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February 14, 1958

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Mr. Strauss:

The question of whether or not to develop 60 MT weapons is now current. Mr. Murray recently criticized our stockpile composition to the JCAE. In considering such issues you may find the following discussion useful in understanding how military requirements for atomic weapons are estimated, and how the procedures can generate questionable estimates if not tempered by good judgment and restraint.

The military tends to follow rather to guide the atomic scientist and to conduct "capability" rather than true "requirements" planning. The difficulty encountered by AEC in obtaining weapon guidance from the DOD is evidence of this fact. An immediate example is the slow military appreciation of "clean" weapons possibilities. Mr. Murray is correct in his criticism of military planning in this respect.

Two major handicaps restrict military atomic planning. First and most important is the inferiority complex still common to most senior officers. They tend to consider atomic weapons to be beyond their understanding without extensive study for which they have neither interest nor time. Atomic planning is therefore delegated to juniors who have completed various "effects" courses. They frequently lack the maturity and judgment normally provided by guidance from their seniors. When these junior planners confront their seniors with effects terminology and apparently complex calculations, the seniors are unable to exert normal guidance. Instead, they are prone to

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endorse the computations without close questioning and without understanding procedures or implications, - and in spite of personal misgivings. I have seen this reaction time and again in the European Theater.

Another major handicap lies in our National Policy which establishes no specific war objectives from which the military can deduce any limitation on the destruction to be inflicted on the enemy. Consequently, no limitations are planned.

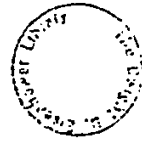
Air and Army atomic planners represent extremes which tend to generate excesses. Air planners think in terms of facility destruction - people are incidental. Army planners think of men - facilities are incidental. Effects tests have provided rather specific data for the facility planner from which he has developed a deceptive "arithmetic". The Army planner whose target is man, mobile and unpredictable, cannot use much of this data, nor develop similar "arithmetic". Consequently, he cannot justify requirements so neatly as can his competitor for the stockpile. It is this competition as well as the lack of realistic planning data which leads to inflated estimates of requirements.

The "arithmetic" of the Air planner is important. He first studies each target in the dim light of four important guesses: his bombing error, his desired probability of success in achieving a selected degree of damage to selected elements of the target. (Single rather than multi-weapon attack on each target is the rule in order to conserve delivery forces.) As an example, the planner may estimate a 3000 foot DEP (explained below), and require a 50% probability of achieving 50% damage to concrete structures. After these

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selections or guesses the answer comes by "arithmetic". The answer is highly sensitive to all initial selections.

CEP means "Circular Error Probable," and is the radius of the circle within which 50% of the bombs dropped on a specific target may statistically be expected to fall. It is a measure of bombing accuracy and is established by average peacetime bombing performance. The degradation factors for war conditions are largely guesswork. SAC says 3000 feet in peace, 10,000 feet in war. 5 miles is the specified CEP for the ICBM. Arithmetic with this CEP and a 50% probability produces a requirement for 20 MT to crater runways. Raising the probability to 90%, same CEP, calls for 110 MT. By such arithmetic the Air planner can establish "requirements" for 60 MT, 120 MT (as SAC now talks in briefings) or any other number without limit. For example, such arithmetic applied to the ICBM can justify 300 MT or higher. As one pushes probability toward certainty, required yield approaches infinity.

As for the factors of degree of damage and target element to be destroyed, they not only affect the yield importantly, but largely determine the type or height of burst, ground or air. When SAC calls for high probability of catering runways, with high CEP, the yield required for single weapon attack is not only high, but the weapon must be ground burst. Fallout from such attacks has been largely ignored to date by all planners except SACEUR, who prohibits ground bursts.

The distinction between analysis by individual targets rather than by systems of targets is most important because by its very nature it insures no allowance for the cumulative effects of weapons upon targets or operations other than those which each individual weapon was intended to destroy. The

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destructive and disruptive nature of nuclear weapons, particular megaton weapons, is such that cumulative or ancillary effects may often be as great or greater than primary damage. Yet in today's nuclear weapon planning they are dismissed as "bonus" effects adding to the certainty of success. Radioactive fallout upon enemy and friend alike, as well as world-wide, are among those effects so lightly dismissed as "bonus".

A current DOD study questioned this procedure, pointed out that "bonus" effects result in tremendous over-kill, and concluded that analysis by systems rather than by individual targets, using the same procedures and calculations, would show that kilotons rather than megatons are more than sufficient to achieve desired destruction. This study was rigorously suppressed and all copies destroyed. It lent support, however, to the growing doubt regarding the validity of current military requirements for nuclear weapons and the missiles to deliver them.

Another major area of guesswork lies in the choice of operational factors; how many planes or missiles get through; how many find the target; how accurately do they bomb. Little intelligence or usable experience is available. The guesses for such questions largely control aerial weapon requirements.

In summary then, the planner for air attack with nuclear weapons can generate requirements for any number or yield of weapons which he desires. By his interpretation of intelligence he can select an almost infinite number of targets for destruction, and of characteristics justifying any yield he wishes. It is he who estimates losses and aborts before penetration of enemy defenses. He also estimates losses to the latter. And he makes

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allowances for destruction of his own weapons by initial enemy attacks. Weapon requirements are directly proportional to the choice of such factors, but the remaining factors of the problem can multiply requirements manyfold. Bombing error, probability of damage, degree of damage, and elements to be damaged can each multiply the required yield of weapons (or the number if yield is limited) manyfold, and do. Requirements so generated are limited only by conscience, financial resources, or production capacity. Since the first is flexible and the second has imposed no restraint as yet, only production capacity has so far limited weapon requirements. The close correlation between SAC requirements and AEC production capacity over a period of years is not coincidence.

The Army planner makes guesses too, such as: how many troop concentrations will form; how many can be detected; how effectively can they be attacked with atomic weapons; how scattered will they be. But the Army planner has a different viewpoint than the air planner. Besides the elusive nature of his target, he is acutely aware of the damage that explosives can do, to him as well as to the enemy if he is not careful. He has often seen high explosive effects, although not nuclear, at first hand. The air planner has seldom seen the results of his own bombing. Consequently, the Army nuclear planner is subject to almost automatic restraints, which do not apply to the reasoning of the air planner. And the results are quite different.

Mr. Murray is in no position to substitute his guesses for those of the military, and it is these guesses that largely determine the numbers and types of weapons. He may have a point on the maximum yield question, but

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even here his conclusion appears to stem from emotion rather than fact. Neither he nor any other civilian can properly or successfully challenge the mathematics or the military factors which generate weapon and missile requirements.

I believe his contention that financial cost dictates stockpile composition is mistaken. Cost is a factor, of course, but only one of many involved in stockpile decisions. The controlling factors to date have been the over-riding urgency of preparation for the worst eventuality (massive exchange); the belief that other eventualities would allow time for adjustment of military posture; and the belief that weapon requirements as now estimated are not sufficiently valid to justify expansion of nuclear material production capacity.

The estimating of military requirements for atomic weapons is still in the "stone age" of development. Certainly you among the Commissioners should be fully aware of this fact in weighing Commission response to requirements expressed by the military.

I have omitted Naval atomic planning because it hovers between the two extremes and has not appreciably influenced the situation. Currently the Navy is playing its customary role of intermediary, although the strong influence of Naval air thinking tends to push the Navy position toward that of the Air Force. This probably accounts for its present support of the Air position on the big weapon and the low priority accorded "clean" weapon development.

In explanation of my qualifications to discuss atomic planning, I served for three and one-half years as Head of General Norstad's Atomic

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Planning Branch within his Air Operations Directorate. I know the plans of that Theater in detail, and all others in general, as well as the procedures by which weapon requirements are prepared by each Theater, assembled, tailored, and endorsed by the JCS as DOD requirements. I also know how developmental guidance is generated - and why we in AEC receive so little.



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