. Comey discusses various problems associated with evacuation and cites specific instances where there has been lack of compliance to established guidelines for evacuation procedures and where mock drills revealed gaps and breakdowns in carrying out simulated evacuation exercises.<sup>21</sup>

Because of the problems associated with evacuating citizens from a large city, a nuclear threat assessed as credible does potentially hold captive tens of thousands of people and could require hostage negotiations at a level not yet seen. The general area of negotiating or bargaining for large numbers of persons who are held as virtual hostages is a topic about which there is little information. Part of the response planning for nuclear threats should include development of policy and *guidelines* for deciding whether to implement evacuation plans. The planning work to date has dealt mostly with clarifying areas of responsibility and points of communication.

Questions which should be addressed are:

- o What are the criteria for deciding to evacuate a large building or large urban area in the face of a nuclear threat?
- o What is the extent of the liability of public officials if they do initiate evacuation procedures and under what circumstances can they force citizens to comply?
- o What risk does a public official take if he fails to order an evacuation and some untoward event occurs?
- o What is applicable to mass hostage situations of what we already know about hostage negotiations?
- o What are the similarities and dissimilarities between the perpetrators of kidnap/hostage situations (where one or two persons are involved) and mass hostage situations?
- o If large numbers of residents evacuate their homes and are relocated in adjacent counties, who provides such things as food, shelter, medical support, etc. , and who pays the bill?

A response plan for dealing with nuclear blackmail or threat has recently been developed for the State of California. Its purpose is "to summarize federal, state and local responsibilities in the event of attempted [nuclear] blackmail, threats, attacks involving radioactive materials, or nuclear weapons." It also attempts to provide planning assumptions and guidelines for local agencies to develop operation plans and SOPS for responding to a nuclear threat; and to protect tile Public health and safety in the event a nuclear threat is carried out.<sup>.22</sup>

This plan focuses on delineating responsibilities and establishing lines of authority and coordination but does not deal with policy issues. It was developed with the participation of a wide range of agencies, each representing its own particular area of jurisdiction and responsibility.

Shortly before the first meeting of various agencies engaged in developing the plan, a nuclear threat was made against a major corporate facility, located in the Southern California area. The threat was forwarded to the FBI which has primary jurisdiction for investigation of nuclear threats. Their evaluation of the threat and the technical assessment made by ERDA (which provides, at the request of the FBI, technical assessment of nuclear bomb and radiologic dispersion threats) was that the perpetrator lacked the alleged nuclear capability. It could not be ruled out, however, that the perpetrator might have planted high explosives at the target facility. Management of the corporation was understandably concerned with this threat and requested assistance from the local police department. The Nuclear Emergency Search Team (NEST) of ERDA was activated at the request of the FBI and was deployed to conduct a search of the target area with special monitoring equipment. The deployment of NEST provided an opportunity to test its response capability in coordination with activities of law enforcement under actual field conditions. While the operation and performance of the scientific instruments was satisfactory, the interaction between various agencies raised numerous questions.

One controversy, at that time, was jurisdictional. The FBI conducted the investigation but who would gather and retain evidence and who would handle the prosecution should the adversary be identified? The event occurred within the city limits, but the sheriff had previously been assigned a central coordination role for emergencies throughout the county. Although the FBI was conducting the investigation, the mayor of the city looked to his chief of police to keep him completely informed since the event could have widespread effects upon the health and safety of his constituents. The information, if any, that should be given to the media and who should make press releases when, could have been more of a problem than it was. These and many other issues regarding questions of jurisdiction and authority surfaced as the incident unfolded. The problems which arose were handled well because of the experience and professional attitude of the participants rather than because of any established policy or guidelines. (The California response plan had not yet been developed.)

The experience of having recently dealt with a nuclear threat in vivo was of great assistance to this group when they convened to draft the response plan for California. They had successfully faced an anxiety-provoking reality and now they were making plans to deal more effectively should it happen again. Because of the low probability of a nuclear threat being made and because of the potential large scale destruction and disruption which could attend execution of such a threat, there is a tendency on the part of some persons faced with planning for this problem to feel that nothing can be done to prevent or limit damage caused by such an act. With this mind-set, damage-limiting options and responses to conserve resources are not appealing and often planning this type of major emergency or disaster response is not attended to or completed. This was not the case of the group that developed the California plan. Because of their experience, the awesome reality for which they were developing a response plan could not be denied. This experience served to keep the group focused on the task and may be one reason why some potentially difficult jurisdictional problems were resolved (this is in no way meant to detract from those who led the work meetings and the manner in which differences were resolved). This group's experience with a real event may be useful to others who are developing response plans for devastating events which they believe highly unlikely and from which there is a natural tendency to shy away.

Because the incident was a hoax, operational issues of a greater magnitude were not encountered, such as, if large numbers of residents had to evacuate their homes and be transported to adjacent counties, who would provide transportation, food, shelter, and medical support? While it is necessary to work out procedures for such logistics, it is also necessary to develop guidelines for making these decisions in the first place.

The identification of issues operating at regional levels and for which responses must also be planned at regional levels is critical because until now, most response planning has been done by local or more

traditional geopolitical levels of government. However, the consequences from a nuclear detonation pose complex problems which include jurisdictional questions crossing traditional boundaries of many agencies and city and county governments. In a way, the Tennessee Valley Authority had to deal with similar inter-agency and inter-regional issues because the "river of concern" impacts numerous geopolitical entities. It was clearly not a concern solely for the Federal Government or any single local government. A moving body of water represents a good analogy for visualizing the impact that a nuclear detonation could have on various levels of government and various local governing bodies. The extent of the "area of concern" will change in both magnitude and direction; it will not be bound by geopolitical considerations within a locale and may even impact several states. The decisions made by one group confronting the threat (equivalent to the source of this "river of concern") may be made on data relevant to their immediate situation but the consequences of their decision may adversely impact another group of persons at a different location and at a later time (equivalent to introduction of contaminants upstream from a population center supplied by water from the "river of concern"). A regional approach to the response planning for nuclear emergencies should involve all entities who potentially would be harmed, in the development of information, discussion and selection of damage-limiting options. A strong impetus for establishment of the TVA was a real river; the possibility of devastating outcomes from a threat not yet made may not be sufficient to coerce similar action to organize regionally for response to threats or to limit damage associated with nuclear emergencies.

Disaster planning in peace time usually involves preparation for serious damage which is widespread or for extreme damage to a limited area. The requirements to deal with either of these forms of disaster can usually be met by some form of material assistance; namely, food, clothing, shelter and economic assistance.

The consequences of nuclear damage introduce new dimensions for crisis management which must respond with knowledge, skills, and equipment, some of which are highly specialized and of limited availability. In

addition to the need for specialized and scarce resources, a unique management system is necessary to assure that timely communication will occur between those who must share information for appropriate **decision-**making and implementation. One such system is "Crisis Management." Although not an entirely new concept, crisis management principles could be applied to a regional approach for dealing with the untoward consequences of nuclear threats. A discussion of crisis management, especially as applied to national (and international) issues and dealing with large natural disasters can be found in Science, Volume 187, by Robert H. Kupperman, et al. The emphasis of timely and damage-limiting actions, the ordering of competing objectives, and the use of computers to assist in the analysis of data and communication of information are a few of the ideas which could find application in a *regional management system* to deal with the nuclear consequences discussed in this section.

IX. APPROACHES TO THE STUDY AND ANALYSIS  
OF THE NON-STATE ADVERSARY

Various approaches have been taken with regard to analysis of the potential non-State adversary. A number of the reports and articles have taken for granted that an adversary exists--profit-motivated criminal, politically-motivated terrorist, demented individual--and have recommended security measures be increased accordingly. The report of the Lumb Panel is an example. According to this school of thought the identity of the potential burglar or his possible motivations matter little in the design of bank vaults. His existence is assumed; his objective is presumed (to get in, remove something of value, and escape); and the problem is prevention or apprehension.

A large portion of the reports and studies are descriptive catalogues of potential adversaries and the possible adversarial actions. These show the existence of a potential threat; some then recommend counter-measures. The Mitre Study of *The Threat to Licensed Nuclear Facilities* is an example. Some of Theodore Taylor's work also would fall in this category. So would most of the clearly anti-nuclear pieces and most of the journalistic pieces. Some of these begin with bits of history--the 14 year old boy in Orlando, a real hijacking--and then proceed to the possible nuclear actions.

Scenarios have been projected to show possible modes of action by different adversaries and reveal possible deficiencies in safeguards and security measures. Some of Theodore Taylor's classified and unclassified work and the Rosenbaum report provide scenarios. "Adversarial simulation" or "black hatting" is taking scenarios one step further. Safeguards and security measures are tested by setting a team of adversaries (scientists, engineers, security specialists) against them. Playing the role of the bad guys, or "wearing black hats," the adversary team actually tries to bypass barriers, pick locks, and so on. Of course, the actual use of armed force in a contest is not **possible; so the "black hats"** present their detailed plan of operations or scenario. The plan is then tested against the defenses, settling the outcome of **hypothetical** combat between guards and adversaries, if the plan calls for the use

of armed force, by computerized models. "Black hatting" is probably one of the most useful approaches in actually testing safeguard and security measures. However, it is not always clear that the specialists who make up the "black hat" team, although usually very knowledgeable about nuclear facilities and material, are always that knowledgeable about the thinking and planning characteristics of burglaries, armed robberies, and sabotage. Second, the composition and skills given to the "black hats" must be derived from some actual data. Do the "black hats" have too few or too many members, are they given too much or too little time to carry out their action, etc.? Finally, the engagements tend to be restricted by the rules of the game. The "black hats" are not always allowed to give free rein to their imagination. They are sometimes compelled to do rather stereotyped things. Nonetheless, "black hatting" is probably the surest way of testing security hardware.

Another approach to identifying possible vulnerabilities is by surveying persons engaged in nuclear monitoring activities. They are asked questions about possible nuclear thefts, much like asking bank security officers about how their banks might be robbed. The results of one such survey are contained in L. H. Rappoport and J. H. Pettinelli, "Social Psychological Studies of the Safeguards Problem," in *Preventing Nuclear Theft*.<sup>2,3</sup> Confidence in the results of such surveys is somewhat limited because nuclear security personnel usually lack a general understanding of criminal operations. (Given the highly technical nature of the target, nuclear security personnel at the management level, as opposed to the rank and file guards, generally have nuclear industry backgrounds rather than criminological or law enforcement backgrounds. It would appear that they are drawn from management of the industry rather than recruited from the outside. Safeguards were initially viewed as a technical problem of detecting and preventing diversion by insiders, not criminal or politically motivated threats from the outside. This is not to say that those with engineering backgrounds are necessarily less effective than those with law enforcement backgrounds.)

Studying analogous events is yet another approach. Several of the studies have sought to infer knowledge about possible adversaries of

nuclear programs by examining non-nuclear events that are somehow analogous to possible nuclear actions. For example, although no known thefts of nuclear material have occurred, crimes are committed in which adversaries by means of stealth or force of arms penetrate well-protected and well-guarded facilities to remove valuable commodities. Thus, major thefts may provide insights about the capabilities and methods of operation of criminals. Several studies have taken this approach. In "Details of Criminological Investigations of Large-Valued Thefts Related to Nuclear Materials," a study carried out for the National Science Foundation, Leachman and Cornella examine major thefts of narcotics, data, precious metals and gems, objects of art, and weapons.<sup>24</sup> The McCulloch study examines the history of industrial sabotage as an analog to possible sabotage against the nuclear industry.<sup>25</sup> A study completed by the Historical Evaluation and Research Organization compiled a chronology of some **4,000** incidents of political violence and the record of one major terrorist group (the FLN in Algeria) to extract inferences regarding possible nuclear actions by terrorists. The BDM study of threats to licensed facilities looks at several thousand bombing incidents.<sup>26</sup> A study currently Underway by the Rand Corporation is looking at several categories of analogous events including major thefts and burglaries, assaults by terrorists, incidents of industrial sabotage, symbolic bombings, incidents the objective of which has been to cause mass casualties or widespread damage, and incidents of large scale extortion. While such an approach is based on "real life" data, it is sometimes a breathtaking inferential leap from non-nuclear to potential nuclear actions. Studies of analogous events provide a useful basis for scenario formulation and "black hat" testing.

A somewhat different approach is that of the "design basis threat" in which a hypothetical adversary is arbitrarily assigned certain strengths and capabilities which become the basis for designing protective measures. The shortcomings of this approach to adversary analysis is that it tends to become a matter of straightforward assaults, because these are the easiest to evaluate. The adversaries are accorded little ingenuity or imagination. The "design basis threat" also tends to lead to a somewhat

sterile debate about numbers. Never the less, design basis threats do provide a reference point for setting and justifying security requirements and for measuring performance.

A combination of analog study plus "black hatting" may offer the surest way of developing a clear idea of the capabilities of adversaries as well as providing for testing these against security systems.

Little attention has been devoted to the subject of motivations and intentions. Although the motives of adversaries may be considered trivial once an action is initiated, such studies would be helpful in assessing the overall threat and in possible measures to deter would-be adversaries.

X. HOW MANY ATTACKERS -- HOW MANY DEFENDERS?

How much security is enough? Assuming for the moment that someone wants to sabotage a nuclear reactor or steal nuclear material, the answer to that question depends on the capabilities of the potential adversary. How many might participate in an act of sabotage or theft? How will they be armed? Will they possess explosives? What special equipment will they have? What level of criminal or military skills (the circumvention of alarm systems, the use of explosives, elementary tactics) will they possess? How knowledgeable will they be about the layout of the target, operating procedures, obstacles they are likely to encounter? How willing are they to risk capture or death?

Of all of the attributes of the potential adversary, numbers has received the most attention. How many external attackers are likely to participate in an act of sabotage or theft? Possibly this is because the number of possible assailants is the easiest attribute to deal with in designing a security system. An estimate of how many is also considered to lead directly to the answer to the question: How many guards are required?

It is this connection which makes the size of a potential attacking force a topic of some debate. Guards at government facilities must be paid for by the government, or in the case of licensed facilities, by private industry which tends to view the guard force solely in terms of added costs. An estimate of a large potential attacking force, if imposed on government programs or on the nuclear industry as a performance requirement, means means guards, which costs more money. A requirement to maintain a large guard force could even shut down some facilities, which would not be able to pay the costs and remain profitable. Naturally, arguments are made for a smaller or more "reasonable" estimate. To increase the design basis threat from three or six to 12 attackers probably would bring considerable protest from the nuclear industry. although it has been calculated that the costs of the added security

necessary to meet such a threat would represent a miniscule increase in the overall cost of energy. Determined foes of nuclear energy recognize this as a vulnerability of the nuclear industry and tend to argue for a larger estimate of the potential attacking force, hoping thereby to make the industry shut down because it simply cannot meet the requirements, or because it cannot profitably remain in business if so many guards are required. The debate thus tends to reflect, in part, motives that have little to do with the actual determination of the threat size. By using different data bases, it is possible to reach different conclusions.

The first public study to mention the number of potential attackers was the Rosenbaum report written in 1974. Its authors estimated that "the maximum credible threat to any facility or element of transportation handling special nuclear materials is 15 highly trained men, no more than three of whom work within the facility or transportation company from which the material is to be taken." Presumably, the authors meant any facility or element of transportation in the United States. An estimate of the number of assailants who might be assembled for an assault in Argentina or Lebanon under recent or current political conditions in those countries, of course, might be considerably more than that in the United States. It is not clear what evidence the authors of the Rosenbaum report used to arrive at their estimate of 15 or 12 outsiders and three insiders. They admitted that their estimate was "both subjective and imprecise" but they also believed it to be "informed and conservative." "It was arrived at," they wrote, "after informal discussions with the FBI and CIA . . . and [also based] on prior relevant experiences of the members of this study."<sup>27</sup>

Looking at the historical record, the Nuclear Regulatory Commission made a lower estimate of the threat size. Testifying before the House Subcommittees on Energy and the Environment of the Committee on Interior and Insular Affairs, the Director of the Office of Nuclear Material Safety and Safeguards said, "Historical data on the size of terrorist groups indicates that terrorist assault groups larger than six persons

are not likely to be formed. We have examined over 4,000 incidents of terrorism and other anti-social behavior and were able to find 1,271 cases where the number of perpetrators could be identified. The number of incidents involving groups of more than six persons account for only about 2.5 percent of the cases. Groups with as many as 12 persons have been very rare. By far, the largest percentage -- 86 percent -- involved groups of three persons or fewer."<sup>28</sup>

The 4,000 incidents to which the director referred were compiled by the Historical Evaluation and Research Organization and comprise an exhaustive chronology of acts of sabotage and political violence going back to 1870. The chronology includes assassinations of presidents and other public officials, as well as many other acts which are of questionable relevance to assaults on nuclear facilities and may distort the impression of group size.

The BDM Corporation, under contract to the NRC, conducted a survey of 1,204 incidents of "worldwide terrorism and antisocial behavior" which took place between 1965 and 1975.<sup>29</sup> These included incidents of arson, armed attacks, bombings, hijackings, kidnappings, "psychological terrorism" (sic), and theft. U.S. bomb data, which had been collected in the course of previous studies by BDM, were deliberately excluded in order to avoid "the high number of unknowns associated with the U.S. bomb data base." In 702 of the incidents examined, the size of the attacking force was unknown, leaving 502 to be analyzed. Of these, 247 were hijacking of aircraft (and a small number of truck hijackings), 77 were bombings, and 5 were incidents of arson. Since many airline hijackings were carried out by lone hijackers, and arsonists and bombers tend to work alone, although bombers may be members of a larger group, one could argue that such a data base is not entirely relevant. And since such acts make up better than 65 percent of the data base, their inclusion would tend to skew findings toward smaller numbers.

The study includes no breakdown of the number of perpetrators by category of action and thus does not allow this possibility to be examined; however, one of the figures in the study does plot type of target with group size. It shows that in 128 of the cases in which "aircraft" were the target (i.e., hijackings), only one perpetrator was involved. Further figures show that individuals acting alone account for almost half (240) of the incidents in which the number of perpetrators was known.

At the same time, the data base used by BDM includes some incidents in which large groups were involved, but which took place in a political context that is not comparable to conditions in the United States today. Among these would be a number of attacks on rural garrisons and other targets by guerrillas in Argentina, or against rural villages in Israel by Palestinian Commandos. In both places, guerrilla warfare has been going on for a number of years and large guerrilla organizations comprising thousands of members have developed. Such conditions do not prevail in the United States today. However, these constitute so few incidents of the total that they probably would not warp the findings. Noting that some of the incidents, particularly some of the larger ones, took place in environments that do not apply to political conditions prevailing in the United States, the authors estimate that if these were eliminated, there would be a less than 1-2 percent total probability for an attack by a group of seven or more.

The study concludes that very few incidents, less than 5 percent, involve more than six attackers and less than 1 percent involve more than 12 attackers. Oddly, this point is emphasized as a refutation of "those who maintain that terrorists are likely to attack in 10--12 men groups." <sup>30</sup>It is not clear who, if anyone, ever asserted that terrorists are likely to attack in 10-12 person groups. Rather it was generally stated that 10-12 person groups represented somewhere near the *maximum*' threat.

The BDM report includes a reference to material compiled by The Rand Corporation which is offered as confirmation of its conclusions. The material consists of chronologies of incidents of international

terrorism that occurred between 1968 and 1974. It includes 422 incidents; in 110 of these the number of perpetrators was known. It shows a similar sharp decline in incidents where the group size approaches six. The authors of the Rand work, however, for reasons already mentioned, would argue that this data base includes many bombings, airline hijackings, and other incidents which are not pertinent, and which tend to push the group size estimate down.

Current research at The Rand Corporation which involves a selected number of events that are more closely analogous to potential nuclear theft or sabotage shows that groups of 3 to 6 are common, that larger groups do appear, that a group size of 12 does appear to be somewhat of an upper boundary although there are a few cases in modern industrialized societies (United Kingdom, France, and United States) in which larger groups have been involved. More importantly, the Rand researchers argue that one must be extremely cautious in interpreting historical data regarding the number of attackers since the figures represent for the most part what the perpetrators, criminals or terrorists, perceived to be necessary to accomplish their mission, and in most cases what turned out to be sufficient. In other words, they came with as many as they needed to do the job, and no more. The fact that most came with a handful of persons, 3 to 6, thus does not represent an upper limit on their capacity to mobilize people.

Although the historical data are useful as a guide, an estimate of the number of attackers is inescapably a matter of judgment. Without speaking in terms of a "maximum" threat, a dozen or so attackers would seem to be a prudent estimate. The term "a dozen or so" has been chosen deliberately. We are not talking about a precise figure, but rather a range of anywhere from 7 or 8 to about 15. To be more precise would imply some type of actuarial chart based upon concrete data that simply does not exist, and a false sense of precision. That is not to say that no group of adversaries could not muster more persons if needed, or even that this many would be needed to accomplish the task. "Prudent" is the key word here.

Although that many (that is 7-15) are rarely needed in a robbery or terrorist assault, there are incidents of both types involving that many persons. Again, although it is judgmental military men and law enforcement officials would argue that more than that number might even be counter-productive. It is no mere coincidence that after **5,000** years of military history, the smallest operational unit of almost all armies is a squad composed of 9 to 13 men. It is difficult to maintain direct control over more than that in a fight. Of course, an attacking force could be composed of several Squads. Theoretically, it could be composed of several battalions. But a multi-squad attack force suggests a military or paramilitary operation. In the mountains of Argentina or the streets of Beirut yes, but under present political conditions in the United States, it seems a bit far-fetched. Even to come up with 10 or 12 attackers would stretch to the limit the capacity of most known violent political extremist groups in this country, most of whom comprise 8 to 12 dedicated "bombers and shooters," a police term to describe those willing to participate in acts of violence. And bombers (who may plant bombs with little risk to themselves) are not necessarily shooters willing to engage in a gunfight. Moreover, **although no one has** attempted to determine precisely how many persons must be in a conspiracy to commit a serious crime before it is no longer a secret, the probability of discovery must increase rapidly in the higher ranges. The fear of leaks appears to be a principal consideration and constraint in assembling the personnel for a task force crime.

Current rules for licensed nuclear facilities postulate an external attack force of three persons who may be assisted by one inside confederate. (The use of "current" here poses some dangers as the security requirements are currently being reviewed and will probably be increased. This was as of January, 1977.)\* ERDA has not picked a design basis threat. It has sought to improve security at its nuclear facilities without declaring that its security plans anticipate an attacking force of any particular number. There has been some debate about the ability of all nuclear facilities to defeat a determined, well-armed force of three external attackers, especially if they are assisted by an inside confederate. In some cases it may be possible for an insider to gain access

Note: See Volume I, Chapter 8 for some information on proposed increased physical security requirements.

to the central alarm station to immobilize those present, neutralize the alarms, and divert the remaining guards, thus facilitating the task of the external attack force. Even without inside assistance, a well-armed attack force of three persons might be able to overwhelm a small, lightly-armed civilian guard force. NRC officials concede that attackers may be armed with automatic weapons, hand grenades, and possibly even anti-tank weapons. Civilian guard forces are armed with pistols, shotguns, and in some cases, semi-automatic rifles. Thus, they are clearly outgunned. (Guards at ERDA facilities may be armed with automatic weapons and at some facilities may also have armored cars.)

The performance standards may be increased to six external attackers with one insider. One technique calculates that a minimum of 11 guards must be on duty at all times to defeat an attack force of six persons. The primary basis for the calculations are Manchester equations, mathematical models developed during World War I to predict the outcome of major battles given the number of attackers and defenders and their respective armaments. Attempts were made during the Vietnam War to apply Lanchester equations to engagements between smaller units. The applicability of the mathematical model was restricted to skirmishes in which surprise was not a factor. However, the relevance of such mathematical models to engagements between a band of armed robbers or terrorists and civilian guards in which surprise is very likely to be a factor is extremely questionable.

Too much emphasis has been placed on the question of how many attackers. Although the size of a potential attacking force is certainly not an irrelevant consideration in determining the size of the guard force that is necessary to protect a facility, it has tended often to be used as a single determinant in a rather simple-minded fashion. As a result, it conjures a rather simple-minded and therefore unlikely adversary. The use of mathematical models to determine the outcome of firefights between guards and attackers suggests armed frontal assaults by potential attackers which may be a common mode of combat but not of armed robbery or even of very many terrorist assaults.

Armed robbers seldom "assault" their target. They employ stealth, deception, diversion and other techniques to gain access. Often they are inside or close upon the guards before displaying arms and revealing their intentions. Surprise is likely to play a major role.

A design basis threat also suggests that all facilities are equally attractive to potential adversaries and merit the same level of protection. This is not apparent. Those facilities where fissionable material is readily available in strategic quantities and in a form that can be handled easily may require greater protection. Moreover, the emphasis on attackers tends to level the differences inherent in different kinds of facilities and in different facilities of the same kind. Some are physically large and would require a major investment to breach; some are small buildings. Some are large complexes of hundreds of employees; others have only a handful. Some are located near population centers, and near reinforcements; others are remote where the assembly of a small group of attackers might arouse immediate suspicion. The number of guards, indeed the adequacy of security, is a judgment that may well have to be made after an examination of each specific site. The analysis has tended to turn the question around. We are not asked, as we ought to, what will it take to protect this specific facility against all conceivable actions -- burglary, armed robbery, sabotage, armed assault, standoff attacks, etc. Rather, it has become solely a question of estimating or guessing the number of armed attackers and the number of guards required to counter their potential assaults.

Much reliance is placed on the arrival of reaction forces to help fend off or prevent the escape of nuclear thieves. Indeed, some propose that on-site guards be no more than watchmen to sound the alarm leaving the armed response to local law enforcement officials. This idea merits scrutiny. It is approved by industry officials who wish to avoid the expense of maintaining large, unproductive, on-site guard contingents and by those who fear the social consequences of the proliferation of private or federal nuclear guard forces. It must be noted that a majority of nuclear facilities for very good reasons are not located in

the heart of metropolitan areas where police response could be swift. Most are located in remote rural areas where the capacity of local law enforcement is limited. Most armed robberies take only a few minutes. Even operations involving the penetration of barriers and setting of explosives, or seizing control of the facility are not likely to take more than a few minutes. The idea that an outside reaction force can be summoned in time to defend the facility again relates to the unlikely situation of a sustained military assault by the attacking force. If they do not achieve their objective in a few minutes, they are likely to flee, certainly not to hang around and shoot it out as Indians circling a wagon train. Moreover, the idea that the local police are going to arrive in strength is not always valid. In many cases, the first arrival, five to fifteen minutes after the alarm is received, is likely to be one man in a patrol car. Reinforcements in strength may take a half hour. By then the attackers are inside, or they have been defeated. Finally, we should draw some lessons from our recent military experience in Indochina. It is not probable that an adversary will be unaware of the local availability of reaction forces and the time it takes to get there. If they present an obstacle, and the adversary is determined nonetheless to seize the target, the first arrivals may be ambushed, not a difficult task given that many of the sites are in remote areas. Or as has been the case in several armed robberies, the reaction forces may be diverted beforehand by the adversary.

In sum, it appears that reaction forces that cannot arrive in strength at a facility in a few minutes, probably less than ten, certainly less than fifteen, are largely irrelevant, except for pursuit. The adversary will then have accomplished the mission or will have abandoned the attack. Local forces available after that might better attempt to seal off a wider area to prevent escape than concentrate at the scene of the incident.

XI. EMPLOYEE SURVEILLANCE AND RELIABILITY IN RELATIONSHIP TO  
THE POTENTIAL NUCLEAR NON-STATE ADVERSARY

Why Employee Surveillance and Reliability?

One potential mode of adversary action, previously identified is the penetration of a nuclear facility's safeguard system by subverting or coercing an employee to assist in the theft or diversion of nuclear material or in the sabotage of a nuclear facility. Employee surveillance and reliability programs contribute an approach to the defense against this type of adversary action.

Subversion is defined here as any action which seeks to manipulate, influence, or otherwise change the values, beliefs or allegiance of an employee and which could ultimately draw the employee into collaboration with the adversary. In this sense, an employee who was "successfully subverted" would be a conscious and willing participant in the scheme of the adversary. A distinction should be made between the employee who is acting as a result of having been subverted by an adversary and the employee who unknowingly takes harmful action because of disguised or misrepresented circumstances produced by the guile or cunning of an adversary. The former is willfully participating in the adversary's schemes; the latter believes he is carrying out his employee role in good faith and may only inadvertently initiate actions which benefit the adversary and harm the system.

Coercion is defined as the use of physical force, the threat of violence, extortion, or blackmail directed at an employee (or his family) for the purpose of obtaining compliance to the demands of the adversary. In this case, the employee succumbs to the pressure of the adversary and undertakes an action which he would normally resist.

An adversary action carried out over an extended period of time such as the diversion of SNM using an insider, as opposed to an armed assault for the purpose of stealing SNM, would be best served by using subversion to recruit the insider rather than coercion. The reason is that the adversary must maintain a sufficient level of coercive force to ensure employee compliance over an extended period of time during which the employee might change his mind about cooperating and might disclose to security or law enforcement the scheme of which he was a part.

Having an employee who was ideologically dedicated to the adversary operation would be much more effective in maintaining the security of the operation and would therefore probably be the preferred course of influencing an employee to participate in an adversarial action which extended over time.

Between the two modes of obtaining compliance [subversion and coercion] coercion may be more appealing to an adversary because it would require much less time to obtain the employee's cooperation than would a prolonged campaign of subversion. Coercion may also be the choice for obtaining inside assistance for an operation of relatively short duration, such as an armed attack to steal nuclear material. There would not be a need in this instance to maintain the coercive force for very long and therefore the probability is high that the employee who cooperates with the adversary under these circumstances would not betray the operation.

An employee surveillance and reliability program should consider as an objective the identification of employees who might be vulnerable or susceptible to subversion and take steps to correct that vulnerability or at least to limit any damage resulting from an exploitation of that vulnerability. How such a task might be approached will be discussed under the heading Monitoring Existing Employees.

#### Screening of New Employees

While it is possible that a nuclear non-state adversary could pose as a legitimate applicant for employment with the intent of gaining access to a nuclear facility, the difficulties of preplanning and providing the lead time necessary to infiltrate a facility and work into a strategic position would create a major obstacle. The long-term process of infiltrating a system is more the style of the traditional espionage agent than that of a non-state adversary who pursues an operation with more immediately achievable goals.

However, screening new employees at a nuclear facility can create a barrier to infiltration of the system by both the more traditional espionage agent and the non-state adversary. This initial screening process could be part of a comprehensive clearance procedure designed

to identify those applicants who may present an increased security risk if employed in positions giving them direct access to SNM, control of accounting procedures, knowledge of security systems, etc.

The development of specific criteria to identify such applicants which could serve to alert those conducting a screening program, is not without problems. Leon Rappoport and J.D. Pettinelli touch briefly on "Identification of Criminal Topologies as They Might Apply to the Nuclear Industry. . . it (1) and point out a distortion in developing criminal typologies results from using criminals who are caught, when the worry should be instead about the criminals who are smart enough not to be caught. With respect to experience in the selection of employees for nuclear facilities, Frederick Forscher (a consulting engineer) tried to get assistance in hiring emotionally stable people. "After talking to several consultants about techniques to screen out emotionally imbalance people, he came to the conclusion that none could provide meaningful advice, a conclusion that Rappoport did not find surprising." The problems associated with selecting of appropriate personnel to fill a particular position or identifying particular people who should not fill specific positions are difficult. In the early years of the Peace Corps the author was involved with the training and selection of Peace Corps Volunteers for overseas assignments. A Civil Service background check was made. In addition the trainee was evaluated during his three-month training period. Criteria were developed for the selection process which resulted in a very low rate of premature return from overseas assignments for other than reasons of compassion (i.e. death in the family). Other studies have identified stressful experiences or conditions in one's life which if present have a high degree of correlation with the development of mental health problems or physical symptoms.

---

(1) Leon Rappoport and J.D. Pettinelli in preventing Nuclear Theft: Guidelines for Industry and Government, edited by Robert B. Lcachman and Philip Althoff (New York: Praeger Publishers, 1972), pp. 173-189.

(2) Ibid.

The point is that a specific criterion for deselecting applicants through a screening process does not exist; however, from experience to date, it seems likely that criteria could be developed which could alert those responsible for security matters to be especially attentive to a particular applicant because of a higher possibility of his becoming a security problem. Some possible categories of potential problem areas are:

- o immaturity and instability
- o mental illness
- o asocial, anti-social personality
- o vulnerability to blackmail
- o strongly identifying with revolutionary political ideologies

Individuals who demonstrate signs of excessive anxiety, worry or depression, drinking, gambling, or who abuse drugs should also be subject to a finer level of scrutiny than those not showing such behavioral traits.

The issue of morality as a criterion is valid if done in a broad perspective of determining how the person relates to others rather than a microscopic examination of his private life.

Monitoring Existing Employees

Just as it is necessary to screen new employees to present a barrier to direct penetration of a nuclear facility by an adversary via the channel of employment and to exclude those who are unstable, mentally ill, or vulnerable to blackmail or subversion, so too is it necessary to monitor certain selected personnel who are in sensitive positions to assure that they do not move from a stable low-risk employee population to a population characterized by instability and a potentially high risk of being influenced by an adversary. Many of the criteria used to evaluate the existing employee will be the same as those for new employees. One major difference will be in how the data are generated. In addition to repeating a background check, as in the case of a new hire, the person who is currently employed could be evaluated in terms of behavior demonstrated on the job. For example, access to particularly sensitive areas could be controlled to require random dialog of a predetermined nature with an access control operator who could use psychologic stress evaluation (PSE) techniques to assess whether there had been any changes in that particular employee's established pattern. In addition to the use of PSE to identify changes in an employee's normal behavioral pattern which may be indicative of stress and would warrant closer evaluation, a psycho-linguistic analysis of speech content could also be made to look for evidence of changing parameters of word usage, thought content or mood.

Research would have to be done to develop or apply the appropriate methods for evaluation and assessment for both screening new employees and monitoring existing employees. Experience with reliability programs of SAC crews, and operators of missile bases, and atomic submarine crews should provide relevant data.

### Societal Risk and Civil Liberties

In addition to the problems of developing a data base and evaluation criteria for 'the purpose of screening and monitoring of employees, the problem of infringing on the personal and civil liberties of those employees in pursuit of the above is not easy to resolve. The Security Agency Study (NUREG-0015) <sup>(1)</sup> discusses full-field background investigations as they relate to guard applicants and points out that "such a requirement could impact the rights of free speech, association, and privacy. Interviews with references, neighbors, employees, and others regarding background and life-style could inhibit the exercise of free speech and association rights of . . . applicants.<sup>4</sup> "Various court rulings in recent years have been favorable to the protection of individual privacy and of individual right-to-work. These rulings have made it difficult to make a personal background check of an individual in commercial activities to assure with high probability that he is trustworthy and, hence, potentially acceptable as a steward for the protection of plutonium." <sup>(3)\*</sup>

From a legal perspective and as it relates to constraints on what can and cannot be done to screen or monitor employees ". . . the ultimate question is whether the courts will perceive the dangers of plutonium to be so overwhelming as to allow them to . . . hold that the new statute authorizes the AEC to restrict the civil rights of plutonium workers in the interests of national security.<sup>h)+</sup> Although the Ayres references deal with plutonium specifically, the tenor of concern of the courts would probably be relevant for those employees dealing with all forms of SNM or high-level wastes.

See also Appendix III-C of this volume for a discussion of the civil liberties implications of safeguards programs.

---

(1) Security Agency Study, Report to the Congress on the Need for, and Feasibility of, Establishing a Security Agency Within the Office of Nuclear Material Safety and Safeguards, PB-256 962 (NUREG-0015), U.S. Nuclear Regulatory Commission, August, 1976.

(2) Ibid., p. IV-19.

(3) Russell W. Ayres, "Policing Plutonium: The Civil Liberties Fallout," Harvard Civil Rights-Civil Liberties Law Review, Vol. 10 (Spring, 1975), Footnote 92, p. 388.

(4) Ibid., p. 399.

Impact of Surveillance on People.

Aside from considerations of the impact of surveillance on an individual's civil liberties-personal privacy or his qualifications for certain kinds of employment, we might well ask the question, "What happens to people who work under conditions of surveillance?" There is a rich history of various types of employment which are conducted under varying levels of scrutiny. In some post offices, postal employees are under surveillance of supervisory personnel during their entire shift and are aware of it. In the military there is close monitoring of crews that man missile silos. Astronauts on space flights are monitored not only for behavior but also for physiologic changes. In their confined quarters they are under keen surveillance and have essentially no privacy for the duration of their mission. Although not exactly under surveillance, famous **persons are often** in the public eye a significant part of the time and the intimate details of their private life are the basis of numerous widely distributed articles. Their response often is protective of their privacy but not necessarily pathologically suspicious or 'paranoid. A good example of an environment under close surveillance is that of gambling casinos in Las Vegas. There both employee and customer are viewed directly and electronically. Judging by the level of activity in these casinos, it does not seem that surveillance per se is bad for business. In this author's opinion, surveillance as an industrial safety measure is no more stressful than being closely supervised or being required to use protective ● equipment for certain industrial procedures. Some individuals will feel constrained and stressed; others will have no reaction, but there is no stress inherent in exposure to a high surveillance environment which would lead to a particular behavioral syndrome--such as a distrustful and suspicious attitude.

The Ex-Employee

Certain ex-employees may be potentially useful to the adversary because of their technical knowledge or information they have about security procedures in a specific facility. Granted that the value of such an employee to the adversary may not have a long half-life; however, it would seem prudent to conduct exit interviews (in addition to security debriefings) with certain employees with special knowledge or skill to determine their mental state and attitude at the time of separation. Further, it might be advisable with selected members of this population to maintain periodic contact until it is determined that the transitional period after leaving employment with the facility has ended. This could be defined as the time when the individual has regained a stable life style and is possibly less vulnerable to malevolent manipulation.

The Insider Problem (1)

At the beginning of this section Surveillance and Reliability were approached from the perspective that the adversary would attempt to penetrate a facility directly or by subversion or coercion force an employee to assist him in carrying out his scheme. For the sake of completeness we should identify the situation of an employee who becomes disenchanted for any of several reasons and who initiates contact with **an** adversary group to assist him in carrying out some scheme he has developed.

The nuclear non-state adversary sees himself as an opposing force from the beginning but the "employee" adversary identified above may never have viewed himself as such. Because he is basically operating on his own or with outside assistance (rather than being an inside man for an outside group) his use of complex schemes, designed to deceive and cover up his actions may be the hardest of all "adversary actions" to identify. In fact his analogue, the "white collar" criminal, merits special attention and study to develop specific methods to deal with the "true" insider threat as opposed to the "adversary-induced" insider threat. It is fairly well conceded that some of the white collar crime of industry is never detected. In the nuclear industry a positive but delayed identification of an "insider" may have unacceptable consequences. He is extremely dangerous because he has opportunity, the key element in addition to motivation and capability, which the nuclear non-state adversary will probably not have.

(1) See also The White Collar Challenge to Nuclear Safeguards (1?UREG-0156 January, 1977), Herbert Edelhertz and Marilyn Walsh, Battelle human Affairs Research Centers, Seattle, Washington 98105.

XII. CONCLUSIONS ON THE NATURE OF THE NUCLEAR THREAT  
OF THE NON-STATE ADVERSARY

First: The threat is real. The notion that someone outside of government programs can design and build a crude nuclear bomb is a good deal more plausible now than in the past. In the beginning, the secrets of fission were closely guarded. Now much of the requisite technical knowledge has come into the public domain. There also are a growing number of technically competent people in society who understand this material, and who, without detailed knowledge of nuclear weapons design, theoretically could design and fabricate a nuclear bomb. It would involve considerable risks for the builders. Its detonation and performance would be uncertain. Its yield would be low, probably in the tenths of a kiloton range.

For a dispersal device, some plutonium, or a quantity of some other available radioactive material, **spent** fuel for example, and a mechanism for dispersal would suffice. The principal impediment to building a nuclear bomb or filling a dispersal device is acquisition of the nuclear material. Should this prove insurmountable, a nuclear reactor could still probably be sabotaged, though the difficulty of causing damage or release of sufficient radioactive material to endanger the public remains unresolved.

The frequent use of reflective grammar -- for example, it could be done -- is deliberate. There is a great difference between theoretical feasibility and someone actually attempting to carry out one of the actions described.

Second: There are political extremists and criminal groups at large today that possess or could acquire the resources necessary to carry out any of the nuclear actions mentioned: sabotage a reactor, steal fissionable material and build a dispersal device or possibly even a crude nuclear explosive device. Some of the larger terrorist groups might undertake such actions with or without the assistance or complicity of a national government, and organized crime, at least theoretically have the option of acquiring a nuclear capability. There is general consensus on this. Arguments arise not so much in the area of theoretical capabilities, but rather in the area of intentions.

Third: The historical record provides no evidence that any criminal or terrorist group has ever made any attempt to acquire fissionable nuclear material or other radioactive material for use in an explosive or dispersal device. Apart from a few incidents of sabotage in France and one incident in Argentina, political extremists have not attacked nuclear facilities. No criminal or terrorist group has demonstrated or claimed that it possesses fissionable material. If members of any such groups have ever discussed the option of going nuclear, the present authors **know** of no such report. There have been bomb threats against nuclear facilities. There have been low-level incidents **involving nuclear**

facilities or nuclear material -- vandalism, token acts <sup>of violence,</sup> low-level sabotage, minor thefts of nonfissionable material. There have been nuclear hoaxes most of which could easily be discarded as not credible. In sum, there is no direct historical evidence of any intentions on the part of the potential adversaries to carry out the actions of which they are theoretically capable. However, one ought to take little comfort in this fact. The lack of intelligence or of visible evidence does not mean that the option has not been discussed. Some group might move in this direction without providing clues or warning. We could first know about it when it arrives.

Fourth: There is, however, no inexorable linear progression that takes one easily from the currently identified spectrum of potential subnational nuclear terrorists to actual subnational nuclear terrorists, or from the nuclear incidents that have occurred thus far to nuclear actions of greater consequence. Terrorist groups, as we know them now, might be among future nuclear terrorists, but their acquisition of a nuclear capability would not be a simple escalation of what has been demonstrated in terrorist actions thus far. We can only say that terrorists have been active in the recent past, that there is an apparent increase in their technical sophistication, that they have demonstrated a degree of imagination in their choice of targets, that nuclear facilities and material theoretically could provide them with a dramatic backdrop or prop for any action, and that terrorists have shown a flair for theoretical actions. On the other hand, terrorists generally have not attacked well-guarded targets. They have generally relied on relatively simple weapons -- submachine guns and dynamite -- and the number of casualties normally associated with the detonation of even a crude nuclear device, or the dispersal of toxic radioactive material is many times greater than the casualties that have occurred in any single terrorist incident. Terrorists have not yet gone to the limit of their existing nonnuclear capabilities. Acquiring a nuclear capability would represent a quantum jump, and upon close examination it is simply not clear what purpose taking that jump would serve.

It is an equally long conceptual jump from the present activities of organized crime to the notion of organized crime acquiring a nuclear capability. It would mean in effect that its leaders have decided to directly challenge the sovereignty of the nations in which organized crime's normal--and highly profitable--activities take place. This would require a fundamental change in the objectives of organized crime, whose members have sought to make money and to acquire political influence to protect their investments, but not to acquire direct political authority at higher levels or to invoke public or political reaction.

It is somewhat easier to imagine organized crime engaged in the theft of or illegal trafficking in fissionable material without seeking to acquire a nuclear capability. The annals of crime are filled with successful penetrations of well-protected targets to obtain precious commodities. Enriched uranium and plutonium certainly are precious commodities. For the immediate future, however, highly enriched uranium or plutonium are unlikely to be stolen for their intrinsic monetary value but rather for their strategic value as bombmaking material. They do not have the same marketability that gold or other precious metals have, and their theft is likely to be regarded in a totally different light by authorities. The loss of fissionable material probably would be viewed by government as a potential threat to the security of the nation, not simply as an economic loss. It would provoke a different level of response, perhaps applied in a state of national emergency, which could pose a serious threat to the very existence of organized crime as presently organized. It would require on the part of its leaders a change in their goals and an acceptance of new kinds of risks.

That leaves the category of psychotic individuals operating alone usually, or occasionally in groups. "Nuts" are probably responsible for many of the low-level incidents and nuclear hoaxes that have occurred thus far, but most would not try anything more serious than causing disruption. On the other hand, a few, if they had somehow acquired a nuclear capability, might use it. Lunatics have been the designers of many known schemes of mass murder. Thus, in terms of intentions alone,

psychotics are potential nuclear terrorists. In terms of capabilities, they probably are the farthest away from being able to acquire a nuclear weapon. To do so would require an enormous increase in their own capabilities or an external change that made the task much easier.

The authors of nuclear hoaxes have manifested desires of becoming nuclear non-State adversaries but none have demonstrated the required capabilities, and it is not certain that all hoaxers, even if they had access to nuclear material, would be anything more than hoaxers, any more than one can say that people who call in bomb threats if they had the opportunity (which in fact they do) would go out and buy dynamite and make a bomb. Hoaxes suggest more hoaxes, not necessarily genuine nuclear adversaries.

In sum, the history of the nuclear incidents to date provides no convincing evidence of the really serious events--the theft of a nuclear weapon or the detonation of a crude nuclear explosive device.

Fifth: Whether any of the current potential nuclear terrorists will decide to actually go nuclear remains an unanswerable question. We can identify potential adversaries and describe their objectives, their capabilities, and the likely modes of operation if they decide to go nuclear, but we cannot predict with any confidence whether any will ever make that decision. This leaves a vast area of uncertainty between what "can be done" and someone deciding to do it.

The primary attraction to terrorists in **going** nuclear may not necessarily be the fact that nuclear weapons would enable terrorists to cause mass casualties, but rather that almost any terrorist action associated with the words "atomic" or "nuclear" automatically generates fear in the mind of the public. Drawing attention to themselves and their causes, creating alarm, and thereby gaining some political leverage--which have been typical objectives of terrorists--could be achieved by undertaking relatively unsophisticated actions with a nuclear backdrop to add drama to the episode. Terrorists seem more likely to do those things that demand less technical skill and risk on their part and also are less dangerous to public safety, instead of attempting some of the more complex and riskier operations which potentially could endanger thousands of people.

Nuclear terrorism seems more attractive as a threat than as an action. Possessing a nuclear device, it seems terrorists could demand anything. But the idea of nuclear blackmail. has some weaknesses. It is not entirely clear how the enormous capacity for destruction associated with a nuclear weapon could be converted into commensurate political gains. Even with a nuclear device, terrorists could not make impossible demands. They probably could not permanently alter national policy or compel other changes in national behavior. To do so would require at a minimum that they maintain the threat and it is not clear how **long this** could be done without discovery or betrayal.

Sixth: The nuclear terrorists of the future may not arise from those candidates currently identified. There may be or appear individuals or new kinds of groups that have not yet been identified who might be more likely to use nuclear means to achieve their objectives. Threats to nuclear facilities or involving the malevolent use of nuclear materials may emerge on a different organizational or mental plane. Ten years ago, the members of the Lumb Panel examining nuclear safeguards for the Atomic Energy Commission, identified "terrorists" as a potential threat to nuclear programs. They did not specify who or what they meant by the term "terrorist," and it is a little difficult to imagine today who or what they had in mind in 1967 since their report preceded the recent increase in terrorist violence. But in retrospect, their report was prophetic, for in the following decade terrorists in well-organized groups that operated internationally did become a significant problem. They are a new entity that has emerged as a major threat in the past decade, and although they have as yet given no indication of going nuclear, they potentially could. It is difficult to say now what new entities may emerge in the coming decade.

The final conclusion is that the origin, level and nature of the threat may change. Some individual or group may acquire a nuclear capability and successfully carry out some scheme of extortion or destruction that will inspire imitation. The probability of a second incident occurring, especially after a "success" would seem to be greater than than probability

of the first. A terrorist group with the capabilities for acquiring a nuclear capability may be placed in a desperate situation that will begin to erode the political arguments against nuclear action. The political context may change. A war may occur in which nuclear weapons are used, inviting further use by nations and subnational groups. Plutonium could become more widely and easily obtainable owing to lack of adequate safeguards. New low technology enrichment techniques could emerge, making the production of fissionable material much easier, giving more entities the capability of producing weapons material. At some point in the future, the opportunity and capacity for serious nuclear violence could reach those willing to take advantage of it. We do not know where that point is or how close we may be to it.

FOOTNOTES

1. Roberta Wohlstetter, "Terror on a Grand Scale," *Survival*, May/June 1976, pp. 98-104, citing Grodzins and Rabinowitch, *The Atomic Age* (New York: Basic Books, 1963), p. 33.
2. According to calculations of Dr. Kenneth Solomon, Rand nuclear engineer.
3. David D. Comey, "The Perfect Trojan Horse," *Bulletin of Atomic Scientists*, June 1976, pp. 33-34.
4. George Comstock, *The Evidence on Television Violence*, The Rand Corporation, P-5730, October 1976, 14 pp.
5. David L. Milbank, *Research Study: International and Transnational Terrorism: Diagnosis and Prognosis*, Office of Political Research, Central Intelligence Agency, PR 76 10030, Washington, D.C., April 1976.
6. Mason Willrich and Theodore Taylor, *Nuclear Theft: Risks and Safeguards*, Ballinger Publishing Company, Cambridge, Massachusetts, 1974, pp. 20-21.
7. Bernard Cohen et al., *Statement Before the National Council of Churches*, February 1976.
8. Ralph Lumb, et al., *Report of the Advisory Panel on Safeguarding Special Nuclear Material*, unpublished, Washington, D.C. 1967"
9. Donald R. Cressey, *Theft of the Nation: The Structure and Operations of Organized Crime in America*, Colophon Books, Harper and Row, New York, 1969.
10. Douglas DeNike, "Radioactive Malevolence," *Bulletin of Atomic Scientists*, February 1974, p. 18.
11. Mason Willrich and Theodore Taylor, op. cit., p. 112.
12. Ibid.
13. Brian M. Jenkins, *Will Terrorists Go Nuclear?*, California Seminar on Arms Control and Foreign Policy, Santa Monica, California, 1975 p. 10.

14. James Lovett, "Who are the Enemy," in Leachman and Althoff (eds.), *Preventing Nuclear Theft: Guidelines for Industry and Government*, Praeger, New York, 1972, p. 215.
15. Deborah Shapely, "Plutonium: Reactor Proliferation Threatens a Nuclear Black Market," *Science*, 1972, April 9, 1971, p. 146.
16. S. Burnham, et al., *The Threat to Licensed Nuclear Facilities*, The Mitre Corporation, McLean, Virginia, 1975.
17. Willrich and Taylor, op. cit., p. 112.
18. DeNike, op. cit., p. 16.
19. Jenkins, op. cit., p. 1.
20. The Japan Times, December 3, 1976.
21. **David D. Comey**, "Do Not go Gentle into That Radiation Zone," *The Bulletin of the Atomic Scientists*, November 1975.
22. State of California, Office of Emergency Services, *Nuclear Blackmail or Nuclear Threat Emergency Response Plan for the State of California*, December 1976.
23. Leon Rappoport and J. D. Pettinelli, "Social Psychological Studies of the Safeguards Problem," in Leachman and Althoff (eds.), op. cit., pp. 173-189.
24. R. B. Leachman and A. P. Cornella, *Details of Criminological Investigations of Large-Valued Thefts Related to Nuclear Material, KSU/Ds-20*, Kansas State University, under contract to National Science Foundation, June 1972,
25. C. Rogers McCullough, et al., *An Appraisal of the Potential Hazard of Industrial Sabotage in Nuclear Power Plants*, Southern Nuclear Engineering, Inc., Dunedin, Florida, July 1968.
26. The BDM Corporation, *Analysis of the Terrorist Threat to the Commercial Nuclear Industry*, Vienna, Virginia, 1975.
27. D. M. Rosenbaum, et al., *Special Safeguards Study*, U.S. Atomic Energy Commission, April 1974.
28. Testimony of Kenneth Chapman, Director, NRC, Office of Nuclear Material Safety and Safeguards, *Hearings before the Subcommittee on Energy and the Environment of the Committee on Interior and Insular Affairs*, February 26-27, 1976, pp. 145-146.

29. The BDM Corporation, *Analysis of Group Size*, Vienna, Virginia, 1975.
30. Ibid., p. 8.

## BIBLIOGRAPHIC NOTES

The literature on terrorism is abundant. Government-commissioned reports, journal and newspaper articles have proliferated particularly during the last decade. Among the major analytical works referred to in this report are those described below. These do not, of course, represent a complete list.

In July 1966, the Atomic Energy Commission appointed a special advisory panel of persons outside the government to review its policies and procedures for safeguarding special nuclear material.. The seven-man panel was headed by Dr. Ralph F. Lumb, Director of Western New York Nuclear Research Center. The 121-page report of the Lumb panel, issued in March 1967, states that "Safeguards programs should also be designed in recognition of the problems of terrorist or criminal groups clandestinely acquiring nuclear weapons or material useful therein."

Ralph F. Lumb, et al., *Report of the Advisory Panel on Safeguarding Special Nuclear Material*, unpublished, Washington, D.C. 1967.

Dr. Theodore B. Taylor is a former designer of nuclear weapons. His early work for the Department of Defense identified potential non-national nuclear threats. In 1968, Stanford Research Institute published Taylor's Preliminary Survey of *Non-National Nuclear Threats*, an unclassified report. Much of Taylor's subsequent reports are classified.

However, in December 1973 Taylor's views gained national attention through a series of three interview articles by John McPhee ("The Curve of Binding Energy," *The New Yorker*, December 3, 10, and 17, 1973).

McPhee's articles were later published in a book, *The Curve of Binding Energy*, Farrar, Straus, and Giroux, New York, 1973.

Mason Willrich and Theodore B. Taylor, *Nuclear Theft: Risks and Safeguards*, Ballinger Publishing Company, Cambridge, Massachusetts, 1974.

Robert B. Leachman and Phillip Althoff, eds., *Preventing Nuclear Theft: Guidelines for Industry and Government*, Praeger Publishers, New York, 1972.

D. M. Rosenbaum, et al. , *Special Safeguards Study*, U.S. Atomic Energy Commission, April 1974.

The BDM Corporation, *Analysis of the Terrorist Threat to the Commercial Nuclear Industry*, Vienna, Virginia, 1975.

S. Burnham, et al., *The Threat to Licensed Nuclear Facilities*, The Mitre Corporation, Mitre Technical Report, MTR-7022, McLean, Virginia, 1975.

## Annex to Appendix III-A

INCIDENTS INVOLVING LARGE NUMBER OF DEATHS 1968-1976  
(Refer to Figure 5 on Page 22 of Appendix III-A)

- October 6, 1976      Caribbean -- A Cuban Airlines DC-8 jetliner carrying 73 persons crashed off the coast of Barbados, killing all 73 persons aboard. The Venezuelan Government pointed an accus--finger at Cuban exiles. [Two men carrying Venezuelan passports were arrested in Trinidad. One of them allegedly confessed to having placed a bomb in the baggage compartment of the Cuban airliner. This led to the arrest of a dozen more Cuban exiles.]
- September 7, 1974      Greece -- A Trans World Airlines jet bound for the United States with 88 persons aboard crashed in the Ionian Sea off Greece. The Organization of Arab Nationalist Youth for the Liberation of Palestine (ANYO) claimed responsibility for the suspected bombing which killed all persons aboard.
- December 17, 1973      Italy-- At least 32 people were killed and 18 wounded at the Rome airport when five Arab guerillas attacked a Middle East-bound Pan American World Airways jet airliner, spraying it with bombs and machinegun fire, hurling hand grenades into it and setting it on fire.
- May 31, 1972      Israel -- Three Japanese gunmen attacked passengers at Tel Aviv's Lod Airport with machineguns and hand grenades, killing 25 persons and wounding 76. The gunmen were members of the URA of Japan who had been recruited by the PFLP for the assault. The PFLP claimed credit for the attack, saying that the three terrorists belonged to the Squad of the Martyr Patrick Arguello.
- January 26, 1972      Sweden -- Croatian emigres claimed responsibility for the bombing of a Stockholm-to-Belgrade airliner which crashed, killing 26 persons.
- February 21, 1970      Switzerland -- A sabotaged Swissair plane en route to Tel Aviv crashed on takeoff, killing all 47 passengers. The PFLP was responsible.

April 11, 1974

Israel -- Three Arab guerrillas stormed a residential building in Qiryat Shemona, killing 18 persons and wounding 16. The guerillas were said to belong to the PFLP-GC.

APPENDIX III-B

NUCLEAR NON-STATE ADVERSARY ACTIONS (NUCLEAR TERRORISM), WITH SPECIAL  
REFERENCE TO THE RAND CORPORATION DRAFT OF JANUARY 6, 1977\*

L. Douglas DeNike, Ph.D.

\*The RAND draft of January 6, 1977 was an incomplete first draft which was subsequently revised, expanded, and edited to become Appendix III-A of this report.

This review evaluatively analyzes the major issues involved in potential nuclear non-state adversary actions in relation to the Rand Corporation draft on this topic of January 6, 1977 (1).

The reviewer concludes that malevolent nuclear actions not authorized by national governments could pose quite extraordinary risks to the United States and to world order. The present report begins with clarification of matters pertaining to the definition and probability of acts of nuclear terror. It proceeds to answer reassurances contained in the Rand draft regarding the likelihood of such acts. The reviewer's perspective on the topic follows. The latter half of this paper is devoted to specific observations on the contents of the Rand draft which are not dealt with in the earlier main text.

#### Most Nuclear Maleficence is Not Difficult Technically

The term "nuclear terrorism" tends, somewhat misleadingly, to connote a James-Bond sequence involving theft of fissile material, atomic-bomb construction by subverted experts, and ultimate detonation of the device. However, many possibilities categorized as non-state nuclear adversary actions are more simple technically. The defining characteristic of a non-state action is the absence of official governmental orders. For example, a government could "leak" a nuclear explosive to a terrorist group, or military authorities could make unauthorized sales of nuclear weapons, especially under conditions of poor inventory control, such as prevail during and after wars. Moreover, nuclear weapons could be stolen and used, especially if national proliferation puts nuclear weapons in the hand of national governments who do not have the resources to guard their weapons adequately.

Also included are simple dispersals of radionuclides for purposes of territory denial and socioeconomic disruption. The most-discussed, but not the most convenient, example of the latter is the induced meltdown of a power reactor's fuel core. Hence, many kinds of nuclear terrorism do not appear to require prohibitively great resources or skills.

#### Probability of Successful Attempts

A meaningful answer to the question, "How likely is an event of this kind?" must be based on specification of additional particulars, such as: "By what means?" "In what country?" "Involving whose nationals?" "In peacetime or wartime?" "Over what time interval?" All analysts in this field are obliged to work with unquantifiable guesses--with surmises that are not so much demonstrable as they are not convincingly refutable. This reviewer guesses that the probability is over 50%, worldwide, of a contaminative incident requiring the indefinite evacuation of one square mile or more, or nuclear explosive damage in excess of \$100 million, over the span of the next five years. This probability may be expected to ascend with the proliferation of nuclear power, with the continued emphasis on such topics in the imaginative media, with media publicity given to the first major incidents if they occur, and with intensification of the global population-resources crisis (which help to create the disparate and desperate conditions by which terrorists justify their means and gain support and refuge).

#### Examining Rand's Guarded Optimism

Rand and this reviewer agree that a crude explosive device probably can be designed and built by some non-state adversary groups. (See

also Volume I, Chapter VI). Rand adduces several arguments suggesting that these admitted opportunities might not be exploited. But dismayingly, rather good replies can be made to each:

(A) (It may not be in the interest of terrorists to induce mass casualties) This is undoubtedly true for most terrorists, most of the time. It cannot be shown true for all terrorists all of the time. Rand's Brian Jenkins has said that terrorism is perpetrated for an audience; "...terrorism is theater" (2). As Michael Flood points out in his comprehensive review of recorded malevolent acts involving the nuclear power industry (3), "...nuclear terror makes gripping theater." The more people dead, the more people watching on the news media.

Moreover, nuclear atrocities need not be equated with mass slaughter. Consider, for example, the detonation of a nuclear device at any one of a number of important sites at 3 A.M. on a Sunday morning when few people would be about. This might be calculated to damage or destroy a symbol of "capitalist imperialism" and yet to kill very few.<sup>1</sup> Again, to force prolonged evacuation and/or decontamination of an urban area would certainly be atrocious, yet given timely warning few casualties might be involved. Yet such an event could cause profound disruption nationwide, and considerable turmoil worldwide. The Atomic Energy Commission, in its 1974 GESMO draft environmental impact statement on plutonium recycle, calculated that the release of two kilograms

---

1. If U.S. retaliatory circuitry were programmed to respond reflexively and massively to such an event on the assumption of a Soviet attack, exceedingly many deaths could ensue. This exemplifies the possibility that terrorists might grossly underestimate the total effects of their destructive acts, or that, in the confusion of the moment, authorities might grossly overestimate the threat to the nation.

of particulate plutonium oxide at ground level would induce cancer in all inhabitants 1000 feet downwind, and in 1% of inhabitants even 40 miles downwind (4).<sup>2</sup>

(B) (Other, non-nuclear channels are available by which terrorists can pursue their objectives) The daily newspapers attest to the vigor with which terrorists are pursuing non-nuclear options. This behavior in itself justifies no reassurance that nuclear means will not be utilized in the future. That would require empirical analysis of terrorists' motivations and their awareness of nuclear security vulnerabilities, both of which could change in an inauspicious way as time goes on. Obviously, conventional weapons and explosives are more readily available to extremists than are fissile materials and other radioisotopes. However, such persons who were favorably situated to learn how to acquire and handle the latter materials might go the nuclear route. Access to a loose-mouthed, disgruntled, bribe-or-blackmail-vulnerable nuclear employee might tip the balance.

(C) (Terrorists might alienate their constituencies by nuclear violence or extortion) The constituency of onlookers might be enraged, but simultaneously impelled to yield in recognition of the adversaries' irresistible nuclear capability. The goal of terrorism is not necessarily to win friends, but rather to influence (possibly bitterly resentful) people that they have no choice but to accede to the terrorists' demands.

(D) (Nuclear terrorist could not handle excessively large money payoffs, nor maintain a credible threat long enough to significantly

---

2. Since evacuative dispersals (the "Seveso effect") may also be caused by non-nuclear substances such as dioxin and polybrominated biphenyls, nations in the future may be forced to choose between national defense and the health of persons working in key facilities contaminated by enemy action. This will not be an unconstrained choice. If the health hazard is manifest in obvious illness, or cannot be concealed from those in the affected zone, there may be little choice but to evacuate.

influence the policy of a national government) If such extortionists could initially establish the credibility of their nuclear devices which could possibly be transportable, they might elude capture for an extended period, as did Patricia Hearst.<sup>3</sup> Malefactors who convincingly claimed to be maintaining two such devices with a failsafe means of communication might threaten that the capture of one device would automatically detonate the other. The perpetrators might be expected to provide shielding which would lessen the effectiveness of searchers' neutron detectors. Unless physical descriptions of the terrorists were available, once they had hidden their devices in an area unlikely to be searched they would be relatively safe even from the outrage of an entire citizenry. As for the unwieldy weight to nuclear blackmailers of "a billion dollars in small bills," they might settle for a lesser sum, or installment payments by parachute, or credits to the treasuries of poor foreign states. If there were reason to believe the gang was not all holed up together, even an atomic bomb exploded by the victim government over their suspected backwoods hideaway would not be expected to neutralize them. And of course, attempts by authorities to capture the retrievers of extortion payments could be forestalled by advance threats to employ nuclear violence.

(E) (Terrorists sophisticated enough to utilize nuclear means, unlike common criminals, may possess a certain revolutionary humanitarianism making them loath to actually do so) The political changes sought by terrorists and guerrillas are known to require considerable bloodshed. A basically humane terrorist leader might wish to cut this short with a bloody but decisive nuclear strike. A "noble" justification can be

---

3. The "Weather Underground" group has eluded the FBI for seven years.

imagined for almost any unspeakable act, especially in the minds of warped individuals susceptible to rationalizations for butchery. All major governments have approved deeds of violence later considered to be unnecessary atrocities. Thus it should not be too surprising if extremist groups do also.

(F) (Terrorists have not signalled their willingness to go big-time by exploding gasoline tank trucks, oil tankers, chemical factories, major dams, or munitions sites; or by making nerve gas or poisoning water supplies). Attacks on intrinsically sabotageable fixed sites may be relatively unappealing since such targets may not be located in places optimal for producing disruptive effects. Or the targets may lack appropriate political symbolism, or endanger large numbers of innocent persons. Nuclear power plants would probably be an exception, since to many they symbolize an oppressive technocracy, and because the disruptive effects of electricity loss or radioactivity release would be felt over a wide area, without killing too many.

As for deadly bacteria and nerve gas, there have been reports that both have been prepared for terrorist use but that the plots were thwarted. In January 1972, Chicago police reportedly narrowly averted a scheme to introduce typhoid germs into the city water supply (5). In March 1976, gang members in Austria were reportedly arrested in possession of a quantity of poison DFP gas (6).

The foregoing discussion reveals no reason to dismiss or minimize the possibility of nuclear interventions by extremists. In assessing the extent of the danger, we might bear in mind not only some humans' tendency to borrow trouble, but many humans' tendency to be optimistic in confronting the unknown. Among professional analysts, there is an

understandable tendency to "look reasonable, " to avoid recommending expensive precautions unless the need for them is very salient, and to say to decisionmakers what one imagines they want to hear. The motive not to make waves in an organization, or not to make a fool of oneself, has led to more than one tragedy when clear signs of danger were overlooked. For example, on December 2, 1975, a radiobiologist on the train platform at Assen, Netherlands noticed seven youths bearing abnormally large gift packages. "...his immediate reaction was alarm," which he stifled, and three innocent hostages were killed in the infamous Dutch Train Incident (7).

There is a strong tendency in human psychology to look on the bright side, and to ignore the evil not yet recorded as hypothetical if not purely speculative. Yet a simple mental exercise will demonstrate what many of us accept in principle, that the outlandish and unbelievable happen every week. Let the most seemingly preposterous news event of the current year be mentally framed as a prediction, and the prediction imagined as issuing from the mouth of some prognosticator of the previous year. Who would have dared to predict the actual course of the Watergate investigations? Who would be listened to if he speculated that a man "who wanted to tell the world his views on the dangers of tobacco" would hold "a man hostage for more than two hours at the top of the tallest building in Los Angeles" (8)? Who would forecast that Croatian nationalists would "hijack" the front pages of several major newspapers to publicize their obscure cause (9)? The reviewer hopes that the nation shall if possible avoid the dangers of unjustified optimism or unvoiced misgivings -- which later might be called the stiff upper brain syndrome.

A Perspective on the Topic

This reviewer defines a counterconspiratorial public-safety policy as one which seeks actively to anticipate possible disruptive malevolent events and to prevent, respond to, and recover from them. Such a policy may have undesirable consequences if the scenarios imagined or the precautions taken become self-fulfilling prophecies by firing the imaginations of evildoers. Counterconspiratorial policies are also expensive and run against the grain of free societies' thinking; even law-enforcement agencies do not relish such contingency planning.

However, a tacit reliance on minimum precautions and crossed fingers also bears risks. Such confidence seems to assume that rapidly proliferating new knowledge in nuclear physics, toxicology, and molecular biology will be much less appealing to public enemies than it is to the television writers who continuously suggest new malevolent schemes to a large and diverse audience. It further assumes that the first instances of a new terror technology (e.g., plutonium dispersal) will neither inspire imitators in such numbers as to overstrain the response capacity of government, nor will those first instances in themselves disrupt that response capability by attacking key administrative nerve centers.

The present and largely unarticulated public-safety philosophy of the United States and other democracies should be viewed as having wishful and frangible features. Up to the present time, the costs of unpreparedness have been sustainable. Next year, they may no longer be. One may reserve the term "ultrafrangible" for policies and programs the first clear sign of whose inadequacy is their total failure. The Teton Dam exemplifies an expensive and elaborately planned structure which proved to be ultrafrangible.

We have no proof that the American-Soviet mutual-assured-destruction nuclear deterrence system is not ultrafrangible. The same may hold for low budget, low-profile preparedness against nuclear terrorism.

A quest for inordinate coercive/destructive power almost defines potential nuclear terrorism. Small groups or possibly even individuals could assume powers vastly disproportional to those they customarily possess. Governments are still unaccustomed to the idea of gigantic forces being manipulated by small numbers of desperados. This, in conjunction with the aforementioned tendencies to minimize unrealized threat possibilities, leads to a lack of adequate contingency and response planning.

Even if planners have substantial motivation to provide against non-governmental acts of nuclear violence and coercion, they may not find their way clear to do so. As they start to compile vulnerabilities and modes of possible attack, they may find themselves writing an encyclopedia for atomic terror, which might have to be kept at an unusefully high level of security classification.

The concept of "Catalytic war" refers to the initiation of armed hostilities between countries X and Y by a deceptive destructive act perpetrated by Z. At some future time, the leaders of a third country might perceive it in their interest to foment war between the United States and the Soviet Union. If an important fraction of an urban area in the U.S. were to disappear beneath a mushroom cloud one day, the U.S.S.R. would quickly become aware of what had happened. The U.S.S.R. might assume that the U.S. would have no choice but to presume U.S.S.R. origin or instigation for the event. That assumption could lead directly to the Soviets' launching a pre-emptive nuclear attack on the U.S. in

order to lessen the blow from the U.S. retaliation for the original act. So pitilessly might history record our joint failure to recognize the fragility of bipolar deterrence theory based on "rational " adversaries. The many weaknesses of deterrence have been elegantly spelled out by David Krieger (10) and Louis R. Beres (11).

Planners considering such an eventuality confront a dilemma. There may be no time to safely conduct an investigation, unless there are excellent grounds for reaching a quick understanding with the Soviets. But what can be said publicly in advance? If the U.S. should announce that it will retaliate against the U.S.S.R. without pausing to ascertain the bomb's origin, we tempt would-be initiators of catalytic war. If, on the other hand, the U.S. makes it clear that it will not attack the Soviet Union until N bombs have gone off in American cities, it virtually invites anyone to detonate N-1 devices of mysterious origin "for free". Even if classified rather than open plans were drawn up to cope with this impasse, there would be constant dread that these plans might unawares leak to potential adversaries, conferring an enormous strategic advantage to them.

Hence, there is a possibility that single acts of nuclear terror could set in motion much larger and far-reaching responses and counter-responses. Recognition of this state of affairs is dulled in part by the bias toward optimism that stems from the very fact of our still being alive as individuals. All persons who are not now dead have experienced an uncanny amount of good luck. Those who got bad shakes of the dice are no longer with us.

The foregoing discussion provides the basis for an emergent principle in international relations, to wit, the absolute intolerance of translational nuclear terrorism. We see that the origin of such atrocities possibly could not be determined with sufficient promptness and reliability. Thus the line is blurred between such acts initiated covertly by foreign governments, and identical acts committed by fanatics without government sanction. Any barbarous deed could be assigned by a foreign state for commission by a trusted radical team, and the connection disavowed if the extremists were captured or identified. This kind of hand-washing would be intolerable to victim states. They would demand scrupulous adherence to the idea that nation-states have an absolute duty to prevent the incipient nuclear terroristic behavior of their own nationals from being exported beyond their own borders. Presumably, nations would wish to quell it within their borders as well.

If national governments come to be held accountable for nuclear blackmail or violence in another state traceable to their own citizens, it is plausible to expect attempts to diminish personal and civil liberties worldwide. Governments and citizens may then become locked in the familiar circle of repression and resistance.

Acts of nuclear aggression, because they can anonymously inflict massive losses on national governments have a potential altogether different from the maximum to be expected from today's violent political episodes. It is a fundamental error to view atomic terrorism as merely a more serious type of deed of the kind to which we have grudgingly become accustomed. The threat of nongovernmental nuclear force, like governmental nuclear force, places unprecedented demands upon the assumptions underpinning present world order.

Attaining Closure on Sustainable Nuclear Policy:Capitalization on Events Conducive to Internationalization of Energy

Many countries lack adequate fossil fuel reserves, and are presently incapable of substituting non-nuclear energy options. Such states may be expected to build nuclear electricity generating stations if they can afford them. Indeed, some countries may be willing to pay a premium price in order to acquire either the prestige or the weapons options (or both) implicit in such facilities. Thus at least until some dramatic occurrence, we may expect nuclear electricity units to be erected in such countries.

For the immediate future, United States policy could be based on the assumption that a global phaseout of either nuclear weapons or fission power is temporarily infeasible. However, breakthroughs in alternative energy sources, or achievement of suitable international agreements to share fossil fuels, or perhaps a nuclear tragedy will sooner or later enable the inception of denuclearization.

Countries obviously intent on joining the nuclear weapons club will need additional positive and negative inducements. The United States could take the lead in fostering new frameworks of regional security, that would damp down or eliminate A-bomb rivalries. Coordinately, we might be able to export some of our 200-year supply of coal as well as our rapidly accumulating expertise in energy efficiency and non-mineral (sustainable) power options.

If a threat or an actual commission of an act of nuclear violence occurred, the federal government could capitalize on the event to jawbone for gaining freedom from reliance on nuclear weapons and fission-generated

electricity. At the same time, we can take two steps dramatizing our plight and furthering movement toward a post nuclear world energy order,

The first is to bring American nuclear exports to a close. A current unexamined premise is that U.S. withdrawal from the role of reactor vendor overseas would deprive this country of any leverage against the proliferative activities of other nations. American leverage against such proliferation inheres in our total national ability to aid, protect, substitute other energy sources, and administer sanctions. It does not depend on our participation in any given trade activity. A policeman who doesn't drink may still arrest a drunken driver. Nor will the salubrious effect of positive example by the United States be lost on other nuclear trading states.

The second interim goal is to upgrade the International Atomic Energy Agency inspectorate to a true international police force with power to arrest. This possibility will seem much less visionary following the first major event of nuclear maleficence. While it will take time and effort to emplace, and logically should be accompanied by an international judicial body to try offenders, its achievement will someday be seen as logical, natural, and inevitable."

A start toward realization of these objectives has already been made . Alternative energy sources are undergoing intensive development, and energy conservation is about to have a significant impact. Diplomacy is cheaper than either bombs or wars, so the taxpayers should welcome regional alliances which reduce the need for both. The U.S. is already exporting coking coal, and soon may be exporting Alaskan oil. Both the outgoing and the incoming federal administrations have given intensive

thought to the nuclear-export question. That leaves only the upgrading of IAEA, which may have to await a conspicuous failure in the latter as presently organized. As Abba Eban said, people will do the sensible thing once all other alternatives have been tried.

Reviewer Comments  
on Rand First Draft

Specific Observations on the Rand Corporation First Draft of January 6, 1977

This first draft was provided by Rand's Brian M. Jenkins. Direct quotation has not been used here, in anticipation of further revision. However, material which follows the conjunction "that" is usually a direct quotation from the draft. While these comments necessarily focus upon differences, reviewer concurs with the bulk of the first draft.

Introduction: A distinctly misleading impression is given by failing to mention the variety of malevolent events later taken up in Section VI.

A reader not familiar with the literature documenting multifarious illegal acts connected with the nuclear industry could readily conclude from this introduction that all is well.

Introduction (page 2): Rand sees disgruntled employees as capable of low-level sabotage. A seriously disgruntled or demented employee could cause damage, as witness the \$10 million Indian Point arson incident and the \$50 million accidental fire in the cable spreading room at Browns Ferry (12).

Section 11 (page 6): There is an unfortunate tranquilizing tone in the statement that people have come to accept the presence of nuclear weapons and have grown accustomed to living with the possibility of nuclear war, and that one nation more or less with nuclear weapons does not seem to make that much difference. India's entry into the nuclear club made a substantial difference, inasmuch as it concretely illustrated the tie between imported nuclear technology and indigenous weapons development.

Section 11 (page 7): The language of this section tends to suggest that nuclear terrorism is a bogeyman invented by nuclear critics. Yet elsewhere in the draft Rand concedes there is reason for doubt and fear.

Section 11 (page 8): Draft avers that there is no convincing evidence that violence on television or in the movies causes people to be violent. This statement is in conflict with studies on media-induced imitative aggression conducted by Professor Albert Bandura and others (13).

Section II (page 9): Reviewer concurs that some loss of confidence in political and economic institutions has occurred. The lagging performance of the criminal-justice system in particular may embolden potential nuclear thieves or saboteurs.

Section 111 (page 15): Rand notes that a hijacking or hostage incident may be in the news for days, even weeks. Contamination and disruption following a nuclear atrocity could be expected to yield a continuing flow of publicity attractive to potential perpetrators. Note the intense coverage given to the extended evacuation of several hundred acres of Seveso, Italy by dioxin dispersal (roughly analogous to urban release radionuclides or the fallout from a fission bomb). In less than a month, the Los Angeles Times carried nine stories on the event and its aftermath (July 26, 27, & 31; August 3, 6, 7, 13, 14, & 21, 1976).

Section 111 (page 15): Rand states here that terrorist violence is trivial compared to the world volume of violent deaths. In its immediate context this statement is misleadingly reassuring. More realistic measures of the impact of terrorism would be the cost to authorities of guarding against and fighting terrorism, the costs of ransoming kidnap victims, rehabilitating people and buildings affected by bombings, etc. Rand acknowledges elsewhere in the draft that body counts are not the measure, and that terrorism will continue to require a major diversion of resources into internal security functions, (e.g., p. 16).

Section IV; The most serious motivation for nuclear sabotage by a non-state adversary may perhaps be found among fifth-columnists or self-styled guerrillas, sympathetic to the aims of a hostile foreign government but still acting on their own initiative.

Section IV (page 17): It is distinctly bold to state that there is no discernible trend toward nuclear action. If we assume that the same mind-sets that yield nuclear hoaxes, small-scale bombings at European reactor sites, and thefts of isotopes could also predispose to major actions, then the great increase of such events in the 1970's is cause for substantial concern. Rand documents the increase in U.S. incidents in Figure VI-1 (p.38), then dismisses it as probably due to better reporting.

Section IV (p.23): Another significant statement by Rand is that at present, we can do no more than speculate about the types of demands non-state adversaries can, cannot, are most likely to make. Rand's appropriate statement here does not prevent unconservative speculation elsewhere in the draft that several types of threats are unlikely. This is a topic on which policy analysis is considerably less expensive than policy failure. Thus it would seem best to err on the side of inclusiveness -- to entertain all categories of possible threat until there is greater than speculative reason to exclude some of them from consideration.

Section IV (p. 23): The closing statement contradicts the principle which reviewer applauded in the immediately preceding comment. Now Rand's viewpoint seems to be that if terrorists have in the past used non-nuclear means to obtain a given type of goal, other terrorist will not use nuclear means to obtain a similar-level goal in the future. If

terrorists were that successful at getting what they wanted by non-nuclear means, they would have long ago traded in their submachineguns for thrones. obviously they are still motivated to find more effective means of coercion and media coverage.

Section IV (p.24); Whether nuclear extortionists could semi-permanently alter national policy depends on their ability to elude capture, which in turn depends on their transportation, shielding from detection> etc. See reviewer's main text under point D. While they could not "persuade" a government to liquidate itself, they could directly liquidate its key leadership or effectively exile it from its capital city. In so doing, they would probably be precipitating chaos and/or military rule, but they might be willing to accept either condition on an interim basis, until they had gathered enough strength to pursue takeover.

Section IV (P. 24): Here Rand seems to be addressing an absent audience of potential terrorists of the "lunatic fringe", telling them that their goals cannot be met by demands Rand considers irrational. A large percentage of violent and extortive behavior seems irrational to one or another observer, but not to those who engage in it. Nor do we automatically call the bluff of every hostage-taker who looks like a mental case.

Section IV (p. 25): Rand states that because of the publicity factor, any terrorist believed to have a nuclear device is automatically a successful terrorist. The reviewer tends to concur, and points out how this short-circuits most counter-arguments as to whether the terrorists might not have the motivation to actually use the device.

Section V (p. 33): Reviewer is listed as the only observer espousing the view that crackdowns on organized crime following nuclear theft operations might be deterred with a nuclear threat. Yet on page 30, Willrich and Taylor (15) are quoted as saying, "A criminal organization might use the threat of nuclear violence against an urban population to deter police action directed against its nuclear theft operations." Willrich and Taylor argue, as does Rand, that a criminal gang would probably not survive a showdown with the government. However gangs as well as nations have been known to engage in unsuccessful brinkmanship leading to their downfall. Moreover, national governments might initially not feel impelled to challenge in an all-out way small-scale nuclear thefts conducted by criminals, if it appeared that the stolen fissile material was being sent abroad.

Section V (p. 33); Here Rand seems to be addressing the Mafia, as on page 24 it addresses the lunatic fringe. It is expounded unequivocally that any involvement in nuclear action will inevitably result in a war that organized crime will not survive. The Mafia, knowing the ease of hiding and transporting stolen goods, and the authorities' reluctance to conduct a "war", might not agree.

Section VI (p. 37): Rand cites the Vermont Yankee incident as involving the only casualty recorded. If foreign events are included, the takeover of the nuclear station under construction at Atucha, Argentina (March 25, 1973) warrants mention. In that event the guerillas wounded two policemen as they escaped (14).

Section VI (p.39): Reviewer concurs that the India-Nepal uranium smuggling scheme reveals the potentiality for an international black-market for nuclear material. Thus, stolen nuclear material could be

smuggled into this country, possibly by organized criminals (see section V). It is debatable whether the first large theft of weapons material will adequately admonish other nations to buckle down, since its occurrence may well be kept tightly secret. A large ransom could be paid without the taxpayers knowing it.

Section IX (page 67); Rand states that is is a breathtaking inferential leap from non-nuclear to potential nuclear actions, implying that analysis of sophisticated non-nuclear crimes may not be fruitful. Reviewer disagrees. What is indeed breathtaking is the amount of resources, planning, and personnel involved in some nonnuclear crimes.

Section VII (page 54): Reviewer agrees it is not difficult for terrorists to assure that the general public is alerted to their nuclear threat. They could take over a broadcasting station, drop leaflets from a high building, mail warnings to randomly selected addresses, etc. Official attempts to discredit the threat could be overcome to some extent by release of radionuclides at important locations, with warnings issued to evacuate and decontaminate.

Section VII (p. 55): The assumption in this table that hoaxes have low coercive power manifestly depends on the authorities' ability to quickly, accurately, and credibly identify them as hoaxes. Bank robberies and at least two aircraft hijackings have been successfully carried out with simulated explosives, the most recent example of the latter being the Croatian nationalists incident (21).

Section VII (p.59): Here it is stated that major problems of prolonged large-scale evacuation have not been worked out While this

discussion refers specifically to urban areas threatened by a nuclear explosive, the same lengthy set of problems would be encountered consequent to the accidental or induced meltdown of a nuclear power reactor.

Section VIII: The dilemma of a "no ransom" posture arises in connection with nuclear-blackmail. The Wall Street Journal notes that this country has consistently adopted a hard line with terrorists, refusing to bargain with them or to meet demands. "There would be no end in sight if we started paying ransom every time a United States official was kidnapped -- it would be an open invitation to the U.S. Treasury," says L. Douglas Heck of the State Department's Office for Combating Terrorism (22). For example, in the French "sewer gang" robbery of the equivalent of \$8-\$10 million from a Riviera bank vault, the operation involved 18 months of planning and the recruitment of about 20 specialists (16). The mastermind's share of the loot reportedly went to "an international group of extreme right-wing militants identified as 'LaCatena'." A study for the NRC by International Research and Technology Corporation describes the particulars of ten very impressively designed criminal incursions (17).

Section VII (p. 48): The assumption that necrologic or bacteriologic agents may be more available to the general public than nuclear material may be due for revision. In the summer of 1976, the NRC gave approval for the wide-scale use of plutonium-238 cardiac pacemakers, anticipating a U.S. market of 10,000 units (18, 19).

Section VII (p. 51): Rand should be encouraged to explore in greater depth the implications of threats against capital cities in nuclear hoaxers' demands. Reviewer suspects that the real nuclear terrorists

of tomorrow will present demands not unlike the nuclear hoaxers' threats of today.

Section VII: Dispersal of radioactive particulate is noted to be a less-popular threat option among nuclear hoaxers, who can claim possession of a hydrogen bomb just as cheaply. However, the socioeconomic disorder which could be inflicted by radiologic weapons is cause for very grave concern. The costs of evacuation, decontamination, and reoccupancy, especially if the interiors of buildings are compromised, "could run to many millions of dollars per gram of plutonium used" (20). Consider also that an inadequately designed plutonium implosion bomb, whose high-explosive component detonates but produces no nuclear yield, is still a plutonium dispersal device.

However, Willrich and Taylor warn, "If a government has made payoffs as a result of credible hoaxes, but not recovered any devices, it may establish a policy of no more payoffs. This could create a situation of extreme danger. The next credible bomb threat might be the real thing, and a nuclear catastrophe would be the probable result" (23).

Section IX: Rand's statement that no methodology has been developed to predict the occurrence of an event that has not occurred is not strictly true. Probability theory and pooled-opinion forecasting such as the Delphi method can be brought to bear on the likelihood of nuclear terrorism of various kinds. Reviewer is not aware that this has been done by anyone not potentially biased by an occupational or ideological commitment to fission power.

Section X (p. 76): Reviewer applauds the excellent reasoning here regarding the unrealism of relying on rapid outside law enforcement agencies for response from offsite in the event of an attack on a nuclear facility.

Section XI: The potential for curtailment of civil liberties and democratic traditions inherent in nuclear-coercion countermeasures is discussed in two detailed reviews on these topics. These are Russell W. Ayres, "Policing Plutonium: The Civil Liberties Fallout," Harvard Civil Rights-Civil Liberties Law Review, Vol. 10, 1975, pp. 369-443; and Michael Flood & Robin Grove-White, Nuclear Prospects: A Comment on the Individual, the State and Nuclear Power, 64 pp.; Friends of the Earth (England) in association with the Council for the Protection of Rural England and the National Council for Civil Liberties, 1976. (See also Appendix III-C of this report). Rand's discussion here is by comparison but touching the tip of a very large iceberg. Recall reviewer's expectation earlier in this review of attempts to strikingly diminish personal and civil liberties worldwide.

Rand discusses post-employment surveillance of former nuclear employees (p.85). Consider also that the U.S. has thousands of nuclear warheads (24), yet continues to add to the stockpile. Perhaps this is not unrelated to the disquieting question, "Can you safely lay off persons who know how to make bombs?"

References

1. Rand Corporation non-state adversary draft of January 6, 1977
2. B. M. Jenkins, "Will Terrorists Go Nuclear?" California Seminar on Arms Control and Foreign Policy Discussion Paper No. 64, October, 1975, p. 13.
3. M. Flood, "Nuclear Sabotage". Bulletin of the Atomic Scientists, October, 1976, p. 30.
4. U.S. Atomic Energy Commission draft Generic Environmental Statement on Mixed Oxide Fuel, WASH-1327, August 1974, Vol. 4, p. V-48.
5. L. Ponte, "Tomorrow the Terrorists May Hijack New York City," Gallery, February 1973, p. 53.
6. "Austrian Police Nab Poison-Gas Producers," Ottawa Citizen, March 2, 1976.
7. W. Mathewson, "The Terrorists: Bitterness Surrounding Dutch Train Hijacking Lingers a Year Later," Wall Street Journal, January 6, 1977, p.1
8. T. Paegel, "Gunman Holds Hostage Atop Skyscraper," Los Angeles Times, December 7, 1976, p.1.
9. "Text of Demands, Letter," Los Angeles Times, September 11, 1976, p.1.
10. D. Krieger, "The Dangers of Deterrence," The Progressive, October 1974, pp. 34-36.
11. L. R. Beres, "Nuclear Quills," Bulletin of the Atomic Scientists (letter), December 1976, pp. 4-5.
12. D. D. Comey, "The Incident at Browns Ferry," Not Man Apart, mid-September, 1975, Insert.
13. A. Bandura, Social Learning Theory, Prentice-Hall, 1977.
14. S. Burnham (Ed.), The Threat to Licensed Nuclear Facilities, MITRE Corporation, McLean, Virginia, September 1975, p. 47.
15. M. Willrich & T. B. Taylor, Nuclear Theft: Risks and Safeguards, Ballinger, 1974, p. 112.
16. "Chief of 'Sewer Gang' Confesses," Los Angeles Times, October 30, 1976, p.1.
17. Estimates of Security Personnel Required to Protect Nuclear Fuel Cycle Components Against Theft of Special Nuclear Materials and Sabotage, International Research and Technology Corporation, Arlington, Virginia, August 21, 1975. Appendix B.

18. "Pacemakers Okay," Nuclear News, September 1976, p. 69.
19. U.S. Nuclear Regulatory Commission, Final Generic Environmental Statement on the Routine Use of Plutonium-Powered Cardiac Pacemakers, NUREG-0060, July 1976, p. 3-1.
20. Willrich & Taylor, op. cit., p. 108.
21. "Hijackers Returned to N.Y. to Face Charges," Los Angeles Times, September 13, 197, p.1.
22. J.A. Tannenbaum, "The Terrorists: For World's Alienated, Violence Often Reaps Political Recognition," Wall Street Journal, January 4, 1977, p.1.
23. Willrich and Taylor, op. cit., p. 110.
24. "30,000 U.S. Nuclear Weapons," The Defense Monitor, Vol. 4, No. 2, February 1975, p. 1.

APPENDIX III-C  
CIVIL LIBERTIES IMPLICATIONS  
OF U.S. DOMESTIC SAFEGUARDS

Alan F. Westin

APPENDIX III - C CIVIL LIBERTIES IMPLICATIONS OF U.S. DOMESTIC SAFEGUARDS

Introduction: The Civil Liberties Context of Nuclear Power

Civil liberties issues have recently moved to a prominent position in the public consideration of nuclear power development. This growth of concern over the impact of nuclear power on civil liberties would probably have occurred even without consideration of plutonium reprocessing. As incidents of non-nuclear terrorism have mounted world-wide, and as assaults have been made on nuclear facilities in several countries by various radical groups, there has been an increased program to safeguard such facilities from actions such as sabotage and deliberate release of radioactive materials. Such increased security measures raise some issues of civil liberties impact. But it has been plutonium recycle or other nuclear technologies (such as high temperature gas-cooled reactors) using material that could, if diverted, be made into nuclear explosives--that has set off the current debates.

Plutonium reprocessing offers the greatest opportunity for potential non-state adversaries--terrorist groups, profit-oriented criminal organizations, deranged persons, or disaffected employees of nuclear facilities--to obtain special nuclear material. Therefore, this paper devotes its major attention to the civil liberties issues likely to be raised by safeguards measures necessary to prevent the theft of plutonium and to effect its recovery if it were stolen.

To analyze the potential impact of plutonium recycle on civil liberties, this presentation will be divided into five parts:

- A. A General Perspective on Civil Liberties Issues.
- B. Projections of the Size of the Plutonium Recycle Industry.
- c. An Analysis of Likely Safeguard Measures and Their Civil Liberties

Consequences.

D. A Presentation of Three Positions Widely Held in U.S. Society as to the Civil Liberties Risks of Plutonium Recycle.

E. Observations and Comments on the Three Positions.

A. A General Perspective on Civil Liberties Issues

U.S. society has always had a fundamental commitment to civil liberties. It was part of the heritage from England, a rallying cry of the American Revolution, and the foundation for enacting the Bill of Rights and other constitutional guarantees. It has been a vital part of continuing efforts to expand and perfect democratic institutions under changing social and economic conditions. U.S. society today takes it as an article of faith that the enjoyment of liberty is vital to individual happiness and self-realization, to the conduct of socially valuable activities of private groups and associations, to the keeping of governmental power within proper bounds, and to the ethical and moral basis for public order, both at home and as the U.S. acts abroad. In both legal and social perspectives, American society recognizes that civil liberties must be exercised within the framework of an ordered society. Some civil liberties will therefore receive very broad, near-absolute status, such as the right of religious belief and exercise. Other civil liberties involving greater impact on the rights of others, on public health and safety, or on national security, have to be defined and applied in the context of balancing conflicting social interests or even conflicting civil liberties claims. But when such balancing of interests is done, whether by legislatures, executive agencies, or courts, Americans like to think that the claims of liberty carry special weight, so that serious limitations upon them must be shown to be clearly necessary, and to have been kept to the minimum required in a given circumstance.

It is in this broad context that debates have begun over the effects on civil liberties of measures to safeguard a future plutonium industry from assault or diversion.

Since the term civil liberties can be viewed in many different ways, it is helpful to this inquiry to note that protection of individual and group rights in American law and social values can be organized under three headings: liberty, equality, and fair procedure.

In a capsule, liberty refers to rights of expression and privacy. More concretely; this involves the guarantees of free speech, press, assembly, association, religious and non-religious exercise, and privacy that are embodied in the First Amendment to the Federal constitution and its state counterparts. Rights of liberty involve primarily volitional acts of individuals, things they have chosen to say, do, or be as part of their exercise of freedom.

Equality rights, usually expressed as rights to equal protection of the laws, deal with characteristics of people that are largely involuntary, such as race, nationality, sex, religious inheritance, and age. Growing out of the post-Civil War Amendments to the Federal constitution, their recent interpretation by the Supreme Court, and a growing armory 'of protective state and Federal laws and regulations, the equality principle forbids governmental and private discriminations that make invidious distinctions about individuals on the basis of characteristics that society has decided are not appropriate for those treatments. What is or is not an appropriate distinction is a judgment that varies over time, reflecting social values.

The guarantees of fair procedure, often called procedural due process, encompass two major dimensions of importance here. The first is that investigations, searches and seizures, arrests, interrogations and other police functions must be conducted in accordance with constitutional limitations,

as judicially interpreted. Principally, this involves the procedural-rights guarantees of the Fourth through Eighth Amendments: the security of persons, houses, papers, and effects against unreasonable search and seizure; the privilege against self-incrimination; the right to counsel; and similar protections of individuals against arbitrary or coercive police practices.

The second aspect involves formal proceedings where sanctions are sought to be imposed on an individual or might lead to imposing penalties (such as criminal trials, government personnel security hearings, and legislative hearings). Here, the civil liberties requirement is that basic fairness be provided in the proceedings, a concept that has come to mean several key elements:

1. advance communication to the individual of behavioral rules that must be followed to avoid legal penalties.
2. if charges are made against the person, a fair hearing for adjudication of those charges (with rights to have a specification of the charges, to be represented by counsel, to hear witnesses and conduct cross-examination, etc.)
3. an appeal to a higher authority, for review of the initial hearing.

The amount of rigorous due process that individuals can demand varies with the context, but in virtually every setting of American organizational life, private as well as governmental) public expectations are that procedural fairness will be afforded.

Applied to the nuclear safeguards problem, it is the areas of liberty and fair procedure that would be most directly involved.

As briefly noted already, guarantees of civil liberties while they properly occupy a fundamental place in the U.S. ideological and legal system,

are always matters of definition in context and must be weighed against competing values. The words used by the Framers of the eighteenth century Bill of Rights always need interpretation to apply them to new economic, social, and technological settings. Rights not mentioned in the constitution, such as freedom of association and privacy, have been read into the constitutional-rights code as these have come to be seen as necessary adjuncts to the protection of First Amendment rights. Sometimes, one civil liberties claim collides with another, as with free speech and privacy, or free press and fair trial, and courts must decide which right is to prevail in a given situation. Finally, judges must often weigh assertions of civil liberties against the protection of other fundamental social values in organized society-- such as public health, national security, public safety, to decide which value will be considered paramount in a given situation.

Thus, in each era there has been a struggle by governmental authorities, interest groups, dissenters, and other actors in the political and legal processes to define what exercises of liberty are vital to a democratic society at that time. There is also a struggle over whose characterization of the alleged threats to order, safety, health, or morals should prevail in defining limits on rights. Decisions about many civil liberties matters therefore inescapably involve judgments about social values, institutional philosophies, and the meaning of contemporary national and international events.

What follows from the" above points is that issues of civil liberties risks, options, and trade-offs should be seen as presenting elected officials and the American public with policy choices that must initially be worked out in the regulatory and legislative processes. These choices should be informed by an awareness of constitutional principles and their judicial interpretation but, of necessity, decisions here will be less circumscribed by clear law or

predictable judicial responses than in most other governmental programs affecting civil liberties. For reasons that will be detailed later in this report, courts cannot be expected to play an immediate role in the judgment about the compatibility of adequate plutonium safeguards and preservation of a free society. This makes the quality of public debates and legislative/regulatory decisions of exceptional importance.

Furthermore, even though courts may rule, sometimes reluctantly, that certain governmental or private actions do not violate the constitution, this does not mean that such measures are also wise policies for a democratic society. Courts only say what is the minimum that the constitution requires. This leaves entirely open for public debate and legislative judgment what further protections represent the best social policy to adopt.

## B. Projections of the Size of the Plutonium Recycle Industry

When the consideration of civil liberties and a plutonium industry entered what might be called its first phase, in 1974-76, both critics and supporters of plutonium recycle based their arguments on projections that envisaged a very large plutonium industry by the year 2000, and especially by 2020.

In 1976, the chairman of the Nuclear Regulatory Commission (NRC) said that 205 nuclear reactors burning recycled plutonium could be completed in the United States by 1985, if licensing went forward at that time. 1-/ By the year 2000, there were expected to be 2,000 nuclear reactors worldwide, producing and burning 2 million pounds of plutonium a year. ~/ The plutonium recycle industry was expected in these projections to reach maturity about the year 2020. Projections for that date assumed there would be some 60 fabricating plants and 2,000 reactors in the United States, with 100,000 shipments per year of special nuclear materials between fabricating plants, reprocessing plants, and storage sites. ~/ Workers and guards in the nuclear plants and those needed to transport and store plutonium were projected to constitute a plutonium work force of over 1 million persons in 2020.

These projections have been scaled downward sharply in the past year, reflecting a variety of factors. The following Table, drawn from the Final Generic Environmental Statement on the Use of Mixed Oxide Fuel (GESMO), indicates the current projections of components for a Light Water Reactor industry using uranium and plutonium recycle.

According to the GESMO assumptions, by the year 2000 there would be 507 light water reactors and 30 plants for fuel conversion, enrichment, fabrication, and reprocessing. The 1976 GESMO estimated that these facilities in the year 2000 would employ 27,000 people in the fuel cycle and 55,000

Table 1

## THE PROJECTED LWR INDUSTRY, 1980-2000\* WITH U AND Pu RECYCLE

<u>LWR Industry Components</u>	<u>Number of Facilities</u>		
	<u>1980</u>	<u>1990</u>	<u>2000</u>
LWR'S*	71	269	507
Mines**	416	1,856	4,125
Mills	21	56	77
UF6 Conversion Plants	2	4	5
Uranium Enrichment Plants	3	3	5
UO2 Fuel Fabrication Plants	6	6	7
Reprocessing Plants	1	3	5
MOX Plants	1	3	8
Federal Repositories for Storage	0	2	2
Plutonium Shipments in metric tons**	5 tons	273 tons	1,170 tons
Commercial Burial Grounds	6	6	11

---

\* From Table S-10 of Final GESMO NUREG-0002, Vol. 1 Summary.

\*\* From Page XI-35 of Final GESMO NUREG-0002.

people in the nuclear electrical production industry. Of these people, a maximum of 20,000 would be in positions that would require employee screening as currently used for security clearances, but perhaps only 13,000 would require such screening if the definition of sensitive positions was made on a restrictive basis.

As for the size of the employment force needed to transport special nuclear material between fabricating plant and reprocessing plant, and the safeguards problems such transportation would raise, this has become a matter of uncertainty rather than firm projection. If the decision were made to co-locate fabricating plants and reprocessing plants, this would eliminate the need for shipment off-site of pure plutonium. Coprecipitation of plutonium oxide and uranium oxide at the reprocessing plant would also eliminate transportation of pure plutonium.

Similar kinds of technological possibilities different than those currently being discussed are under consideration for dealing with storage of radioactive waste, including some that might reduce greatly the problem of safeguarding storage sites.

The basic point to draw from the 1976-77 revisions of earlier projections for a plutonium industry is that the size and distribution of such an industry is now seen as being much smaller than when the civil liberties impacts were first examined, and with several major technological aspects as yet uncertain or open to choice, rather than being technologically determined. How much this affects the essential civil liberties problems, and the main competing positions on these issues, will be discussed later.

## c. An Analysis of Likely Safeguards Measures and Their Civil Liberties Consequences

## 1. Current Safeguards Measures for Nuclear Powerplants

There are Federal laws that forbid the unauthorized possession of special nuclear material, or efforts to obtain it illegally.<sup>4/</sup> providing security against diversion, theft, or sabotage of special nuclear materials during production, transportation and storage has been part of military nuclear operations for three decades, and civilian reactor programs since 1957.<sup>5/</sup> Although the standards and procedures of safeguards programs have undergone significant changes in these decades, and particular threats have also shifted, the basic elements of nuclear safeguards programs have remained fairly constant. These involve techniques to safeguard sites from internal or external threats such as the following:<sup>6/</sup>

1. Personnel security: (Applies chiefly to the military programs):  
Investigation of persons applying for jobs handling nuclear material to assure their reliability and loyalty and monitoring their continued stability after employment.
2. Intrusion control: Protecting physical sites and transportation facilities from assault, theft or sabotage using a combination of guards, detection and alarm systems, and outside response forces.
3. Physical access controls: Limiting worker and visitor entry to persons with clearances and need-to-know-purposes, and setting special access controls for certain extra-sensitive locations within nuclear facilities.
4. Physical inspections and surveillance: Searching of persons and objects entering the facility to prevent the introduction of improper materials or removal of protected materials, and on-the-job physical surveillance techniques.
5. Materials accountability: Employing devices to measure, on a regular basis, the amount of nuclear materials present in operations or shipment, and to detect losses or unexplained shortages.

6. Preventive intelligence: Collecting intelligence about terrorist organizations, radical protest groups, criminal elements, and other potential assailants, to gain knowledge with which to forestall or be prepared for diversion attempts.

Current safeguards techniques also include security for transportation of special nuclear-material in special vehicles and under guard forces. Finally, there are diversion response plans for tracing, locating, and recovering nuclear materials that may be stolen surreptitiously or seized by force, or for responding to blackmail demands by successful diverters.

Protection of private power reactors proceeded in the 1950's and 60's from the awareness that most plants were using low-enriched nuclear materials that could not be used to make nuclear explosives. For those plants producing and storing plutonium, highly enriched uranium, and uranium 233, the growing awareness in the 1970's of threats from domestic or foreign terrorist groups, and several incidents or threats to nuclear plants, led to a major expansion of safeguards in 1974-76. However, the effectiveness of these measures has been criticized, and official safeguard requirements have recently been increased.<sup>7/</sup>

Much the same picture is involved in safeguarding worldwide nuclear power activities today. When the United States exports nuclear materials that could be diverted to produce explosives, it imposes physical security requirements on the recipient countries and has indicated that it uses team-inspections to assure that these are adequate.<sup>8/</sup> In addition, the International Atomic Energy Agency (IAEA) has a safeguards program based on deterrence of diversion and early detection of diversion attempts, with this program accepted by IAEA member States.<sup>9/</sup> The adequacy of both the U.S. and IAEA programs has also been criticized at recent Congressional hearings, and concerns have been expressed whether effective safeguards could be maintained in the expanded worldwide plutonium industry projected for the future.<sup>10/</sup>

## 2. Safeguards Measures for a Plutonium Industry

Both experience with the existing nuclear power industry and other high-security industries and Government activities indicate that the measures that would be designed to safeguard plutonium would not be unique. We use many of them today in safeguarding sensitive security areas (e.g., nuclear weapons sites, gold depositories, intelligence facilities): in safeguarding the transportation of dangerous or valuable objects (e.g., bank currency shipments, nerve gas, Secret Service protection of high Federal officials); and in locating dangerous objects or persons by search techniques (e.g., airport scanning for weapons, public health inspections or quarantines when epidemics threaten, customs searches for drugs or contraband).

Some commentators conclude, therefore, that plutonium safeguards differ primarily in degree rather than kind from a variety of high-security situations that we now have, and with which we have dealt without major harm to civil liberties. Others point to the extremely high level of harm that would be done to society if a nuclear diversion and explosion were successful (e.g., in numbers of deaths and long-term radiation effects) and to the immense public fears that even a blackmail threat would generate; they conclude that these risks are so great that a plutonium safeguards program would be different in kind, not merely degree; it would have to be far more intense, permanent, and subject more people inside plants and outside the industry to preventive and responsive intelligence than anything we have experienced previously.

Trying to particularize and, if possible, narrow this disagreement requires that we go more deeply into what safeguards would be necessary in a plutonium industry, especially in terms of the possible availability of measures--technological or administrative--that might lessen the scope of intrusiveness into citizen's rights.

Several points of agreement in the safeguards debate are important to note as a baseline for discussion:

a. There is general agreement that if plutonium recycle is initiated, there would be a genuine need for high-security measures. In other words, this

would not be an instance in which responsible critics would allege that there was no need for such measures, such as when critics denied the presence of any real security risk to justify passage of the Alien and Sedition Laws in the 1790's or the Palmer round-ups of aliens in the 1920's, or the Joseph McCarthy investigations of the 1950's.

b. There is general agreement also that there is no way to remove all possibilities of diversion by more humane, just, or effective social policies, and thereby obviate the need for high-security measures. In the debates over broad police powers of arrest, search, and seizure, for example, it is argued by some that we should work on the underlying problems that cause high crime--such as unemployment, racial discrimination, punishment of victimless crimes--rather than allow police to use intrusive or harsh techniques. In the case of potential threats against plutonium plants, there is general agreement that we have no real prospects in the foreseeable future of adopting national or international policies that would remove the causes of all political terrorism or of removing the causes of individual derangement or eliminating criminal organizations.

c. There is also general agreement that there is no complete technological solution available or foreseen that would make it unnecessary to have some safeguards measures that would affect civil liberties. Unlike the situation with machine scanners used in airport searches, which remove the necessity for hands-on searches of people and their property, safeguarding the physical sites and transportation routes in a plutonium industry, and especially recovering plutonium if it were diverted, would necessitate some measures that have potential for violating civil liberties. Just how many, and of what kind, represent the point at which informed debate begins.

One other important observation needs to be made. Our social values, political culture, and legal rules all combine to give us some common understanding about what is meant by "civil liberties," and we are often able to turn to the

courts to make authoritative rulings on what the Constitution requires. However, important as existing judicial decisions would be if and when plutonium safeguards measures were tested in the courts, or as policy guides to legislators and administrators setting up protections of civil liberties in a safeguards system, it would be a mistake to assume that the courts themselves would be quickly or easily available to correct any deficiencies in a program or protect individual rights. There are several reasons for this.

1. It is the nature of the American judicial process to require that claims of constitutional rights be determined in specific contexts, where the laws and regulations that have been established can be studied in detail, their application to real persons can be examined, and the surrounding ethos of an on-going program can be taken into account. Thus the U.S. Supreme Court does not issue advisory opinions on proposed or recently enacted laws; rather it requires real cases and controversies involving persons with proper standing to sue and genuine legal interests to assert. How the courts would assess the constitutionality of plutonium safeguards measures would thus depend heavily on how the programs were established, who ran them, what specific protections of individual rights were incorporated in them, how the programs were actually being administered, the circumstances under which a legal challenge to the program arose, and similar factors.

2. There are few decisions by the U.S. Supreme Court dealing directly with the constitutional aspects of personnel security, physical security, and preventive intelligence in the kind of clearly sensitive, high-security settings that plutonium safeguard programs present. There are a handful of decisions that approach the boundaries of this problem, such as rulings on standards and procedures in defense plant personnel clearance programs or in waterfront-security programs; presidential authority for warrantless wiretapping in domestic-security investigations; decisions dealing with physical searches in airports.<sup>11/</sup> Beyond these lie dozens of cases discussing principles of liberty and fair procedure in related but less high-sensitive settings; these cases provide judicial statements that can be analyzed for their

possible application as guides in the plutonium-safeguards context.<sup>12/</sup> But the primary fact is that existing judicial precedents offer only suggestive concepts to apply to the legal evaluation of plutonium safeguards measures,

3. Finally, American courts have a long history of deferring to the elected branches of government, particularly the executive branches when genuine national-security or public-safety interests are seen to be involved. This would be especially true as far as government's response to a diversion. If it were learned that plutonium had been stolen and was somewhere in the vicinity of a nuclear plant, or if a credible nuclear blackmail threat were made by a political or criminal organization, the dangers of such a situation would closely resemble a state of national emergency in which, traditionally, courts give the widest immediate deference to what executive officials feel it necessary to do to protect the public. Later, usually after a war or national emergency has ended, courts may try to adjudicate the rights and wrongs of a government policy, and perhaps award compensation to injured persons. But the ancient maxim--during wars, the laws are silent--reflects realistically what courts actually do when genuine national or local crises arise.

This does not mean that constitutional guarantees would not apply to a plutonium industry or that court rulings provide no help in considering civil liberties risks and options in the nuclear safeguards area. What it does suggest is that existing decisional law offers only broad (and sometimes cryptic) concepts from which to work in considering the high-security milieu of nuclear power activities.

With these initial observations made, let us turn to a closer examination of potential safeguards measures and their civil liberties consequences.\*

The safeguarding of any highly dangerous or valuable material can be posed in terms of four basic procedures. These are:

---

\*The following few pages depend heavily on J.N. O'Brien, "Nuclear Safeguards and Civil Liberties: A Regulatory Scheme," Working Title--Dissertation in progress, Social Science Department, Syracuse University.

o Employee Screening--These measures are designed to prevent employment in the industry of individuals who might be likely to use their position to steal or harm the materials to be protected.

o Access Controls--These are methods of physically preventing protected material from unauthorized removal.

o Threat Analysis--This covers activities aimed at obtaining advance knowledge of attempts to steal or harm protected material.

o Recovery--In the event that a quantity of protected material is missing, these are measures to locate and recover the material.

The specific measures that could reemployed in each of these areas are quite varied.

Those measures which may be used in employee screening are:

o Compulsory disclosure questionnaires, which would force an applicant to supply detailed information about her or himself.

o National agency checks, conducted to gather, and evaluate all the information as to suitability that the Government maintains on applicants or employees.

o Full Field Investigations, in which the character and associations of an applicant or employee are investigated by interviewing friends and associates and asking detailed questions regarding the applicant's background and lifestyle.

o Polygraph testing, where an employee or applicant may be asked a series of questions and the employee's physical responses are evaluated, in an effort to expose any contemplated theft or other threatening activity.

o Personality and psychological testing, which is used to identify employees or applicants who may be considered unstable enough to be compromised by outsiders or to undertake themselves a theft of protected material.

Measures which have been employed to maintain control over access to various types of valuable or hazardous material are:

- 0 Mechanical Detection, which entails a hands-off body search for various types of contraband (e.g., the magnetometer used in airports for detection of weapons).
- 0 Inspection of hand carried items into and out of areas containing protected material, which is employed to assure that no weapons, explosives, or contraband enter or leave the area authorized as proper for the material.
- 0 Identification checks, to maximize assurance that only those persons who have been screened are allowed access to the material.
- 0 On-the-job surveillance, audible or visual, directed at maintaining employee security when employees are handling protected materials.
- 0 Pat-down body searches (frisks), used to assure that an individual leaving or entering an area containing protected material is not carrying contraband.
- 0 Strip searches and body cavity searches, which are employed as a means of absolute assurance that no small quantities of valuable material are being transported out of the authorized areas.
- 0 Emergency responses to alarm warnings or material balance accounting insufficiencies, which may include detention, arrest, search, and interrogation of employees and visitors within the facility at the time of the emergency.

Those measures employed to give advance warning of a threat of theft or harm to protected materials by groups in the society at large are:

- o Overt intelligence techniques, which include name check, telephone record checks, credit checks, and other techniques used in investigating ordinary crime, applied to individuals or groups suspected by investigators of being potential assailants of plutonium facilities.
- o Covert intelligence techniques, which may include electronic surveillance, unauthorized or surreptitious entries, informants and agents in various organizations, and mail openings.

0 Creation of a special unit in an existing law enforcement agency or a separate special intelligence force.

In the event that plutonium is diverted, a recovery operation could conceivably include:

- o Perimeter searches aimed at cutting off routes by which protected material in a known area might be transported away. This search may be accomplished through mechanical detection, lessening the scope and degree of intrusion of the search.
- 0 Area searches conducted on large areas, possibly of residential character. These searches may be conducted, partially at least, by mechanical detectors so as to limit, to some degree, the scope and intrusion of the search.
- 0 Evacuation of areas in which a credible threat has been made to detonate a clandestine explosive device.
- 0 Restriction of population movement in the event of a crisis triggering a massive civilian retreat away from a threatened area.
- 0 Press censorship may be employed to minimize the effects terrorist activity seeks: public attention and alarm. Censorship may be contemplated on a voluntary basis or by law.
- 0 Harsh and unusual investigative techniques which may include measures ranging from a general round-up of those individuals suspected of being privy to information regarding the whereabouts of the missing material, to interrogation by torture of individuals who are believed to possess substantial information of the materials' whereabouts.

Some of those activities are mutually exclusive, in that the employment of one may eliminate the need for the other. In those instances, the least onerous alternative may represent a measure with little civil liberties damage. This is particularly true with respect to activities designed to detect or locate nuclear

material. For example, if a portal monitor (doorway with a radiologically sensitive alar@) is available which could with great certainty warn of unauthorized removal, then the need for a physical hands-on search would be eliminated.

These devices are available in some cases. The technology for detection of even small amounts of radioactive material has been developed and further advancements are likely. Freedom from unreasonable search and seizure is meant to prevent arbitrary and intrusive actions by Government officials. A method of mechanical detection is a reliable method of locating persons or places which should be searched, and a warning from a mechanical detection device represents the functional equivalent of probable cause. The result is that employees leaving a material-control access area in a plutonium reprocessing plant need not be searched any further, if they can pass through a portal monitor which is properly operating. Present nuclear safeguards have been directed at making the detection devices as fail safe as possible, and with high reliability. If a totally fail-safe portal monitor system could be developed, it would negate the need for hands-on body searches altogether.

The same type of situation exists in the event of a recovery operation. As a result of the weapons program, hand-held radiologically sensitive devices have been developed which, within a certain radius, can detect the presence of even well-shielded radioactive material. As the sensitivity and reliability of these devices increase, the intrusion necessary to assure that an area does not contain radioactive material decreases. In that sense, some technological solutions are available; current research may yield better solutions.

It is useful to note that different safeguards techniques present different levels of potential civil liberties harm. Some intrusions are not overly onerous when compared to intrusions already accepted by American society. An example already noted is the search conducted by mechanical hands-off devices. In airports, the increasing potential of skyjacking led to the need to assure that weapons were not being carried into the passenger compartment of commercial

aircraft. The magnetometer, which can detect a metallic mass such as a small handgun, is used to scan all passengers boarding the aircraft. The judiciary has found this to be an acceptably minimal invasion of privacy, given the serious threat of a successful skyjacking.

A safeguard activity of medium risk is the possibility of escalation of domestic intelligence activities in the interest of nuclear safeguards. The status of domestic security operations is currently unsettled. The recent study completed by the Senate Select Committee, charged with investigating domestic security, found numerous instances of sweeping and unjustified intelligence activity and abuse of lawful intelligence objectives during the past two decades; an absence of guiding standards to govern such activities and inadequate techniques for supervisory control. Some commentators have suggested that domestic intelligence activity for nuclear security may escalate to the same unacceptable levels that prevailed during the past twenty years. This represents the possibility of collecting extensive information, via such techniques as electronic surveillance, surreptitious entry, infiltrators and informants, as well as the creation of extensive files and databanks on anti-nuclear and dissident groups, not just declared terrorists. Whether such a phenomenon would be likely to take place is not clearly predicable, but the danger of it happening is sufficient to constitute a middle-level risk to civil liberties.

Finally, there are areas of concern which involve very high levels of risk. These are mainly in those activities which would result from a successful diversion of plutonium. The type of recovery operations which would follow such a diversion represent serious intrusions on civil liberties, and the likelihood of judicial intervention would be small. For example, if an area search were thought by responsible officials to be necessary, it is doubtful that the courts would interfere even though a sweeping area search represents an activity which is unlawful under current search and seizure doctrines. Although mechanical devices

are available which make it possible to scan a room in a dwelling and detect the presence of plutonium, even if shielded, this only reduces the scope of the search; house to house, room by room searches over wide areas would still be required.

Rather than go on further in this section about the risks, tradeoffs, and possibilities for civil liberties protection involved in specific safeguards measures, we will develop these discussions in the context of three main positions about plutonium and civil liberties that have developed during the debates of the past few years, since these positions frame the issues with valuable clarity.

D. A Presentation of Three Positions Widely Held in U.S. Society as to  
the Civil Liberties Risks of Plutonium Recycle

The positions described below have been constructed from an analysis of public statements made by civic groups and industry representatives, scientific and legal experts, executive-agency officials, members of Congress, and similar commentators. The sources for their statements have been books and articles, state and federal legislative hearings, conference papers and reports, and special consultant studies, all of which are set out in the Bibliography.

The approach was to identify what seemed to be the logical, alternative viewpoints that have been voiced in the recent debates. Then a single, coherent statement of each position's assumptions, arguments, and conclusions was developed. Despite the obvious usefulness of this exercise for policy-makers, no such analytic presentation of these viewpoints has appeared previously in the literature.

A. Position One: A Plutonium Economy Would Require Such Extensive Safeguards and Curtailment of Civil Liberties That Its Creation Would Jeopardize Our Free Society

The general theme of Position One is that the measures adequate to assure the safeguarding of a large-scale plutonium industry would, inevitably, require such severe intrusions into the civil liberties of employees and citizens that the maintenance of a plutonium economy is incompatible with the U.S. system of constitutional rights. In a phrase, plutonium would bring on a nuclear police state.

Position One begins with the following key assumptions:

1. The presence of millions of pounds of plutonium in reprocessing plants and in transit--when ten to twenty pounds would be enough to make a nuclear

device and with prevailing conditions of domestic and international terrorism--poses a situation so perilous to public safety that only a far-reaching, fail-safe type of safeguards program would be sufficient to protect the public. Therefore, the only kind of safeguards program to envisage, for purposes of considering civil liberties impact, is a far-reaching, fail-safe kind" of response. Government could do no less.

2. Despite decisions of the courts during the past decade setting important constitutional limits on personnel security programs, police intelligence operations, government search and seizure, and similar activities, the immense potential consequences of a nuclear diversion from inside or an assault from outside would probably lead the courts to uphold sweeping preventive measures for a plutonium industry. The courts would be even more likely to decline to interfere if government were taking Draconian measures in response to a blackmail threat or nuclear incident. This release of intelligence agencies and security investigators from constitutional limits would not only be harmful in itself but also be likely to stimulate surveillance and dossier-building in non-nuclear fields.

3. Even if a safeguards program were originally setup with strong civil liberties protections, written into legislation or set out by executive order, public reaction to thoroughly predictable incidents of diversion and blackmail, and certainly to any successful explosion, would probably lead to the dropping of such limitations and the adoption of a maximum security program. Thus no safeguards program can be expected to stay limited as a plutonium economy continues for any length of time.

4. There are special dangers to civil liberties in the fact that a plutonium safeguards program would be jointly administered by private industry and the federal government. Giving industrial security forces and corporate

managements a role in collecting data and managing security programs about employees, suspected assailants, and community anti-nuclear groups would be a major step backward in the development of good employer-employee, employer-union, and employer-community relations in this country.

5\* Given all of these likely consequences to basic liberties, and the fact that alternative energy sources such as coal or solar power require no such safeguards measures, government and private-industry proponents of plutonium recycle must prove to Congress and the public that no other energy sources or conservation programs can be developed to meet American energy needs, even at higher but not unbearable economic costs.

6. It is increasingly clear that opposition to the proliferation of nuclear weapons and nuclear power plants is becoming a broadly-based political movement in the United States, and many other Western nations. Its supporters run a gamut from left to conservative political views as well as including various environmental-protection positions. There are bound to be protest meetings, demonstrations, and possibly some direct-action tactics in the tradition of earlier ban-the-bomb, civil rights, and anti-war movements. Given this growing political movement, any choice of energy policy that creates highly visible targets for concern and protest in thousands of local communities and along hundreds of transportation routes will require harsh protective responses and produce serious confrontations. Not to see this conflict arising in the last decades of this century--and to try to avoid it if possible--would be to invite cleavages in our society.

Based on these key assumptions, advocates of Position One have warned that most of the intrusive kinds of safeguards will inevitably be used, that they cannot and will not be conducted in tolerable fashion, that we can expect no timely intervention by the courts, and, therefore, that plutonium

economy would mean unacceptable levels of surveillance and government control over free expression for people who would work in plutonium plants, reside in nearby communities, or exercise First Amendment rights of protest against plutonium.

This leads advocates of Position One to two conclusions:

1. Whatever the other objections might be, on civil liberties grounds alone, Congress should reject plutonium recycle as an energy policy and prevent the licensing of plutonium reprocessing plants for commercial use.

2. The United States should not export plutonium technology. Partly, this is to diminish the threat of plutonium diversions that might be smuggled by terrorists into this country and thus create the need for extensive customs-search procedures. It is also urged in order to avoid having the United States export a technology that would inhibit the evolution of greater civil liberties in developing nations.

One special outlook of Position One is important to note. Its advocates look at the future of safeguards in light of two critical events since World War II: the painful struggle to reverse the cold-war anti-communist hysteria of the 1940's and early 1950's and the set of executive misconducts that are now called by the shorthand of "Watergate".

They argue that any judgment of how carefully and responsibly a safeguards policy would be conducted over the next 25-50 years, and beyond, has to be considered in light of the fact that during the past 30 years, we have passed through two disturbing examples of abuse of government power. With this record, it is asked, why should a society that realizes how fragile freedoms are in this chilly authoritarian world want to create such dangerous tools to guard over the next half century?

Furthermore, advocates of Position One note a series of recent events involving the nuclear power industry which they see as demonstrating that abuses of individual rights have already begun to arise. They cite the creation of dossiers on anti-nuclear critics by the Texas State Police<sup>13</sup> and infiltration of anti-nuclear groups by police in Baltimore;<sup>14</sup> the compulsory polygraphing of employees at the Kerr-McGee nuclear fuel plant in Oklahoma, with questioning about employee memberships in a union, having sexual relations with fellow employees, and similar questions;<sup>15</sup> the efforts of Virginia Electric and Power Company to secure a bill from the state legislature giving its security force police-arrest powers and access to confidential police records, to meet the company's nuclear-security needs;<sup>16</sup> and allegations that local power companies and the national atomic industry association maintain files on anti-nuclear individuals and groups.<sup>17</sup> These are cited as events which foretell the kind of anti-libertarian atmospheres that plutonium protection would foster.

As for the consequences of not proceeding with plutonium recycle, those adopting Position One reject completely the argument that failure to proceed with a plutonium economy could lead to a severe energy shortage, increased unemployment, and widespread economic disruption; all of which would also bring serious civil liberties consequences. If rationing were necessary to enforce energy conservation, this is seen as not even approaching the curtailment of freedoms involved in plutonium safeguards. As for the dangers to civil liberties in a possible depression, Position One argues that this would still only cause temporary hardships involving civil liberties problems, and ones within the historical experience of this Nation several times before. According to Position One, there would be no comparison with the long-term system-transforming effects on civil liberties of a plutonium economy.

David Comey expressed the essence of Position One in this way:<sup>8</sup>

"The nuclear industry's favorite taunt to its critics is: 'Well, do you want to go back to candles?' That is hardly the choice we face, of course, but if it were, then I should rather read the Bill of Rights by candlelight than not have it to read at all."

B. Position Two: Safeguards Can be Adopted for a Plutonium Industry That Would be Both Effective Against Threats and Acceptable in Terms of Civil Liberties

Essentially, this position sees civil liberties problems as manageable ones and the predictions of an inevitable "nuclear police state" as unjustified hyperbole. In their view, safeguards measures must be strong but reasonable, with the necessity for what is adopted vigorously defended before Congress, the public, and the courts.

Position Two proceeds from the following primary assumptions:

1. Both military and commercial operators of nuclear facilities have been managing safeguards programs successfully for decades; adapting these to the new scope and requirements of a plutonium economy would therefore represent not a totally new venture but an expansion of present operations. What is done effectively in 60 plants can be accomplished in 500, just as what safeguards 200 shipments can also safeguard 20,000. The difference is one of degree, not of kind.

2. It is simply unacceptable for a large and strong society such as the United States to let potential threats from a few terrorists, criminals, or disturbed people deprive the American economy and the public of a badly needed energy supply in the next 50-100 years.

Nuclear power is economically competitive with other sources, capable of safe use, and environmentally sound, therefore the need to safeguard

nuclear power facilities is no more reason for rejecting nuclear power than allowing potential threats to close down natural gas facilities, city water reservoirs, subway systems, or other facilities that might be attacked with great harm to the public.

3. Whether the size of a plutonium work force would be 50,000 or several million, it is thoroughly justified to set initial personnel clearances and continued-suitability standards for persons who choose to apply for or work in that industry. This deprives no one of rights to pursue gainful employment, even in the nuclear field, as there will be many other nuclear research and operating facilities beside the commercial plutonium industry. Since there is no draft of persons to work in the plutonium industry, nor need there be any harmful consequences to persons denied a job in this industry (in a properly run program), it is no more justified to attack plutonium-industry clearance procedures as an unacceptable ban on individual rights than to do this for persons given suitability clearances today for working in the CIA, in top-secret defense production jobs, or as military personnel holding sensitive jobs at missile sites. The same justification of voluntary choice with advance knowledge applies to measures such as identification checks, screening parcels and people, administering polygraph examinations periodically, monitoring work stations by TV-camera, and conducting strip-searches if a diversion of materials has been detected.

4. The intrusions into personal liberties of workers, community residents, and diversion suspects that would take place should a diversion be detected or a nuclear blackmail threat be made--awesome as those situations are--are really no different than if nerve gas or highly-dangerous bacteriological agent were stolen from a civilian or military site, or a credible threat to use such substances were delivered to authorities. In all such cases, Preliminary investigation by professionals would establish the cred-

ibility of the danger, negotiations would be weighed, and a response pursued that would be appropriate to the situation. Harsh as it is to contemplate, there is simply no way a democratic society can eliminate the possibility of such episodes, even by abandoning plutonium recycle. The answer is neither surrendering to terrorists in advance nor installing a police state, but a concerted policy of prevention, deterrent, moral suasion, and particular response to specific incidents.

5. As for intelligence-gathering about potential diverters, there is a strong need for obtaining intelligence about terrorist organizations and other groups whose conduct indicates that they might use violence against nuclear facilities. However, this would not be done by any special nuclear intelligence force but by the FBI, operating under clear controls by the White House and with Congressional supervision. Legislation and regulations would spell out carefully the limits under which such intelligence programs would operate, both as to the range of groups on which data would be collected and the methods used to do so.

Based on these assumptions, Position Two reaches the following conclusions:

1. The United States should proceed with a plutonium licensing program, after full public participation in a rule-making proceeding, development of a set of safeguards requirements, and formulation of civil liberties principles under which the" safeguards program would operate.

2. The United States should also proceed with sales of plutonium recycle facilities abroad, under a safeguards program that would meet both U.S. and IAEA standards.

These conclusions are supported by the Ad Hoc Subcommittee to Review the National Breeder Reactor Program report of 1976, which stated: "The

suggestion that the imposition of appropriate safeguards measures for the nuclear fuel cycle threatens the civil liberties of the people of this or any other country does not appear to be warranted."lg

The mood of those championing this position was well expressed by Gerald K. Rhode, Vice President of Niagara Mohawk Power Corporation, at an Atomic Industrial Forum Conference on Nuclear Safeguards in April of 1976.20 Chairing a panel on "Safeguards Studies and Legislation," Rhode commented that, from "the user side of this business," he felt it essential that "every credible situation be guarded against and every reasonable precaution taken . . . ." He also agreed that "civil liberties are definitely involved" in the plutonium decision, and that "public review and involvement" in reaching decisions on plutonium "is an absolute necessity." However, he said, "there is a point of absurdity beyond which the rational public should not be expected to go in imagining safeguards hazards," by which he meant both security threats and civil liberties threats. "I am reminded," he observed, "of a young soldier who was placed on guard duty a number of years ago in an open field on the Kansas plains."

Soon after taking his post, he was visited by the lieutenant of the guard, who came by to check the effectiveness of this particular post. When the soldier had snapped to attention, the lieutenant asked him:

"What would you do if you suddenly saw a battleship coming across this field?"

The soldier thought for a moment, then brightened and replied:

"Sir, I would torpedo him."

"And where would you get the torpedo, soldier?"

"The same place you got your battleship, sir!"

In the view of the supporters of Position Two, Position One represents

an entirely unrealistic picture of how safeguards measures would be conducted. In their view, fully effective plutonium safeguards can be installed without imposing improper limitations on the rights of plutonium workers, community residents, or anti-nuclear critics.

As for the concern expressed by Position One, that the United States has passed through two disturbing examples of abuse of government power in the past 30 years, Position Two replies that the United States has come through these periods without lasting harm to civil liberties. This illustrates, according to Position Two, that the United States Constitution and social system have the strength and resiliency to cope with any civil liberties impacts a plutonium safeguards program might bring. Position Two also contends that the civil liberties impacts of major and prolonged energy shortages would be at least as far reaching as those of a program to safeguard plutonium recycle and breeders.

c. Position Three: An Acceptable Program of Nuclear Safeguards is Possible but Only if American Society is Willing to Run Some Permanent Risks of Diversion in Order to Keep Civil Liberties Risks at a Low Level

This position maintains that if a persuasive case for plutonium recycle is proven in terms of national energy needs, and if safety and environmental problems are met, then a safeguards program could be designed that would be acceptable in civil liberties terms if Congress and the American people are willing to live with some risks of diversion in the interest of limiting risks to freedom.

The assumptions that underlie this position can be summarized as follows:

1. To adopt a fail-safe or zero-risk approach to safeguards, or even to speak of holding threats to negligible proportions, is to insure that the civil liberties costs of such a program will be unbearably high. Once it is assumed that reducing threats to near zero is the objective, man-

agers of a safeguards program would be driven to adopt highly dangerous techniques of personnel security and preventive-intelligence.

2. Instead of this standard, Position Three urges adoption of a standard that would trade off some small risks of diversion against heavy risks to basic civil liberties.

3. This would mean deliberately rejecting some widely proposed techniques of personnel screening, employee monitoring, intelligence gathering on anti-nuclear groups, not merely because many of these techniques are of doubtful real value but because their civil liberties costs are too high. In balancing slightly greater risks of diversion against very heavy risks to basic freedoms, the decision would have to be made to protect freedoms.

4. For plutonium recycle to go forward, such a set of fully-articulated tradeoffs would have to be set out as the philosophy of a safeguards program, tested before the public in a variety of hearings and proceedings, be fully accepted by the commercial firms and government regulatory agencies most directly concerned, be written explicitly into legislation and implementing regulations, be subjected to firm annual reporting duties and legislative reviews, and have procedures created for both administrative appeals and judicial review. Only if the accepted risks and tradeoffs were developed and institutionalized in this way should plutonium recycle be allowed to go forward.

5. It would be especially important to a proper safeguards program that the Nuclear Regulatory Commission not simply turn over to the discretion of the FBI the conduct of preventive intelligence for plutonium security,

or leave the decision-making responsibility in a recovery effort or diversion response to ad hoc developments among federal, state, and local officials. These activities, because they are among the most important for civil liberties, should be defined and supervised by the NRC, possibly with a Congressional oversight role.

6. Holding to this line would involve reaffirming the bargain year after year and decade after decade, especially in the face of predictable low-level incidents (see Appendix III-A) and possible serious incidents. This would mean that the American public would have to hold the line of moderation, refusing to let itself be stampeded by demagogues and forcing sufficient public supervision to prevent the program being subverted by secret-government.

Based on these assumptions, Position Three draws the following policy conclusions:

1. Congress should go forward with a full-dress review of the need to have plutonium recycle and breeders to meet America's future energy needs, and of whether this process can be made environmentally and physically safe. If the answer to these inquiries is yes, then Congress should receive from the NRC a fully-worked out plan for safeguards, which then would be publicly reviewed and implemented in the manner described earlier (paragraph 4).

2. There is no automatic judgment in Position Three as to plutonium export policies by the United States, nor has this been addressed in the literature thus far produced in support of a civil-liberties-acceptable domestic safeguards program. Certainly the risk of plutonium being diverted in another country and brought into the United States is a serious one, and it does not appear feasible to apply border control search measures to prevent this, even if the authorities knew that a diversion had taken

place and an effort to smuggle it into the U.S. would be made. still, most advocates of this position would probably assume that other democratic nations could and would adopt the same freedom-respecting programs as we would, and that developing nations should be given the chance to have the energy technology they wish.

To see how this third position would go about fashioning a safeguards program, it is worth quoting in some detail from a report to the Nuclear Regulatory Commission by attorneys Timothy Dyk, Daniel Marcus, and William Kolasky, Jr. As their basic standard, they urged the Commission to adopt a "least restrictive alternative" test for each component of a safeguards program. 21

We think it vital that such a "least restrictive alternative" approach be the keystone of the NRC's approach to the selection and shaping of safeguards measures. In approaching a particular safeguards problem, the Commission should evaluate the impact on civil liberties of each of the ways of solving that problem. The factors to be considered in evaluating the impact of various safeguards measures on civil liberties should include the following: (1) the extent of the intrusion on personal liberties; (2) the frequency and pervasiveness of the intrusion on civil liberties (Will it be part of a daily routine or will it only occasionally be employed? Will its effects be temporary and limited or long-lasting?); (3) the number and types of individuals affected (employees in nuclear plants; members of suspected terrorist organizations or dissident groups; "innocent" members of the public); (4) the likelihood that a particular safeguards measure will actually be employed; and (5) the likelihood that the same or similar invasions of civil liberties will take place even if the safeguards measure under consideration is not employed.

Where resolution of a safeguards problem involves a significant impact on civil liberties, the NRC should choose the method that has the least impact, even if that method is more costly or less efficient. To take a simplified example: physical body searches and mechanical detection techniques (such as those commonly employed in airports) both have an impact on civil liberties, in terms of invading privacy, restricting freedom of movement, and raising questions of reasonable search. But the physical body search clearly has a much more severe impact on individual privacy, and few would dispute that the mechanical

detection procedure is preferable even if more costly. On the other hand, if mechanical detection methods are far less effective than body searches, a substantial question would be presented as to whether they are a reasonable alternative safeguards measure.

By the same token, as to each alternate safeguards measure the question should be asked: how can any necessary intrusion on a civil liberties interest be minimized or mitigated, and "how can abuses be guarded against? There are a number of familiar procedural protections and checks and balances that can be incorporated into various safeguards measures in advance: issuance of a warrant based on a probable cause showing before a home is searched or a phone tapped; providing a right to counsel during interrogation; conducting a hearing before denying or revoking a security clearance. Incorporation of such protections will not eliminate the intrusion on individual privacy or other personal rights and interests. But it can restrict the intrusion and give some assurance that governmental (or government-sanctioned) power will not be abused.

The same type of "least restrictive" alternative analysis should be applied across various areas of the safeguards system--physical security of facilities; personnel reliability; surveillance of potential thieves and saboteurs; and reaction and recovery plans. In fashioning a total safeguards program which will inevitably interfere with civil liberties in a number of areas, consideration should be given to whether the adoption of measures in one area with a certain cost in terms of civil liberties will obviate the need for adoption of more onerous or objectionable means in other areas. For example, should it prove feasible to require licensees to adopt "real time" inventory procedures that would make it possible to know at the end of each work shift whether any SNM was unaccounted for, it might be possible to dispense with routine searches of employees as they leave work. The more sophisticated inventory system would itself raise civil liberties problems--for example, detention of all employees on a shift pending resolution of accounting discrepancies and interrogation of employees about those discrepancies. But a decision-maker might conclude that the occasional intrusions on employee freedom resulting from such an accounting system were less restrictive and objectionable than a daily search procedure. On a broader scale, an extremely tight and effective facility security system might obviate the need for background investigations or psychological testing of employees. One might decide to tolerate greater intrusions on personal freedom at the working site if the far-ranging invasion of privacy and chilling impact on political freedom involved in a security clearance system could be largely or entirely avoided.

In sum, the NRC'S effort should be to design a safeguards system that, in toto, has the smallest impact on civil liberties

consistent with the achievement of safeguards goals. Once that has been done, the Commission will be in a position to evaluate the benefit of authorizing new technologies such as plutonium recycling against that civil liberties cost (as well as other costs). Civil liberties, then, should enter into the NRC's decisionmaking both in designing particular safeguards measures and in reaching a decision on the basic issue of whether to proceed with the development of a new technology that will require the imposition of those safeguards. And in factoring civil liberties considerations into its deliberations, the Commission should be asking not only, What can we do?, but also, What should we do?

There are similar discussions of security-liberty tradeoffs in reports by Baron, Clune, and Wyle, with each insisting, as the essence of Position Three, that plutonium recycle should proceed only if some safeguards for high-security situations are willingly relinquished in the interest of preserving basic freedoms.\*

---

\*Thus far, the American Civil Liberties Union has not taken an official Position One stand on plutonium recycle. A recent ACLU report noted: "The Washington office has intervened in a Nuclear Regulatory Commission proceeding concerning the security measures that may be required to safeguard nuclear plants fueled by plutonium. The ACLU is arguing that recycling of plutonium should not be permitted without a full study and public airing of its impact on civil liberties, and contends that the practice should be barred if the requisite safeguards--such as stricter security clearance measures, expanded police powers to search for missing plutonium and surveillance of potential terrorists--would violate constitutional rights." ACLU Activity Report, October-December, 1976, page 1.

## E. Observations and Comments on the Three Positions

At the outset, it is fair to note that the effort to isolate the key differences among the major discussants has produced some rigidity in the statement of premises and conclusions. Someone may share a premise or even several premises of one position yet not feel compelled to reach the same conclusion that the advocates cited as holding that position have reached.

For example, a person may believe that our experience in the civilian and military nuclear programs provides important insights without believing that it provides definitive answers to the civil liberties questions, a stated assumption of Position Two. Or a person may believe that the voluntary nature of employment in a plutonium industry justifies personnel clearances without concluding that it justifies more intrusive techniques, such as polygraph examinations.

Also the differences between Position One (which would forego plutonium recycle because of civil liberties concerns) and the other two positions (which would go forward with plutonium recycle with steps to solve civil liberties problems) are clearly more marked than the differences between Positions Two and Three. Both Positions Two and Three recognize some civil liberties risks, believe these risks should be minimized, are willing to accept some security risks, and believe in balancing the conflicting interests. As a result, an individual's viewpoint might include some aspects of both positions. Having recognized this, let us turn to a closer analysis of the assumptions and conclusions of the three viewpoints.

One problem with the plutonium dilemma is that each of the three positions outlined is partially right.

--Position One points correctly to the dangers of so much plutonium being handled in a world of terror and mishap; the pressure this could

create from the public to use Draconian safeguards measures; and the remarkably optimistic assumptions as to unbroken national responsibility and moderation on which both Positions Two and Three rest their faith.

--Position Two reminds us that the year 2020 is not coming immediately; that a plutonium industry would develop slowly and could therefore be safeguarded step by step, modifying the technology, physical locations, plant design, shipment procedures, and many other elements as it went along; and that safeguards techniques could be installed in equally evolutionary and self-correcting fashion.

--Position Three is persuasive in suggesting that it has been a traditional feature of American pragmatism to resist either-or choices, and to seek ways to trade off one set of risks against another in a way that preserves important values of both liberty and order. By taking relatively minor risks of diversion, using all the mechanical and technological means available and going to hardened site, the necessity of using harshly intrusive employee security and potential-group surveillance could be avoided.

Though there are persuasive elements in each position, it is equally helpful to examine what are the weak points, or points of uncertainty, in the three main positions.

The extent to which the concerns expressed Position One are realistic is dependent to some degree on the specific details of the safeguards and security measures used by a plutonium industry. For example, the concerns about diversion during transportation of special nuclear material would be greatly reduced if collocation of fuel reprocessing and fuel fabrication facilities or coprocessing (without collocation) completely eliminated transportation of weapons material. Secondly, concerns about assaults by outsiders would diminish if facilities containing special nuclear material were convincingly designed to prevent removal of weapons material by a large, heavily armed band.

Such successful perimeter defenses for colocated facilities would probably reduce or eliminate the need for off-site security measures such as surveillance and dossier-building on members of the public. In effect, the industry's attitude would be "We don't care what plans outside groups are making; we can withstand anything they come up with."

If the number of people in the plutonium industry who would be subjected to full field investigations of their backgrounds, and would be subjected from time to time to such measures as physical searches and surveillance were very limited in number (to a few thousand), the civil liberties infringements involved would not be significantly greater than presently exists in the defense industry or other sensitive private activities. It is not clear, however, what number of persons must be affected in order to reach a point of civil liberties concern; some people might regard 10,000 as an acceptable upper limit for such intensive security measures; others might accept higher numbers.

The assurances contained in Position Two would be disputed by many knowledgeable persons. It is not certain that the past and present safeguards system has been totally successful. The very large amounts of Material Unaccounted For leave open the possibility that diversions have already taken place over the past 20 years.

It is not clear that Position Two is correct in saying that an expanded plutonium industry merely represents a difference in degree, not in type. In cases where plutonium facility becomes a major employer (or the dominant employer) in a community, there is less freedom of choice for residents as to whether they succede to the security restrictions or refuse to work at the facility. In small rural communities the company town syndrome may appear, making it difficult for employees to resist extensive security measures.

Position Three is not without its conceptual shortcomings as well. Past experience with security officers makes many persons dubious about the possibility of containing a security program to least restrictive security procedures. Security personnel are prone to seek tighter measures, regardless of civil liberties implications. They tend to gravitate toward easy or fool-proof techniques that invariably involve infringement on civil liberties. Moreover, even with tight internal security and strong perimeter defenses, it is likely that security personnel would keep pushing for positive intelligence (e.g. surveillance, informers) about potential attackers or critics. The nature of security officers is to want to reduce all risks to negligible proportions, which contradicts the assumptions of Position Three.

It has been hypothesized by some proponents of Position Three that addition of ombudsmen or public advocates to the system would protect against unwarranted security intrusions. Such an ombudsman would act as a third party to restrain security or prosecutors when they sought judicial approval for search warrants, surveillance or surreptitious entry. Yet there is a danger that constant proximity to such processes may render the ombudsman too sensitive to the needs of the security forces so that she or he becomes part of a triumvirate (including the prosecutor and judge) that authorizes the infringements of civil liberties. Our experience with seeing regulators over-sensitized to the interests of the regulated should teach us that it is a basic phenomenon of human nature to become sympathetic to persons with whom one associates constantly.

It could also be said that Position Three assumes a greater degree of rationality than has yet been observed in the nuclear regulatory area or any other government agency. The procedural, legislative and administrative arrangements necessary may be beyond realistic implementation by Congress, agency officials, and management of industry.

Finally, Position Three may be ignoring the backlash effect that would occur if a successful diversion resulted in a major threat or actual casualties. It is not clear that the original limited safeguards system contemplated by Position Three would survive the pressures of an outraged public determined to prevent any further incidents. Indeed, it could be argued that to the extent one limits the original problem, one is increasing the risk of an incident, and this will ensure that such a backlash will eventually occur. On the other hand, a maximum safeguards program such as is contemplated by Position Two may preclude any incidents from occurring, but result in the same degree of infringement of civil liberties as would occur if an incident took place as a result of a limited program under Position Three.

In trying to decide which one or combination of these views is more right and therefore should be used in policy-making, we should recognize that we do not have here a problem that can be put to the tests of either logic or empirical investigation. There is no way we could lay out a set of factual questions to be answered by research, or to design a pilot program from whose results clear guidelines for decision could be plotted. The reality is that each of these positions rests, fundamentally, on socio-political judgments as to how American government and public opinion have dealt in the past with threats to national security (real or assumed) ; how government and commercial security forces would be likely to carry out a safeguards program, even one that was highly respectful of civil liberties in its formal framework; how much privacy, dissent, protest, and cultural diversity our civil liberties traditions demand or our society should encourage; and how the American public would probably respond to diversions, blackmail threats, or a nuclear explosion, in terms of its shocked post-incident attitudes toward the scope of safeguards measures.

We also have no real guide to decision in the way that other industrialized

democracies are dealing with the plutonium recycle issue. Inquiries made for this report in Canada disclosed that there has been no government inquiry or public debate as yet about the civil liberties aspects of nuclear power, though several environmental and civil liberties groups expect to raise this issue soon.<sup>22</sup>

In Britain the debate over plutonium and civil liberties is in almost exactly the same stage as in this country. Britain has been actively pursuing plutonium recycle during the past decade, with a government-sponsored program planned to move toward large-scale uses in the next 25-50 years very much like those projected by the AEC for the United States. However, a recent report of the Royal Commission on Environmental Pollution (the Flowers Committee) raised serious questions about the safety risks, environmental effects, and civil liberties dangers associated with nuclear power development.<sup>23</sup> On this last issue, the Flowers Report wrote:<sup>24</sup>

The problems of safeguarding society against these hazards could become formidable in a "plutonium economy". There are particular risks during transport of the element between nuclear installations, although techniques could be adopted to make access to the plutonium both dangerous and difficult. There is also, however, the risk of theft of plutonium by direct action at installations where it is stored or by people working in the industry. Of course, many measures are taken to prevent this but it cannot be entirely ruled out. In order to counteract these risks, some people foresee the need for the creation of special security organisations which, because of the vast potential consequences of plutonium loss, would need to exercise unprecedented thoroughness and vigilance to safeguard the material while significant quantities remained on the earth in accessible form...

Many people are concerned about the implications for society of the security arrangements that might become necessary in plutonium economy. An effective security organization could not be merely passive, simply reacting to events. It would need to have an active role (as was recommended for the USA in the Rosenbaum report; that is, to infiltrate potentially dangerous organizations, monitor the activities of nuclear employees and members of the public and, generally, carry out clandestine operations,

It would also need to have powers of search and powers to clear whole areas in an emergency. Such operations might need to be conducted on a scale greatly exceeding what would otherwise be required on grounds of national security in democratic countries. The fear is expressed that adequate security against nuclear threats will be obtained only at the price of gradual but inexorable infringements of personal freedom.

We are sufficiently persuaded by the dangers of a plutonium economy that we regard this as a central issue in the debate over the future of nuclear power. We believe that we should not rely for something as basic as energy on a process that produces such hazardous substances as plutonium unless we are convinced that there is no reasonably certain economic alternative.

Last October, this position was taken up in greater detail in a booklet published by three organizations: Friends of the Earth, the National Council for the protection of Rural England, and the National Council for Civil Liberties. Titled Nuclear Prospects: A comment on the Individual, the State, and Nuclear Power, this booklet explored in detail all the civil liberties problems that safeguarding a British nuclear power program would entail. Given the wide powers of government secrecy, government controls over the press, and strong police emergency powers that British law and tradition support, the authors of the study conclude that the British nuclear power program presents grave threats to British freedom and is "bound to produce serious civil disorder". However, these groups did not adopt a ban-recycle-now position (Position One in the American debate). Instead, they called on the government to address these issues in public proceedings:

An over-riding characteristic of the recent nuclear debate has been the insistence of those committed to the nuclear option that the issues at stake are essentially technical. However, the matters discussed in this paper are not the province of experts. They are properly the concern of all of us.

Any commitment to a new technology gives rise to social and political side effects. In our view this may prove truer of nuclear power than of most technologies. Moreover, the time to anticipate these side effects is now, before a full commitment to deploy the technology has been made. The scale of

Britain's contemplated commitment to nuclear power is so great that a decision to proceed could well be irreversible.

Our survey makes no claim to being complete, nor does it pretend to answer the range of questions it raises. However, there is little in the public record to suggest that the Government, poised to vault us into a nuclear future has addressed itself to these questions in any but the most superficial way. We hope very much it will begin to do so now.

As these British commentaries (and others listed in the Bibliography, Section E) indicate precisely the same technical and socio-political issues are now being put to Parliament and the British public as Congress and the American public must decide. There is support in British government documents, parliamentary reports, commercial industry materials, and civic-group literature for each of the three positions competing on the American scene.

One other observation should be made, this one dealing with the capacity of the United States to police the adequacy of safeguards in other nations that might possess plutonium technology. Beyond the issue of whether we could have sufficient continuing powers of inspection to guarantee the internal measures against diversion or the physical security of facilities against attack, it seems doubtful that we could exercise many controls over the civil liberties dimensions of such foreign nuclear industries. Neither we nor the IAEA could reasonably expect such nations to allow monitoring of the way they conduct their employee screening and stability-monitoring programs, especially to let outsiders exercise any control over the criteria they used as to loyalty and disloyalty to the country or regime. Outside authorities could not reasonably expect to have supervisory authority over the way that nations's intelligence agencies carried out surveillance of potential terrorist and radical groups, or political dissenters, within that country. Finally, if a diversion were suspected or established, any nation would insist upon entire freedom of

action in determining how its security forces would respond. Thus it is **clear** that whatever supervision of physical security measures might be imposed and monitored bilaterally or by international agency, the civil liberties **fallouts** from a plutonium industry would be beyond such external influence.

The task that faces Congress in trying to control nuclear proliferation including the decision whether creation of U.S. plutonium industry at home or export of such technology abroad will increase the dangers of such proliferation, **is** an extraordinarily important choice. What this report has discussed is implications for civil liberties in what we decide, how we proceed, initially if we do license plutonium recycle, and how we police the boundaries and operations of a safeguards system throughout **its** course.

Ultimately, it would seem necessary for the U.S. to make its decision on a total package basis, not on the civil liberties considerations alone. To put this more clearly, Position One becomes harder to maintain if the case **is** made out that pursuing some plutonium recycle is essential for the energy needs and national independence of American society. Were that case made out in a public proceeding, there would still remain important issues of how large a plutonium industry needed to be, and how it might be located and used. These matters, as we have seen, would have important implications for safeguards and civil liberties impacts.

The single most important conclusion suggested **by** this **review** is that, if a plutonium industry as described in Table I were to be pursued in the near future, steady attention would need to be paid by Congress, the executive agencies, public-interest groups, and the courts to the way in which safeguards are defined, administered, monitored, and reviewed. Keeping such a plutonium safeguards program consistent with civil liberties would become one of the most important, continuing tasks of all those who cherish American freedom.

F O O T N O T E S

Footnote citations are keyed to the Bibliography, which follows this section. Unless otherwise cited in full, reference numbers presented here with a # before them refer to the numbered items cited in full in the Bibliography.

1. Testimony of William Anders, Chairman, U.S. Nuclear Regulatory Commission, in House hearings, #56, Volume I, 66.
2. Statement of Senator Ribicoff, in Senate Hearings #4, page 763.
3. Atomic Energy Commission, Proposed Final Environmental Statement for the Liquid Metal Fast Breeder Reactor Program, WASH--1535, (December, 1974).
4. #51, pages 20-21.
5. For a discussion of these existing safeguards from a variety of perspectives, see the AIF Orlando Conference Report, #28.
6. Ibid.
7. See the testimony of witnesses Theodore Taylor, Eldon Greenberg, Herbert Brown, and Herbert Scoville, Jr., and the safeguards program discussions, in the 1976 Senate hearings, #4, and of witnesses Thomas B. Cochran, David F. Ford, Senator Mike Gravel, Ralph Nader, J.G. Spaeth, and Theodore Taylor, in the 1975 House hearing, #56.
8. Testimony of Alfred Starbird, Assistant Administrator for National Security, Energy Research and Development Agency, in 1976 Senate hearing, #4, at page 407.
9. Ibid, 408-411.
10. See note 7.
11. These are discussed in the items listed in Section C of the Bibliography.
12. Ibid.
13. Described in #78.
14. Ibid.

- 15\* Ibid; Gravel, #69.
16. Described in #78.
17. Ibid.
18. Comey, #3.
19. McCormack, #25.
20. In #28.
21. Dyk, Marcus, and Kolasky, #68.
22. Communications to Alan F. Westin from Canadian Environmental Law Association, Canadian Civil Liberties Association, Probe, and Canadian Institute of International Affairs, January, 1977.
23. Flowers Committee, #80.
24. Ibid, at 81-82.

Bibliography

## A. General Background on Nuclear Power and Proliferation.

1. Alexander, Tom. Our Costly Losing Battle Against Nuclear Proliferation. Fortune, v. 92, Dec. 1975, 143-146.
2. 2. Steven J. Commercial Nuclear Power and Nuclear Proliferation. (Ithaca, N.Y.) Cornell University Peace Studies Program, 1975. 66 p. (Occasional Paper No. 5). Brookhaven National Laboratory. IAEA costs and manpower requirements under NPT. Prepared for the Office of Safeguards and Materials Management, U.S. Atomic Energy Commission, Upton, New York, 1970.
3. Comey, David Dinsmore, "The Perfect Trojan Horse," Bulletin of the Atomic Scientists, June, 1976.
4. 4. Committee on Government Operations, U.S. Senate, Hearings on the Export Reorganization Act of 1976, 94th Congress, 2nd Session, Jan. 19, 20, 29, 30 and March 9, 1976, especially testimony of Eldon V.C. Greenberg, National Resources Defense Council; Myron Kratzer, Acting Assistant Secretary of State; Alfred D. Starbird, Acting Administrator for National Security, U.S. Energy Research and Development Administration; Dr. Fred C. Ikle, Director, U.S. Arms Control and Disarmament Agency; Victor Gilinsky, Commissioner, Nuclear Regulatory Commission, George Stathakis, Vice President, General Electric Co., Nuclear Energy Division; David Lillienthal, and Hans Bethe.
5. Commoner, Barry, The Poverty Of Power: Energy and the Economic Crisis (N.Y. : A.A. Knopf, 1976) , 82-120.
6. Dunn, Lewis A. and Kahn, Herman, Trends in Nuclear Proliferation (Hudson Institute, May 15, 1976) , Report Prepared for the U.S. Arms Control and Disarmament Agency.
7. 7. Energy Research and Development Administration, Final Environmental Statement: U.S. Nuclear Power Export Activities, April, 1976, especially Section 6, Safeguards and Physical Security and Section 7, Social and Other Impacts.
8. Epstein, William, The Proliferation of Nuclear Weapons, Scientific American, v. 232, April 1975: 18-33.
9. Feld, Bernard T., "The Menace of a Fission Power Economy." Science and Public Affairs, v. 30, April 1974: 32-34.
10. Ford, D.F. et al. The Nuclear Cycle: A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power, Cambridge, Mass., 1974.
11. Ford Foundation Energy Policy Project, A Time to Choose (Cambridge: Ballenger Press, 1974. )
12. Geesaman, Donald P. and Abrahamson, Dean E., "The Dill- of Fission Power," Bulletin of the Atomic Scientists, November, 1974.

13. Geyer, Alan. "The Nuclear Question Explodes;" Worldview, v. 8, Sept. 1975: 27-32.
14. Hans Bethe, et al. , "No Alternative to Nuclear Power," Bulletin of the Atomic Scientists, March, 1975.
15. Lindsey, George. "How Dangerous is Nuclear Proliferation," Background Paper for Canadian Seminar on Nuclear Proliferation, Trinity College, Toronto, February 7-9, 1975.
16. Mintz, Morton and Cohen, Jerry s., "Nuclear Power: 'The Faustian Bargain,'" Chapter 42, Power, Inc. : Public and Private Rulers and How to Make Them Accountable (N. Y. : Viking, 1976) .
17. Novick, Sheldon, The Electric War: The Fight Over Nuclear Power, (San Francisco: Sierra Club Books, 1976) .
18. "Nuclear Power Struggle Hits Critical Stage," Conservation Foundation Letter, March-April, 1976,
19. Redford, Robert W. Problems of Nuclear Proliferation, Canadian Institute of International Affairs, May, 1975.
20. Ross, Leonard, "How 'Atoms for Peace' Became Bombs for Sale," N.Y. Times Magazine, December 5, 1976.
21. Rowen, Henry S. and Jones, Gregory, Influencing the Nuclear Technology Choices of Other Countries: The Key Role of fuel Recycling in the U.S. (Los Angeles: Pan Heuristics, August 6, 1976).
22. Speth, J. Gustav, Tamplin, Arthur R., and Cochran, Thomas B., "Plutonium Recycle: The Fateful Step," Bulletin of the Atomic Scientists, November, 1974.
23. Stockholm International Peace Research Institute, Nuclear Proliferation Problems (Stockholm, 1974).
24. U.S. Congress, Senate. Committee on Banking, Housing, and Urban Affairs. Subcommittee on International Finance. Exports of Nuclear Materials and Technology. Hearings, 93d Congress, 2d Session. July 12 and 15, 1974. Washington, U.S. Gov't. Print. Off., 1974,
25. U.S. Congress. Joint Committee on Atomic Energy. Ad Hoc Subcommittee to Review the Liquid Metal Fast Breeder Reactor Program. Review of the National Breeder Reactor Program. 94th Congress, 2nd Session, January 30, 1976
26. Weinberg, Alvin, "Social Institutions and Nuclear Energy," Science, July 7, 1972.
27. Wohlstetter, Albert, et al., Moving Toward Life in a Nuclear Armed Crowd? (Los Angeles: Pan Heuristics, 1976).

28. Atomic Industrial Forum, Program Report: Conference on Nuclear Safeguards, Orlando, Florida, April 11-14, 1976 (AIF, Inc., 7101 Wisconsin Avenue, Washington, D.C., 20014) , especially Barton, John H., "The Societal Impact of Safeguards" and conference discussions on this.
29. Atomic Industrial Forum, Technical Options for plutonium Safeguards, A Report of a Forum Study Group on Fuel Cycle safeguards (1975?).
30. Bennett, Carl A., William M. Murphey, and Theodore S. Sherr. "Societal Risk Approach to Safeguards Design and Evaluation." (Washington, U.S. ERDA) 1975, (ERDA-7) .
31. Brennan, C.D. et al. "The Threat to Licenses Nuclear Facilities." (Washington, The Mitre Corporation. 1975. ) (MTR-7022)
32. Buchanan, J.R. , ed. "Safeguards Against the Theft or Diversion of Nuclear Materials" Nuclear Safety, v. 15, Sept.-Oct. 1974: 513-519.
33. Cohen, Bernard, "The Potentialities of Terrorism," Bulletin of the Atomic Scientists, June, 1976.
34. Comptroller General of the U.S., Role of the International Atomic Energy Agency in Safeguarding Nuclear Material, Report to the Committee on International Relations, House of Representatives, July 3, 1975.
35. Curray, Robert B. "Plutonium Safeguards and Physical Security," Remarks before the Atomic Industrial Forum Topical Conference Kansas City, March 6, 1975.
36. De Nike, L. Douglas. "Radioactive Malevolence," Science and Public Affairs, Feb. 1974: 16-20; "Nuclear Terror," Sierra Club Bulletin, v. 60, November/December 1975: 9-13.
37. Dukart, Joseph M. "Atoms on the Move: Transporting Nuclear Material," Washington, U.S. Energy Research and Development Administration, 1975.
38. General Accounting Office, Improvements Needed in the Program for the Protection of Special Nuclear Material, November 7, 1973.
39. Gillette, Robert, "Nuclear Safety," Science, September 1, 8, 15, and 22, 1972; "Nuclear Safeguards: Holes in the Fences," Science, v. 182, Dec. 14, 1973: 1112-1114.
40. "Industry Inundated by Proposed New Safeguards Rules." Nuclear Industry, Feb. 1973: 45-47.
41. Ingram, Timothy H. "Nuclear Hijacking:" Now Within the Grasp of Any Bright Lunatic;' Washington Monthly, Jan. 1973: 20-28.
42. Inman, Guy. Research and Safeguards. Washington: U.S. Atomic Energy Commission 1968.

43. Jacobs, Paul. "What You Don't know May Hurt You: The Dangerous Business of Nuclear Exports," Mother Jones, v. 1, February/March 1976: 35-39.
44. Jenkins, Brian, "Will Terrorists Go Nuclear?" Santa Monica, California seminar on Arms Control and Foreign Policy, 1975. (Discussion Paper no. 64) .
45. E.R. Johnson Associates, Inc. , An Upper Estimate of Safeguards for Handling Plutonium, Report prepared for Atomic Industrial Form, July 21, 1975.
46. Karber, P.A. et al. Analysis of the Terrorist Threat to the Commercial Nuclear Industry; Summary of Findings. Vienna, Virginia, BDM Corporation, 1975. 98 p. (Draft Working Paper B); Analysis of the Terrorist Threat to the Commercial Nuclear Industry; supporting appendices. Vienna, Virginia BDM Corporation, 1975. Various pagings. (Draft Working Paper C).
47. Kinderman, E.M. Plutonium: Home Made Bombs? Presented at the Conference on Nuclear Public Information, organized by the Atomic Industrial Forum, March 5-8, 1972,
48. Krieger, David. "Terrorists and Nuclear Technology," Bulletin of Atomic Scientists, v. 31, June 1975: 28-34.
49. Kriegsman, William E. Safeguards Objectives and Regulations in Perspective. Remarks before the Atomic Industrial Forum Topical Conference. New Orleans, March 20, 1974.
50. Lapp, Ralph E. "The Ultimate Blackmail," New York Times Magazine, February 4, 1973: 13, 29-30, 33-34.
51. Laws and Regulations Governing Nuclear Exports and Domestic and International Nuclear Safeguards: Message and Accompanying Papers from the President of the United States, House Document No. 94-131, 94th Congress, 1st Session, May 6, 1975.
52. Leachman, Robert B. and Phillip Althoff, eds. Preventing Nuclear Theft: Guidelines for Industry and Government. New York, Praeger Publishers, 1972.
53. Meguire, Patrick G. and Kramer, Joel J., "Psychological Deterrents to Nuclear Theft: A Preliminary Literature Review and Bibliography," Prepared by Law Enforcement Standards Laboratory, National Bureau of Standards for Intelligence and Security Directorate, Defense Nuclear Agency, Washington D.C., March 1976.
54. Salisbury, David. "Quarantining Plutonium," Technology Review, v. 78, January 1976: 4-5.
55. Stanley Foundation, Conference on Strategy for Peace, Discussion Group Report, Nuclear Theft and Terrorism, October 1975.

56. Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs, House of Representatives, Oversight Hearings on Nuclear Energy, Part I, "Overview of the Major Issues," and Part VI, "Safeguards in the Domestic Nuclear Industry," 1975. In Part I, see especially the testimony of William Anders Chairman, U.S. Nuclear Regulatory Commission, Daniel F. Ford, Union of Concerned Scientists; Senator Mike Gravel; Ralph Nader; Prof. Norman Rasmussen, M.I.T.; Rep. Frederick W. Richmond, N.Y. and Mason Willrich, Professor of Law, Univ. of Virginia. In Part VI, see especially the testimony of Rep. Hamilton Fish (N. Y.) ; the panel on nuclear threat (Bell, DeNilse, and Jenkins) ; the panel on Nuclear Regulatory Commission Safeguards (Chapman, Shapar, Builder, and Case) ; Arthur Tamplen and Tom Cochran, Natural Resources Defense Council; Frank Graham, Atomic Industrial Forum; Samuel Edlow, President, Edlow International Co. ; and Theodore B. Taylor, co-author, Nuclear Theft: Risks and Safeguards.
57. U.S. Atomic Energy Commission, Special Safeguards Study (Rosenbaum, et al.), April, 1974.
58. U.S. General Accounting Office. Protecting Special Nuclear Material in Transit: Improvement Made and Existing problem. Report to the Joint Committee on Atomic Energy, Congress of the United States, Washington, 1974.
59. U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Security Agency Study, August, 1976.
60. Willrich, Mason and Taylor, Theodore B., Nuclear Theft: Risks and Safeguards (Cambridge: Ballinger, 1974) .

C. Civil-Liberties-Oriented Analyses.

61. Ayres, Russell W., "Policing Plutonium: The Civil Liberties Fallout," Harvard Civil Rights-Civil Liberties Law Review, Vol. 10, No. 2, Spring, 1975.
62. Bartkus, Robert and Block, Gail, Rapporteurs' Report: Conference on the Impact of Intensified Nuclear Safeguards on Civil Liberties, Stamford Law School, October 17-18, 1975.
63. Barton, John H., Intensified Nuclear Safeguards and Civil Liberties, Paper prepared for the Nuclear Regulatory Commission, October 31, 1975.
64. Brookhaven National Laboratory, Technical Support Organization, Issues Related to Use of Guard Force to Protect Nuclear Materials and Facilities, July 8, 1974.
65. Bureau of National Affairs, Inc., Washington, D.C., Government Security and Loyalty: A Manual of Laws, Regulations, and Procedures (current edition) .
66. Clune, W.H. , Standards and Decision Rules for Evaluating Trade-offs Between Civil Liberties and Nuclear Materials Safeguards, Report to the Nuclear Regulatory Commission, October 31, 1975.

67. Cranston, Roger C. et al. , Legal Implications of Guard Force Personnel: A Tentative Report prepared for the Brookhaven National Laboratory, June 26, 1974.
  68. Dyk, Timothy B., Marcus, Daniel, and Kolasky, William J. Jr., Civil Liberties Implications of a Safeguards Program for Special Nuclear Material in the Private Nuclear Power Industry, a report to the Nuclear Regulatory Commission, October 31, 1975.
  69. Gravel, Mike, "Plutonium Recycle: The Civil Liberties View," The Civil Liberties Review, April-May, 1976.
  70. Green, Harold P., "Q Clearance: The Development of a Personnel Security Program," Bulletin of the Atomic Scientists, May, 1964, 9-15.
  71. Orlansky, Jesse, "Security Investigations," in Wheeler, Stanton (cd.), On Record: Files and Dossiers in American Life, (N.Y.: Russell Sage Foundation, 1969), 275-315.
  72. U.S. Atomic Energy Commission, Division of Security, Personnel Security Handbook (various editions, 1960's).
  73. U.S. Nuclear Regulatory Commission, Final Generic Environment Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors, August, 1976.
  74. Westin, Alan F., Privacy and Freedom (N.Y.: Atheneum, 1967).
  75. Westin, Alan F. and Baker, Michael A., Data Banks in a Free Society (N.Y.: Quadrangle, 1972).
  76. Wyle, Frederick S., Plutonium Recycling, Safeguards, and Civil Liberties, Report to the U.S. Nuclear Regulatory Commission, December, 1975.
- D. Position Statements on Civil Liberties Issues by Interested Groups.
77. American Civil Liberties Union, Memorandum of Special Committee on Nuclear and Other Energy Programs Affecting Civil Liberties, March 29, 1976.
  78. Center for Science in the Public Interest, "Nuclear Power and Civil Liberties-- Countdown to 1984?" People and Energy, September, 1976.
  79. Industrial Union Department, AFL-CIO, "Nuclear Energy and America's Energy Needs," Viewpoint, Vol. 6, No. 3, 1976.
  70. The Plutonium Economy: A Statement of Concern, Governing Board, National Council of churches, September, 1975.

## E. British materials.

71. Atomic Energy Authority, Evidence to the Royal Commission on Environmental Pollution, 1974-75.
72. Barnaby, Frank, "Safeguards - With or Without Strings," New Scientist, Feb. 25, 1971; "A Problem of Protection," New Scientist, May 29, 1975.
73. Bunejan, Tony, The Political Police in Britain (London: Julian Friedmann, 1976).
74. Cox, Barry, Civil Liberties in Britain (London: Penguin, 1975).
75. "Democracy Versus the Breeder," (Comment) , New Scientist, October 28, 1976.
76. Flood, Michael and Grove-White, Robin, Nuclear Prospects: A Comment on the Individual, the State, and Nuclear Power (Friends of the Earth Limited, Council for the Protection of Rural England, and National. Council for Civil Liberties, October, 1976) .
77. Hill, John, "The Case for Saying **Yes** to Plutonium Recycle, " The Observer, August 1, 1976.
78. Kenward, Michael, The Nuclear Backlash, New Scientist, v. 65, May 1, 1975: 263-264.
79. Report of the Committee of Inquiry on the Structure of the Electricity Supply Industry, January, 1976 (Plowden Report).
80. Royal Commission on Environmental Pollution, Sir Brian Flowers, Nuclear Power and the Environment, Sixth Report, September, 1976.
81. U.K. Department of Energy, Nuclear Activities in the U. K.: Commentary on Some Points of Public Interest, March, 1976.
82. Williams, David, Not in the Public Interest (London: Hutchinson, 1965).