Early International Nuclear Controls

Part 1: Acheson-Lilienthal Report, Baruch Plan, and Atoms for Peace

A presentation by
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Nonproliferation Policy Education Center
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QUESTIONS TO BE ADDRESSED:

I. Why bother with previous nuclear control initiatives?

II. What did the authors of the earliest initiatives—the Acheson-Lilienthal Report, Baruch Plan, and Eisenhower's Atoms for Peace Program—see as the nuclear war scenario that needed to be avoided?

III. How did their nuclear threat perceptions shape their views of which nuclear activities and materials were safe or dangerous and how they should be controlled?

IV. How sound were their nuclear threat perceptions and how best to mitigate them?

SHORT ANSWERS

I. We are rediscovering nuclear restraint requires controlling both civil & military nuclear energy.

II. Baruch Plan feared with relative few atomic weapons, nuclear aggressors could always win by targeting cities; there'd be no defense. Atoms for Peace feared U.S. military mobilization base could be knocked out with 100s to 10,000s of nuclear weapons.

III. The Baruch Plan placed tight controls on almost all nuclear activities and materials. Controls under Atoms for Peace were more relaxed as U.S. was primarily concerned about preventing ***large*** military diversions – hundreds of bombs' worth or more.

SHORT ANSWERS

IV. The Baruch Plan mistakenly downplayed deterrence and defenses and focused too much on the targeting of cities. This encouraged tight controls but also intense fear and distrust of the Soviets, which made agreeing to any controls impractical. Atoms for Peace ignored how few nuclear weapons it would take to knock out U.S. SAC bases or to catalyze major nuclear wars. As a result, it paid too little attention to preventing military diversions of a relative few nuclear weapons worth of material

II. WHAT DID THE EARLIEST STRATEGIC CONTROL INITIATIVES SEE AS THE NUCLEAR WAR THREATS TO BE CONTROLLED?

Acheson-Lilienthal Report
Baruch Plan

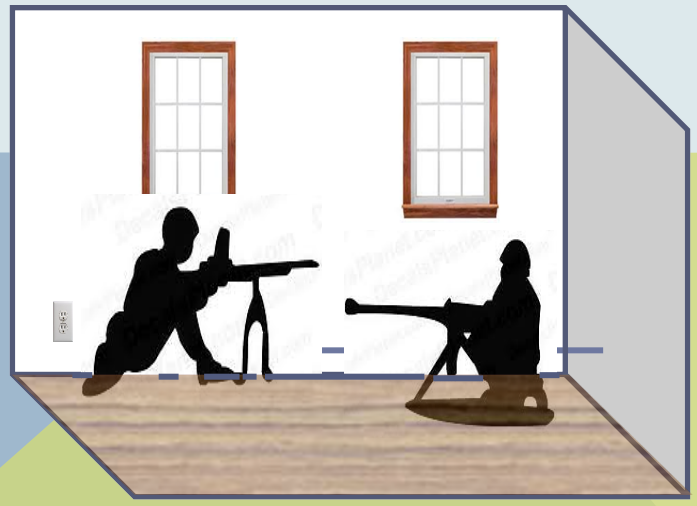
ACHESON LILIENTHAL REPORT AND THE BARUCH PLAN

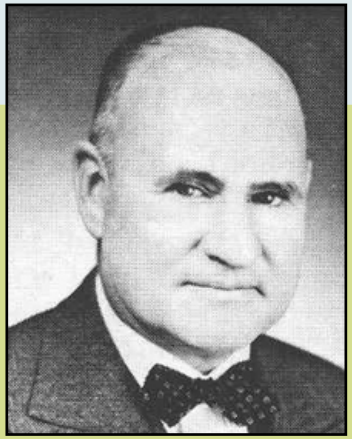
AFTER WE NUKED JAPAN: FEARS NEXT NUCLEAR WAR WOULD BE THE SAME

- Whoever strikes first wins
- No defense, the bomber (or missile) would always get through
- Cities are the main target

WORLD WAS LIKENED TO TWO MACHINE GUNNERS IN A SMALL ROOM

A nation or even a political group, given the opportunity to start aggression by a sudden use of nuclear destruction devices will be able to unleash a 'blitzkrieg' infinitely more terrifying than that of 1939–40. A sudden blow of this kind might literally wipe out even the largest nation—or at least all of its production centers—and decide the issue on the first day of the war. ***If two people are in a room of 100 by 100 feet and have no weapons except their bare fists, the attacker has only a slight advantage over his opponent. But if each of them has a machine gun in his hand the attacker is sure to be victorious…with the production of nuclear bombs…the world situation approaches that of two men with machine guns in a 100 by 100 foot room.***





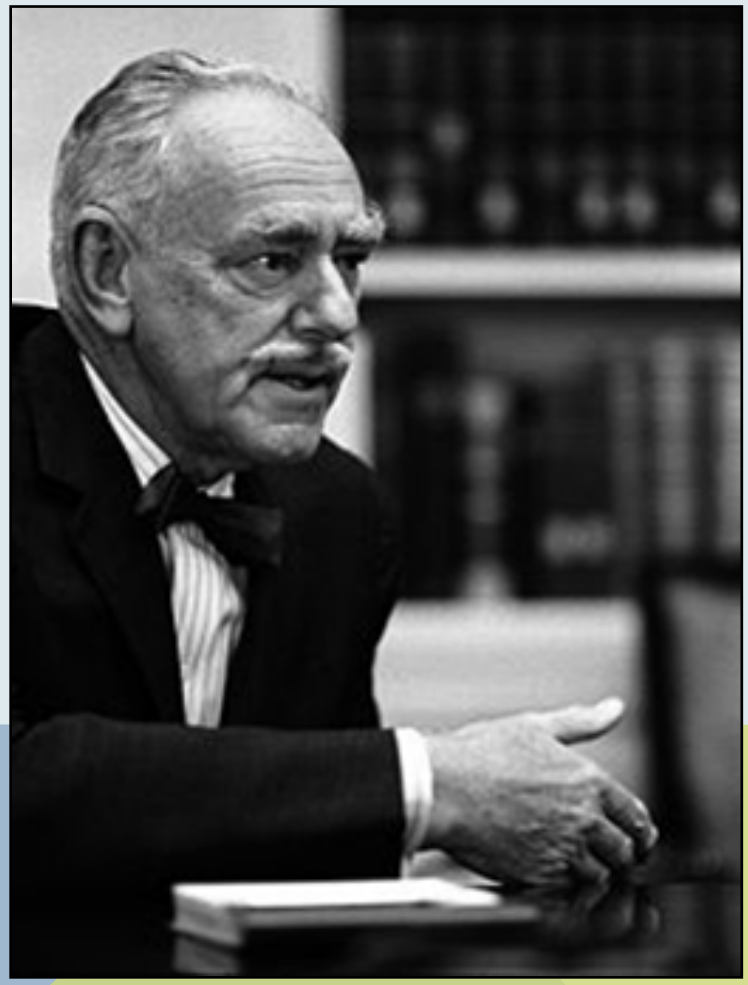
Zay Jefferies, et al., "Prospectus on Nucleonics (The Jeffries Report)," reprinted in Alice Kimball Smith, *A Peril and a Hope,* pp. 539-559.

HARRY TRUMAN, CLEMENT ATTLEE, AND MCKENZIE KING ENDORSED THIS VIEW 11/15/1945

Statement emphasized that there was no defense against nuclear weapons and that the salvation of civilization required the international control of nuclear energy so that the useful civilian applications could be shared without risk of military diversion

DEAN ACHESON

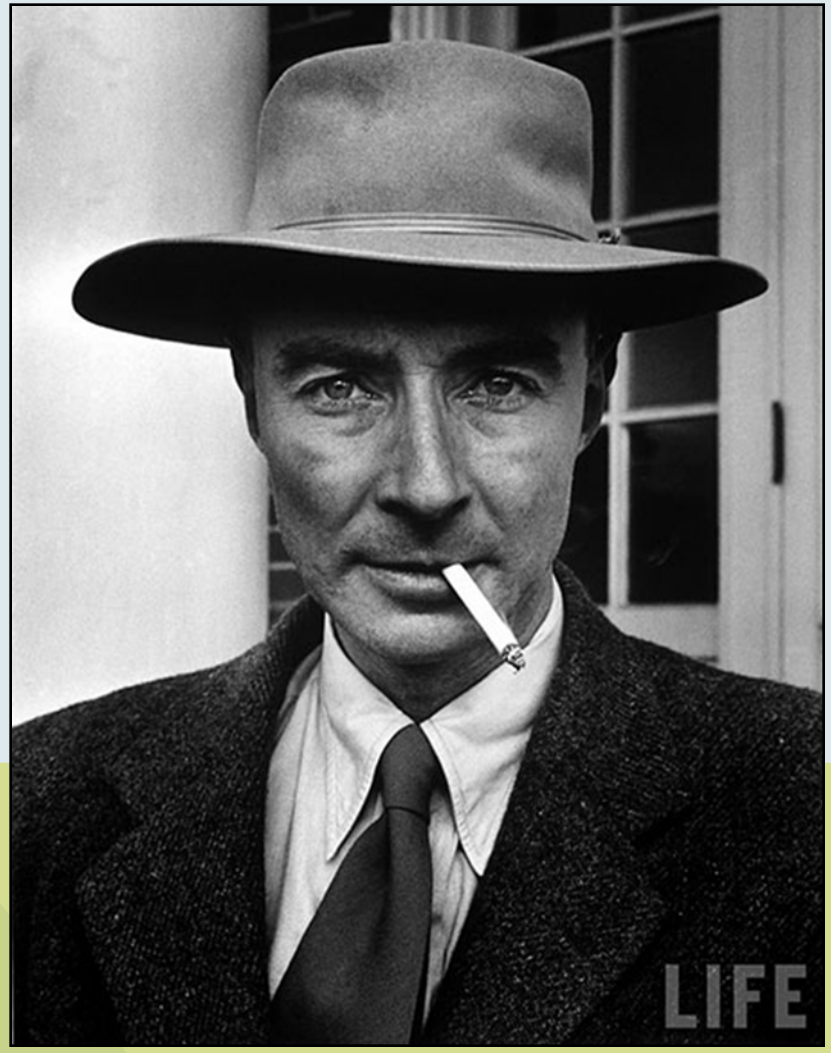
Undersecretary of State



DAVID E. LILIENTHAL

Chairman Tennessee Valley Authority

J. ROBERT OPPENHEIMER: KEY AUTHOR, ACHESON-LILIENTHAL REPORT



ACHESON-LILIENTHAL PREMISES MIRRORED THOSE OF SCIENTISTS MOVEMENT

Atomic weapons were revolutionary "particularly as weapons of strategic bombardment aimed at the destruction of enemy cities and the eradication of their populations"

"There can be no adequate military defense against atomic weapons"

The uncontrolled development of nuclear energy "would not only intensify the ferocity of warfare, but might directly contribute to the outbreak of war."

Only international ownership of dangerous nuclear facilities and materials with controls over all nuclear activities, and intrusive inspections to assure the Soviets did not have or was getting the bomb followed by U.S. nuclear disarmament could avert the annihilation of civilization

ACHESON-LILIENTHAL REPORT'S OPERATIONAL CONCEPTS WERE RADICAL

- There's a distinction between "safe" and "dangerous" nuclear activities.
- Uranium and plutonium can be denatured– rendered useless to make bombs.
- Inspections alone are insufficient to prevent military diversions.
- Timely warning is essential to prevent such diversions.
- Economic market signals should be relied on to pace nuclear power development.
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THERE'S A DISTINCTION BETWEEN "SAFE" AND "DANGEROUS" NUCLEAR ACTIVITIES

"In our view, any activity is dangerous which offers a solution either in the actual fact of its physical installation, or by subtle alterations thereof, to one of the three major problems of making atomic weapons:

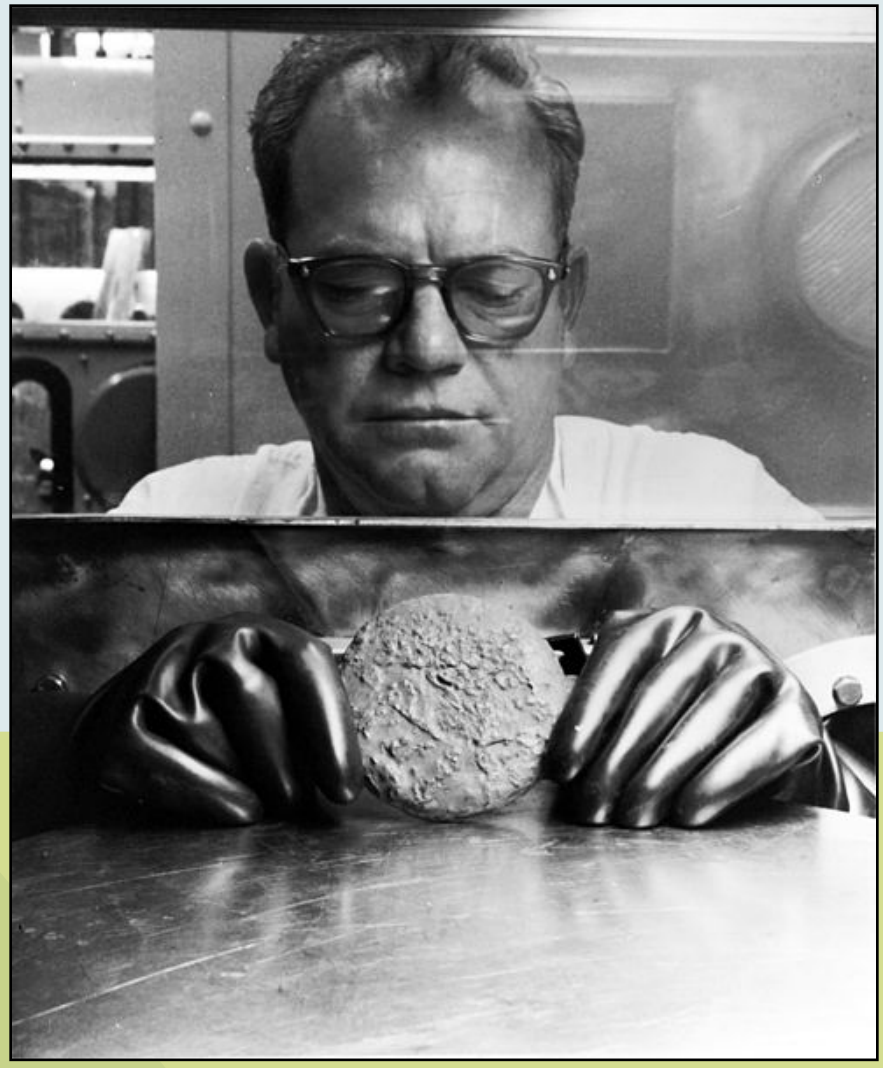
I. The provision of raw materials,
II. The production in suitable quality and quantity of the fissionable materials plutonium and U 235, and
III. The use of these materials for the making of atomic weapons"

DANGEROUS NUCLEAR ACTIVITIES 1:
URANIUM AND THORIUM MINING

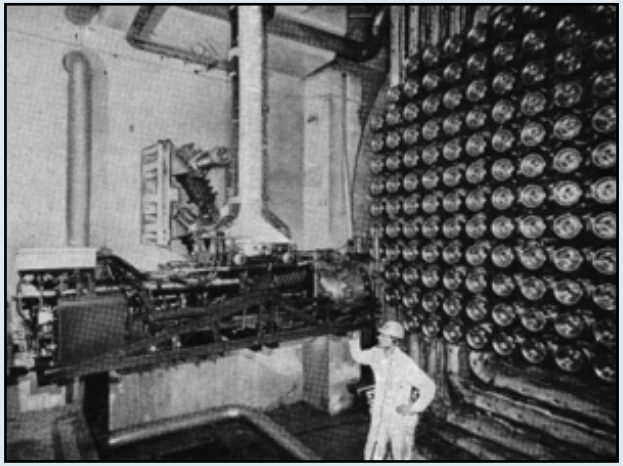
DANGEROUS NUCLEAR ACTIVITIES

2: NUCLEAR FUEL MAKING

DANGEROUS NUCLEAR MATERIALS 3:
PLUTONIUM & HIGHLY ENRICHED URANIUM



DANGEROUS NUCLEAR ACTIVITIES 4:
REACTORS OPTIMIZED TO MAKE WEAPONS PLUTONIUM

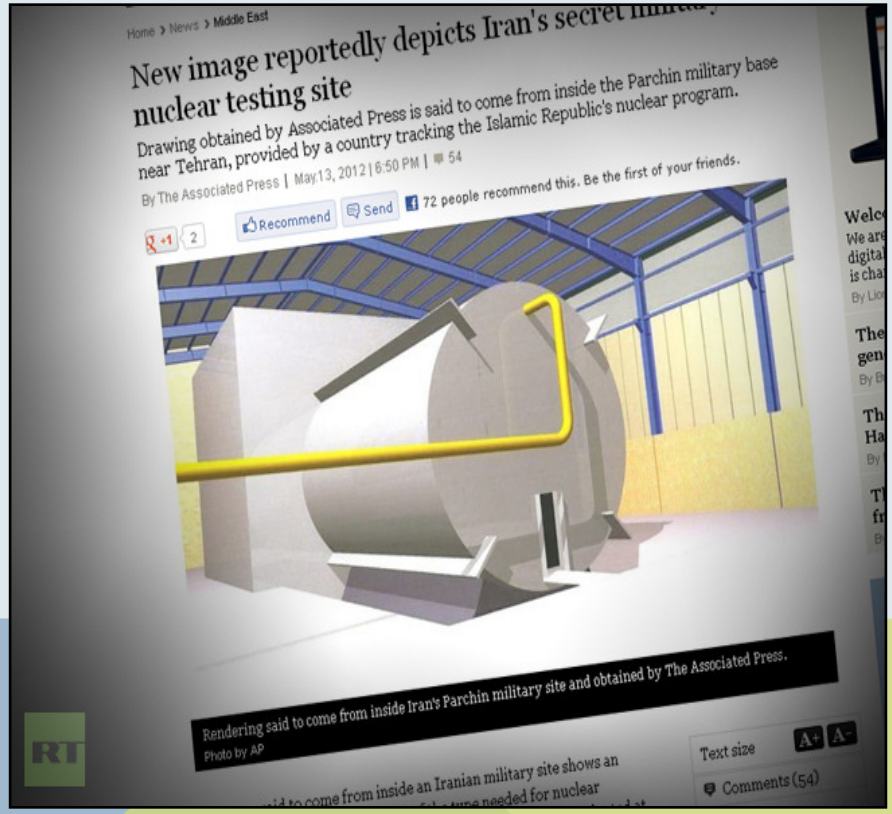


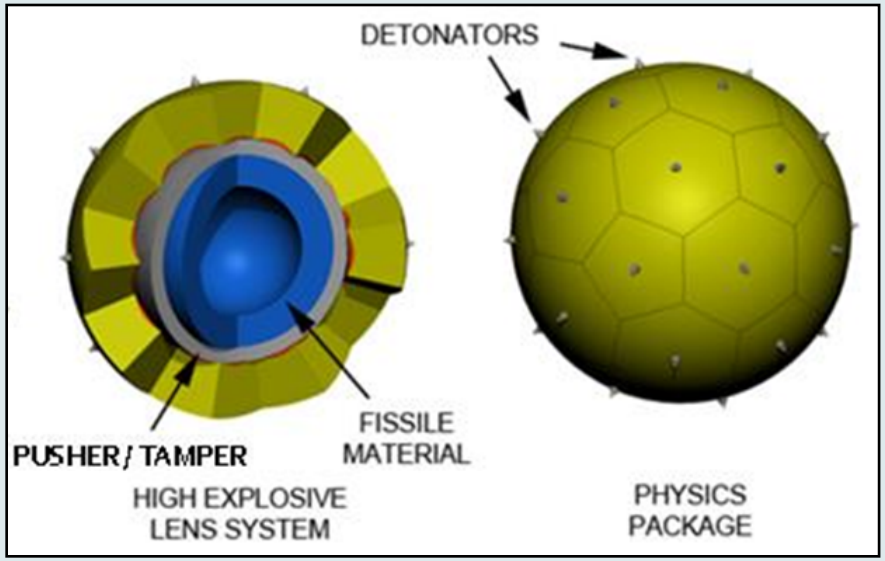
Chalk River Heavy Water Reactor, Manhattan Project

Super Phenix, Breeder Reactor, France

Hanford, graphite-moderated military production reactor

DANGEROUS NUCLEAR ACTIVITIES 5:
RESEARCH & DEVELOPMENT INTO ATOMIC EXPLOSIVES





SAFE NUCLEAR ACTIVITIES 1:
SMALL RESEARCH REACTORS

SAFE NUCLEAR MATERIALS 2:
“DENATURED” NUCLEAR FUELS

NOT SO SAFE NUCLEAR ACTIVITIES: NUCLEAR POWER PLANTS

Sequoyah, Units 1 & 2 ©TVA

THE ACHESON-LILIENTHAL REPORT'S KEY OPERATIONAL CONCEPTS

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STATE DEPARTMENT PRESS RELEASE 235 DOWNPLAYS DENATURING *April 9, 1946*

DEPARTMENT OF STATE

For the press
No. 235

April 9, 1946

The Department of State, on March 28, 1946, made public a publication entitled "A Report on the International Control of Atomic Energy". In the public discussion of the Report questions have arisen with respect to the denaturing of materials utilized in atomic explosives.

After consultation with the Department of State, Maj. Gen. L. R. Groves called together a group, representative of the outstanding scientists connected with the Manhattan Project during the development of the atomic bomb and all of whom are still connected with the project either on a full-time or consulting basis. This group has met and has just completed a conference in which the measure of safety afforded by the use of denaturants was discussed. They prepared among other papers a report which can be released without jeopardizing security. Their report is as follows:

"The possibility of denaturing atomic explosives has been brought to public attention in a recent Report released by the State Department on the international control of atomic energy. Because, for security reasons, the technical facts could not be made public, there has been some public misunderstanding of what denaturing is, and of the degree of safety that it could afford. We have thought it desirable to add a few comments on these points.

"The Report released by the State Department proposes that all dangerous activities in the field of atomic energy be carried out by an international authority, and that operations which by the nature of the plant, the materials, the ease of inspection and control, are safe, be licensed for private or national exploitation. The Report points out that the possibility of denaturing explosive materials so that they 'do not readily lend themselves to the making of atomic explosives' may contribute to the range of licensable activities, and to the overall flexibility of the proposed controls. The Report does not contend nor is it in fact true, that a system of control based solely on denaturing could provide adequate safety.

"As the Report states, all atomic explosives are based on the raw materials uranium and thorium. In every case the usefulness of the material as an atomic explosive depends to some extent on different

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properties than those which determine its usefulness for peacetime application. The existence of these differences makes denaturing possible. In every case denaturing is accomplished by adding to the explosive an isotope, which has the same chemical properties. These isotopes cannot be separated by ordinary chemical means. The separation requires plants of the same general type as our plants at Oak Ridge, though not of the same magnitude. The construction of such plants and the use of such plants to process enough material for a significant number of atomic bombs would probably require not less than one nor more than three years. Even if such plants are in existence and ready to operate some months must elapse before bomb production is significant. But unless there is reasonable assurance that such plants do not exist it would be unwise to rely on denaturing to insure an interval of as much as a year.

"For the various atomic explosives the denaturant has a different effect on the explosive properties of the materials. In some cases denaturing will not completely preclude making atomic weapons, but will reduce their effectiveness by a large factor. The effect of the denaturant is also different in the peaceful application of the materials. Further technical information will be required, as will also a much more complete experience of the peacetime uses of atomic energy and its economics, before precise estimates of the value of denaturing can be formulated. But it seems to us most probable that within the framework of the proposals advanced in the State Department Report denaturing will play a helpful part.

"In conclusion we desire to emphasize two points, both of which have been challenged in public discussion. (1) Without uranium as a raw material there is no foreseeable method of releasing atomic energy. With uranium, thorium can also be used. (2) Denaturing, though valuable in adding to the flexibility of a system of controls, cannot of itself eliminate the dangers of atomic warfare.

"L. W. Alvarez
R. F. Bacher
M. Benedict
H. A. Bethe
A. H. Compton
Farrington Daniels
J. R. Oppenheimer
J. R. Ruhoff
G. T. Seaborg
F. H. Spedding
C. A. Thomas
W. H. Zinn"

The background of the individuals who have signed this report follows below:

Dr. L. W. Alvarez worked for the Manhattan Project on the development of the bomb, first at the Metallurgical Laboratory at Chicago and then as group leader at the Los Alamos Laboratory. He is now a professor of physics at the University of California Radiation Labo-

DENATURING: NOT AN EFFECTIVE SAFEGUARD

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U.S. State Department Press Release No. 235
April 9, 1946

REPORT AUTHORS ULTIMATELY DOWNPLAYED THE VALUE OF DENATURING PLUTONIUM

"*The Report does not contend nor is it in fact true, that a system of control based solely on denaturing could provide adequate safety*... In some cases denaturing will not completely preclude making atomic weapons... Further technical information will be required, as will also a much more complete experience of the peacetime uses of atomic energy and its economics, before precise estimates of the value of denaturing can be formulated... *Denaturing*, though valuable in adding to the flexibility of a system of controls, *cannot of itself eliminate the dangers of atomic warfare*."

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A SYSTEM BASED SOLELY ON INSPECTION WITHOUT INTERNATIONAL OWNERSHIP OF DANGEROUS ACTIVITIES WILL NOT WORK

Take the case of a controlled reactor, a power pile, producing plutonium. Assume an International agreement barring use of the plutonium in a bomb, but permitting use of the pile for heat or power. No system of inspection, we have concluded, could afford any reasonable security against diversion of such materials to the purposes of war. If nations may engage in this dangerous field, an only national good faith and International policing stand in the way, the very existence of the prohibition against the use of such piles to produce fissionable material suitable for bombs would tend to stimulate and encourage surreptitious evasions. This danger in the situation is attributable to the fact that this potentially hazardous activity is carried on by nations or their citizens.

Acheson–Lilienthal Report, March 16,1946, p. 21

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TIME ADEQUATE: WHAT SAFEGUARDING AGAINST MILITARY DIVERSIONS REQUIRES

Provide unambiguous and reliable danger signals if a nation takes steps that do or may indicate the beginning of atomic warfare. Those danger signals *must flash early enough to leave time adequate to permit other nations—alone or in concert—to take appropriate action.*

Acheson–Lilienthal Report, p. 9

TIMELY WARNING: MEASURED IN MANY MONTHS

Seizures will afford no immediate tactical advantage. They would in fact be an instantaneous dramatic danger signal, and they would permit, under the conditions stated, a substantial period of time for other nations to take all possible measures of defense. For it should be borne in mind that even if facilities are seized, *a year or more would be required after seizure before atomic weapons could be produced in quantities sufficient to have an important influence on the outcome of war.*

Acheson–Lilienthal Report, p. 48

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GLOBAL DISTRIBUTION OF DANGEROUS PLANTS VIEWED AS A HEDGE AGAINST WAR

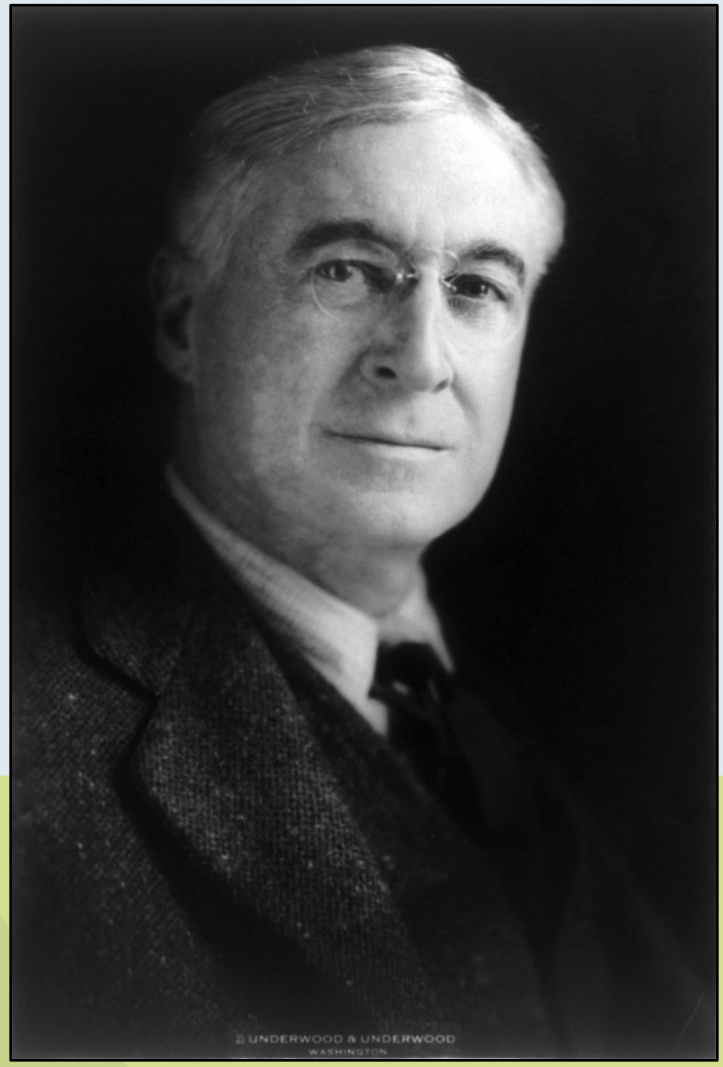
With appropriate world-wide distribution of stockpiles and facilities; with design rendered as little dangerous as possible; with stockpiles of dangerous materials kept at the lowest level consistent with good economics and engineering; there will be no need for a sense of insecurity on the party of any of the major powers. Seizures will afford no immediate tactical advantage. They would in fact be an instantaneous dramatic danger signal, and they would permit, under the conditions stated, a substantial period of time for other nations to take all possible measures of defense. For it should be borne in mind that even if facilities are seized, a year or more would be required after seizure before atomic weapons could be produced in quantities sufficient to have an important influence on the outcome of war.

A-L REPORT RECOMMENDED RELYING ON ECONOMIC MARKET SIGNALS TO LOCATE POWER PLANTS

The problem of power producing piles should be somewhat less difficult in the case of the non-dangerous plants. In these, fissionable materials will be denatured. The charter should be able to provide for their allocation of this type of plant in accordance with more conventional economic standards. It might be possible to provide that they should be *located on the basis of competitive bids among interested nations. On such a basis, countries with ample power resources in water, coal, or oil would limit their bids to those warranted by the costs of alternative sources.*

Acheson–Lilienthal Report, p. 49

BERNARD BARUCH



NEW POINTS OF THE BARUCH PLAN

- **Condign Punishment**
- **Required majority UN Security Council vote for enforcement**
- **Requirement that Russia be inspected before U.S. nuclear disarmament**

U.S. INITIALLY CURTAILED NUCLEAR PRODUCTION

GLOBAL NUCLEAR WEAPONS INVENTORIES, 1945-2010

YEAR	UNITED STATES	RUSSIA	UNITED KINGDOM	FRANCE	CHINA	ISRAEL	INDIA	PAKISTAN	TOTAL
1945	2								2
1946	9								9
1947	13								13
1948	50								50
1949	170	1							171
1950	299	5							304
1951	438	25							463
1952	841	50							891
1953	1,169	120	1						1,290
1954	1,703	150	7						1,860
1955	2,422	200	14						2,636
1956	3,692	426	21						4,139
1957	5,543	660	28						6,231
1958	7,345	869	31						8,245
1959	12,298	1,060	35						13,393
1960	18,638	1,605	42						20,285

RUSSIAN NUCLEAR TEST KILLED THE BARUCH PLAN

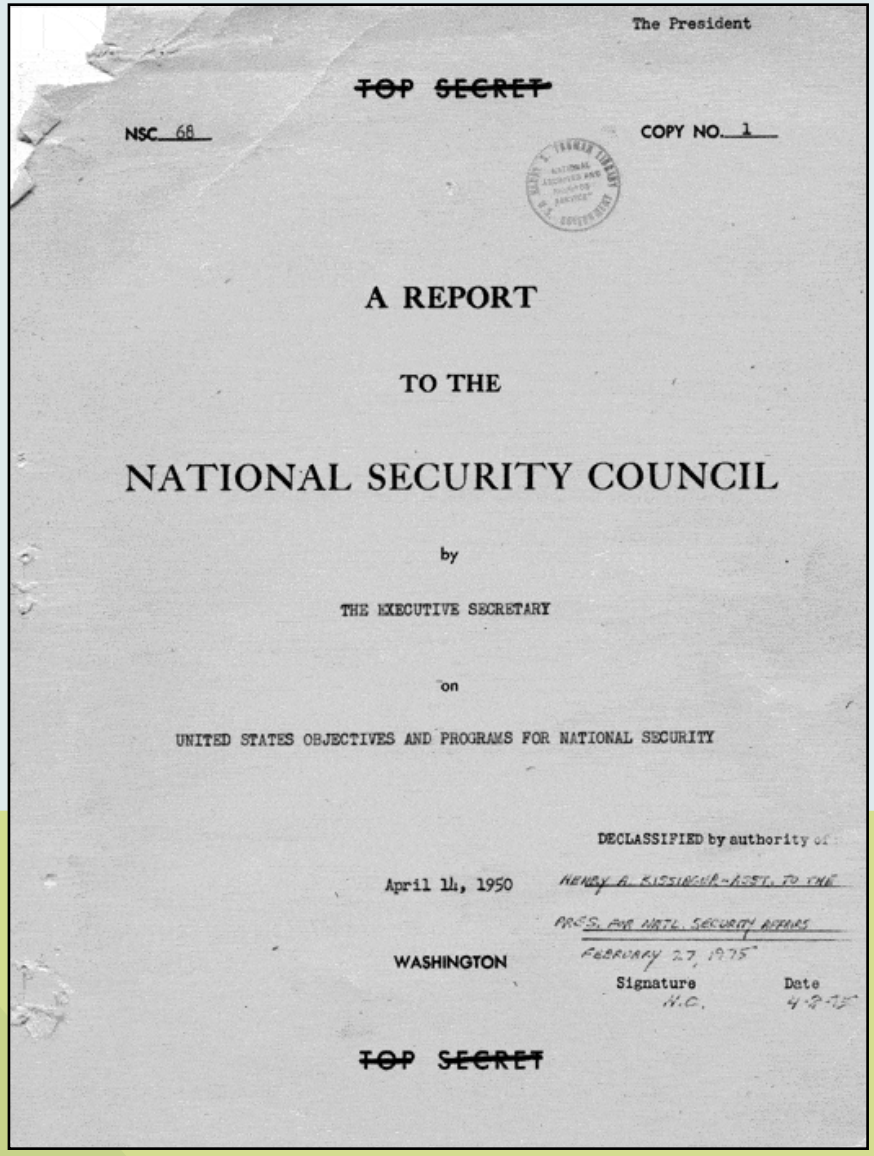
August 29, 1949

II. WHAT DID THE EARLIEST STRATEGIC CONTROL INITIATIVES SEE AS THE NUCLEAR WAR THREATS TO BE CONTROLLED?

The end of the Truman Administration and Eisenhower's Atoms for Peace Program

NSC 68 DESCRIBED THE "KNOCKOUT BLOW" THREAT

APRIL 14, 1950



The President

~~TOP SECRET~~

NSC 68

COPY NO. 1

A REPORT

TO THE

NATIONAL SECURITY COUNCIL

by

THE EXECUTIVE SECRETARY

on

UNITED STATES OBJECTIVES AND PROGRAMS FOR NATIONAL SECURITY

DECLASSIFIED by authority of:

April 14, 1950

HENRY A. KISSINGER - ASST. TO THE PRES. FOR NATL. SECURITY AFFAIRS

FEBRUARY 27, 1975

WASHINGTON

Signature N.C.

Date 4-9-75

~~TOP SECRET~~

NSC 68 ESTIMATED MOSCOW COULD KNOCKOUT TOP 100 U.S. CITIES BY 1954

100 Largest US Cities by Population*

Anchorage, AK and Honolulu, HI not shown on map

THE NEXT NUCLEAR WAR: WOULD TARGET AMERICA'S 100 LARGEST CITIES

"It is believed that the Soviets cannot deliver their bombs on target with a degree of accuracy comparable to ours, but a planning estimate might well place it at 40-60 percent of bombs sortied. ***For planning purposes, therefore, the date the Soviets possess an atomic stockpile of 200 bombs would be a critical date for the United States, for the delivery of 100 atomic bombs on targets in the United States would seriously damage this country***." *NSC 68*

PANEL OF CONSULTANTS RECOMMENDED REDUCE STOCKPILES TO PREVENT A KNOCKOUT BLOW, JAN. 1953

…Atomic bombs can be decisive only if they are delivered on the target in considerable numbers (The American requirement for a knockout atomic attack on the Soviet Union now runs well into four figures.)...It seems reasonable to say, then, that *much would be achieved if it should be possible to get a reduction in the size of stockpiles and bombing fleets such that neither side need fear a sudden knockout from the other.*

"Report by the Panel of Consultants of the Department of State to the Secretary of State," Washington, January 1953, Annex 1.

HOW MANY BOMBS THE USSR NEEDED TO KNOCK OUT AMERICA: 600 – 15,000

…It will be a pleasant surprise if the defense is ever able to knock down or deflect as many as four out of five of the attackers, and at present we should be lucky to get one in five.. the Soviet Union may be able to destroy our economy beyond the hope of recovery when she has 15,000 atomic bombs, while she might well have this ability when she has as few as 600. The lower figure might be reached in a few years, and the upper is not out of reach within the next two decades.

"Report by the Panel of Consultants of the Department of State to the Secretary of State," Washington, January 1953, Part II, Section A.

CATALYSTS IN 1953 FOR "OPERATION CANDOR"

FOREIGN AFFAIRS
Vol. 31 JULY 1953 No. 4

ATOMIC WEAPONS AND AMERICAN POLICY

By J. Robert Oppenheimer

IT IS possible that in the large light of history, if indeed there is to be history, the atomic bomb will appear not very different than in the bright light of the first atomic explosion. Partly because of the mood of the time, partly because of a very clear prevision of what the technical developments would be, we had the impression that this might mark, not merely the end of a great and terrible war, but the end of such wars for mankind.

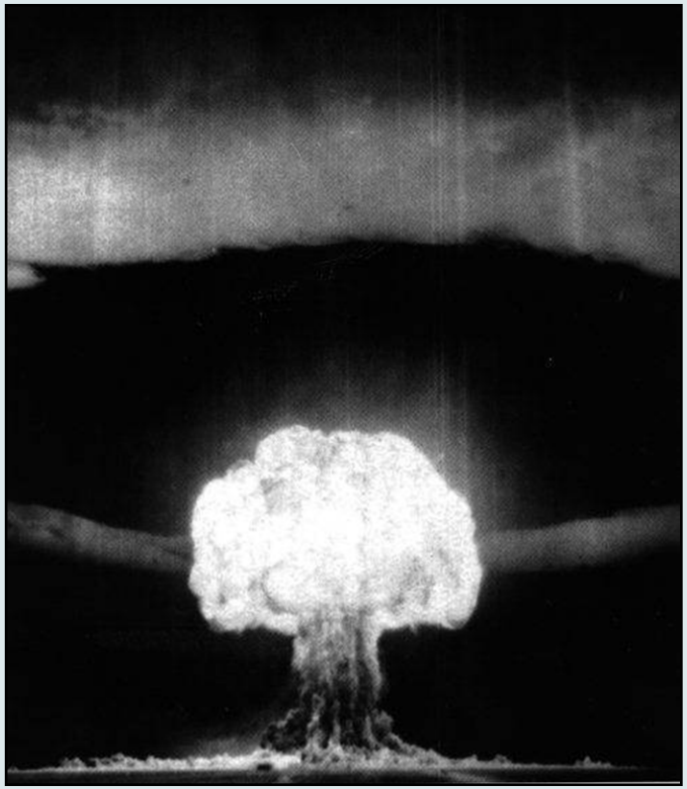
Two years later Colonel Stimson was to write in *Foreign Affairs*, "The riven atom, uncontrolled, can be only a growing menace to us all. . . ." In the same paragraph he wrote, "Lasting peace and freedom cannot be achieved until the world finds a way toward the necessary government of the whole."[1] Earlier, shortly after the war's end, the Government of the United States had put forward some modest suggestions, responsive to these views, for dealing with the atom in a friendly, open, coöperative way. We need not argue as to whether these proposals were stillborn. They have been very dead a long, long time, to the surprise of only a few. Openness, friendliness and coöperation did not seem to be what the Soviet Government most prized on this earth.

It should not be beyond human ingenuity for us to devise less friendly proposals. We need not here detail the many reasons why they have not been put forward, why it has appeared irrelevant and grotesque to do so. These reasons range from the special difficulties of all negotiation with the Soviet Union, through the peculiar obstacles presented by the programmatic hostility and the institutionalized secretiveness of Communist countries, to what may be regarded as the more normal and familiar difficulties of devising instruments for the regulation of armaments in a world without prospect of political settlement.

[1] "The Challenge to Americans," by Henry L. Stimson. *Foreign Affairs*, October 1947.

Panel of Consultants on Disarmament Report, early '53

"We may be likened to two scorpions in a bottle, each capable of killing the other but only at the risk of his own life"

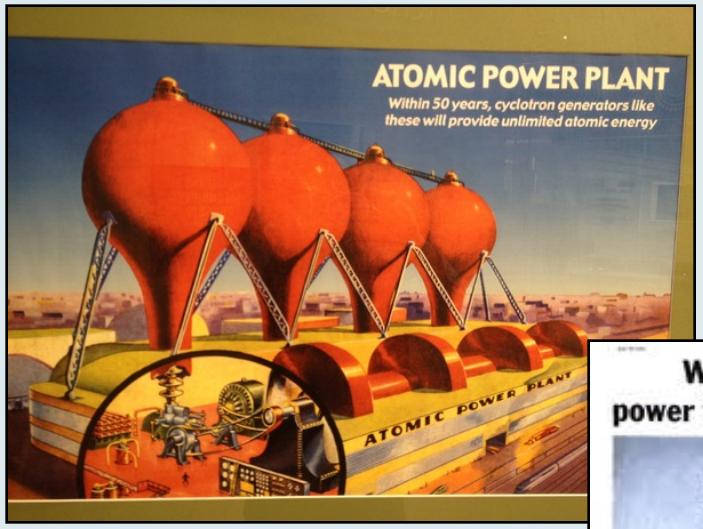


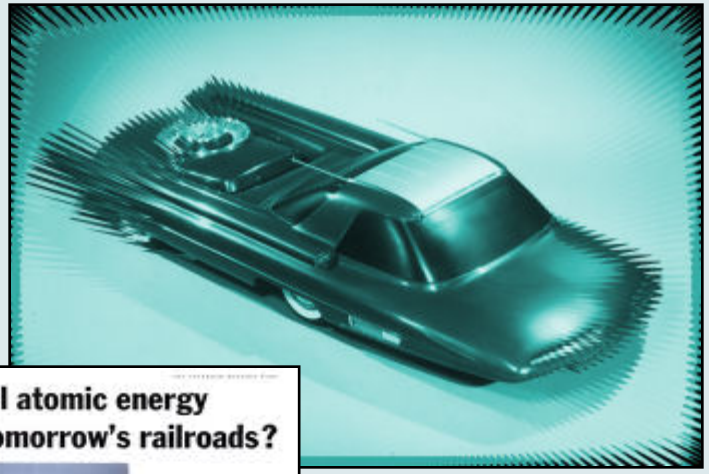
Joe-4 "Alarm Clock" Test, Aug. 12, '53

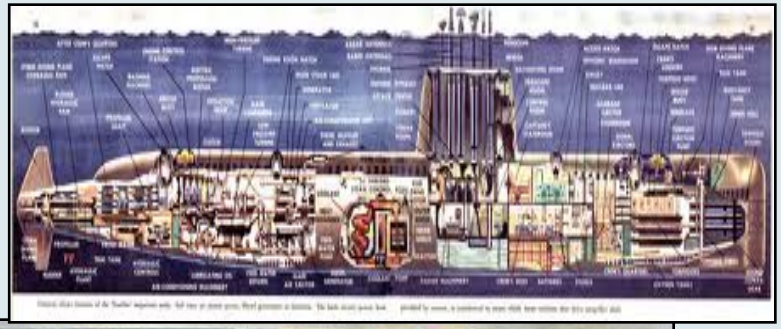
C.D. JACKSON: IKE'S PSYCHOLOGICAL WARFARE ADVISOR HEADED OPERATION CANDOR

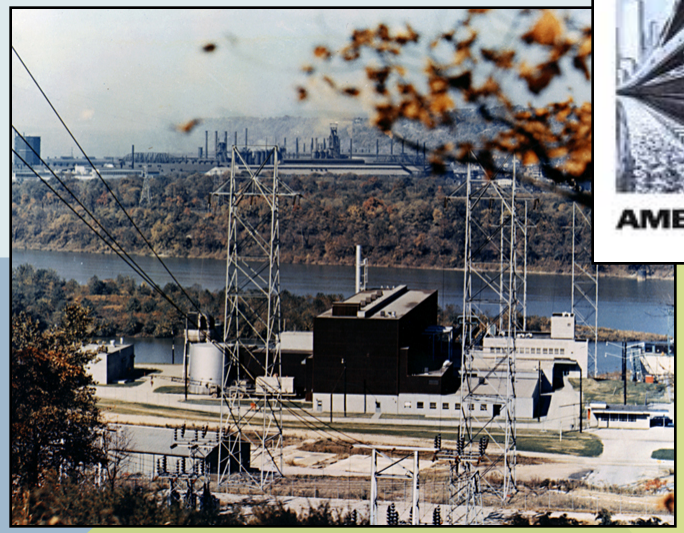
LEWIS STRAUSS: EISENHOWER'S NUCLEAR ADVISOR, ANOTHER MAJOR PLAYER

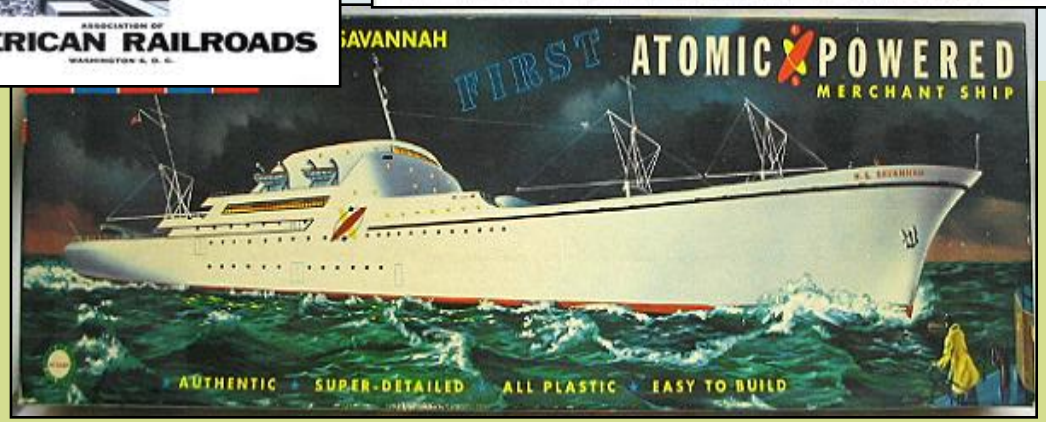
NUCLEAR ENERGY: 1950S KILLER APP



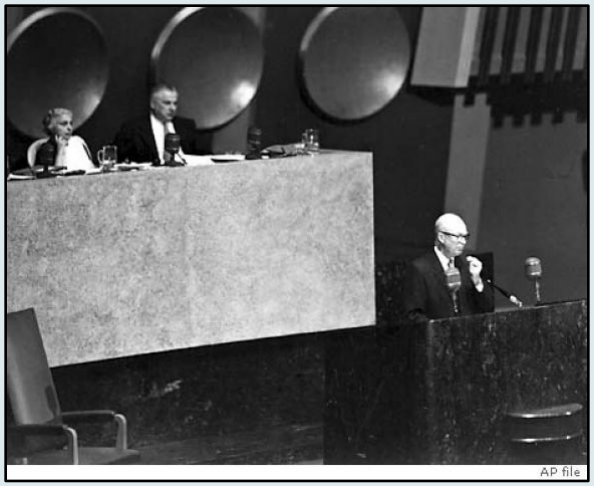








ATOMS FOR PEACE ASSUMED THE KNOCK OUT BLOW THREAT



Dwight D. Eisenhower, "Atoms for Peace," address to the 470th Plenary Meeting of the UN General Assembly, New York, December 8, 1953.

Eisenhower argued that even a *"vast superiority in numbers of weapons, and a consequent capability of devastating retaliation, is no preventive of itself against the fearful material damage"* that would be inflicted by a surprise attack and an aggressor *"in possession of the effective minimum number of atomic bombs for a surprise attack"* could cause hideous damage even against the most defended of nations.

ROBERT BOWIE: LED ATOMS FOR PEACE IMPLEMENTATION STUDY

ATOMS FOR PEACE GENEVA CONFERENCE PROLIFERATED PLUTONIUM KNOW HOW

August 8-20, 1955

U.S. AMBASSADOR TO THE UN QUESTIONED KEY ATOMS FOR PEACE ASSUMPTIONS

James Wadsworth

WHAT WAS ASSUMED SAFE UNDER ATOMS FOR PEACE

- Storage of fissile material
- Any production activity that could not produce a knockout blow stockpile of several scores of weapons without being detected

ATOMS FOR PEACE SAFEGUARDS: WHY THEY NEEDN'T BE "PERFECT"

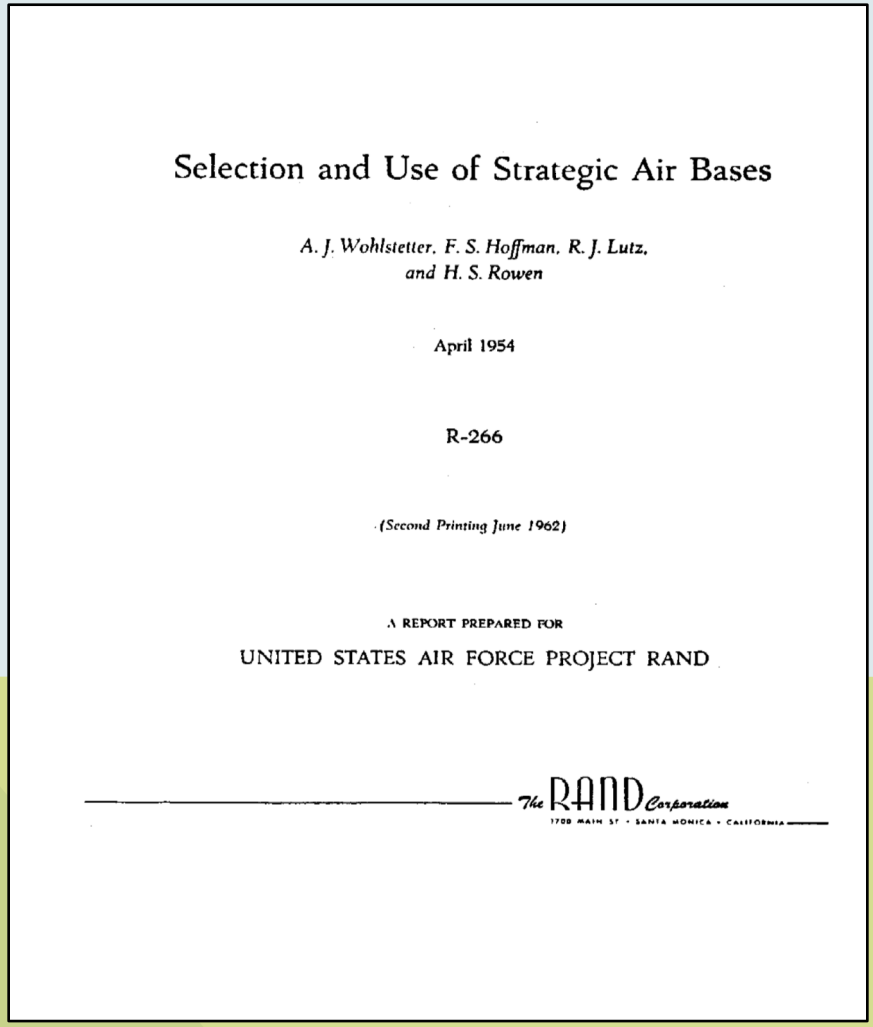
"***even under the most effective controls…a future government [could] divert without the knowledge of inspectors …fissionable materials from which twenty, forty or even fifty multi-megaton bombs could be fabricated***….[but] 100 percent perfection of inspection [was unnecessary]… nor would there be terrible consequences…because those few weapons would be…deterred by the remaining capability in the hands of nations on various sides."

Harold Stassen
U.S. UN Ambassador
March 20, 1957

BUT VULNERABLE SAC BASES, NOT U.S. CITIES WERE REAL TARGETS

Tornado Damaged 76 B-36s at Carswell AFB, 9/1/52

NOT HUNDREDS OR THOUSANDS OF BOMBS, BUT ONLY SCORES WERE NEEDED TO DESTROY SAC BASES IN 1953



Selection and Use of Strategic Air Bases

A. J. Wohlstetter, F. S. Hoffman, R. J. Lutz, and H. S. Rowen

April 1954

R-266

(Second Printing June 1962)

A REPORT PREPARED FOR

UNITED STATES AIR FORCE PROJECT RAND

The RAND Corporation

1700 MAIN ST • SANTA MONICA • CALIFORNIA

NOT SCORES, JUST ONE WEAPON A THREAT: CATALYTIC AND ACCIDENTAL WARS

F-104 Starfighter, 1950s-60s

"Widow Maker"

Davy Crockett, 1950s-60s

Nuclear B-47 crashes (4 in '50s)

Suez, 1956

ATOMS FOR PEACE: PERHAPS THE MOST SIGNIFICANT OF NONPROLIFERATION POLICY FAILURES

"…one of the most inexplicable political fantasies in history. Only a social psychologist could hope to explain why the possessors of the most terrible weapons in history should have sought to spread the necessary industry to produce them in the belief that this could make the world safer"

Leonard Beaton, Must the Bomb Spread?, Baltimore: Penguin Books, 1996, pp. 88-89.