The atom grows up

Atomic Shield, 1947/1952, Volume II of a History of The United States Atomic Energy Commission
By Richard G. Hewlett, Francis Duncan
718 pp. Pennsylvania State U. P., 1969. $11.95

Reviewed by Craig Hosmer

From almost any standpoint, *Atomic Shield* is a remarkable book. As history, it is an exceptionally well researched and objective volume on a largely overlooked period of the nuclear enterprise—from the appointment of the first Atomic Energy Commissioners in 1947 through the end of the Truman Administration in 1952. As literature, it should and will be "must" reading for those intimately involved with the atomic-energy field.

But perhaps its greatest importance lies in its relevance to the Commission today. What the Commission has become since 1952 is almost directly related to the momentous events of those six years.

This book can not be classified as a public relations "puff piece" for the AEC. The authors, Richard G. Hewlett and Francis Duncan, although professional historians on the Commission staff, were given a free hand to write the history as they saw it. Their success is evident on the first page where they describe former Senator Kenneth D. McKellar of Tennessee as a senile old man with a mind warped by age and smoldering hatred—hardly normal respect for the Congress from a government agency. The authors duly record the Commission's successes as well as its failures (for example, the neglect of the genetic effects of radiation during the early fallout studies).

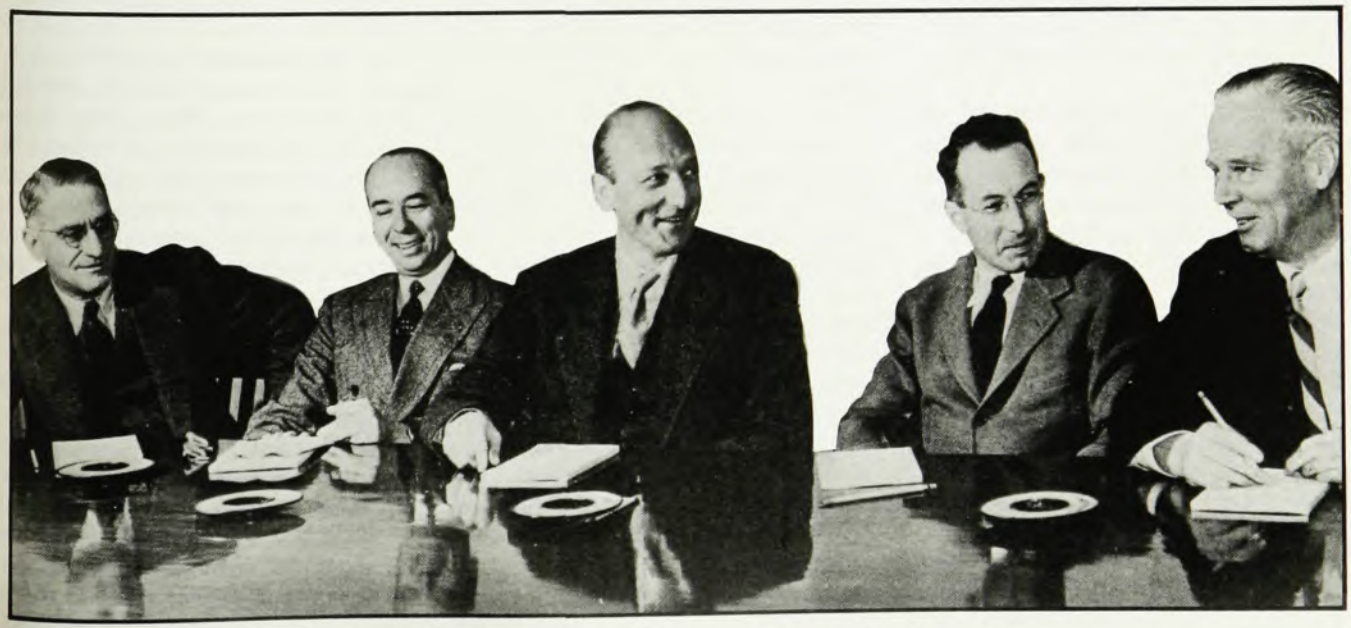
Understandably, the Commission appears as the hero but in a strange role. Although a prevalent image of the AEC today is of a sinister, secretive and militarist organization, the Commission (with the exception of Lewis Strauss) emerges as almost dove-like in comparison with the real hawks—the Joint Chiefs of Staff, the Joint Committee on Atomic Energy, Edward Teller and Ernest Lawrence.

Perhaps the most fascinating thing about *Atomic Shield*, as with all the current atomic-history books, is that the majority of the central characters are still alive and still involved in the program—men like Teller and Strauss, Alvin Weinberg, Hyman Rickover, Glenn Seaborg, Walter Zinn, Norris Bradbury and David Lilienthal.

No one acquainted with Alvin Weinberg could not enjoy the sections on the dark days at Oak Ridge National Laboratory when the irrepressible Weinberg almost single-handedly saved the laboratory from extinction by pestering the Commission with an endless string of proposed reactors. Some things never change.

And Teller's friends will appreciate how the volcanic physicist stormed out of Los Alamos in a fit of temper, only to have Livermore established as a second weapons laboratory to keep him happy and hard at work on the hydrogen bomb.

Another interesting vignette deals



Original Atomic Energy Commission named in 1947. Left to right are William W. Waymack, Lewis L. Strauss, David E. Lilienthal (chairman), Robert F. Bacher, and Sumner T. Pike.

with Admiral Rickover's arrival on the nuclear scene in 1946. The authors relate how the then Captain Rickover had "second thoughts" about embarking on his now legendary career in nuclear propulsion because of the tenuous nature of the program. Apparently, had Admiral Earle W. Mills of the Bureau of Ships not persevered, Rickover might have never joined the program. How history is made in such small moments.

It is also worth noting that in January 1947 Zinn was counseling the Commission that "the only hope for power reactors" lay in breeders. Although Zinn's foresight has been fully verified by time, the Commission is still slow on the uptake.

The book's central topics are the development of the atomic stockpile and the questions and frustrations surrounding development of the "Super" (hydrogen) bomb, hence the title. However, the authors deal in detail with the genesis of the peaceful atom as well, for example, the early controversy over the propriety of AEC support for basic research; the organization and operation of the Commission and its field offices; the problems with labor relations, security and the communities of Oak Ridge, Richland and Los Alamos; the beginnings of reactor development at Argonne, and the origins of the national laboratories.

Chapter 3, titled "First Venture," is a treasury of exciting detail regarding these first steps towards civilian uses of atomic energy. In this chapter, Weinberg first broaches the subject of water reactors; the Commission warily ventures into the field of high-energy physics and begins to assemble its research staff.

With that background, chapters 14 ("Changing the Patterns of Administration") and 15 ("Science: Shield of the Free World") reveal in striking detail the changes in practice and attitudes that had developed between 1946–47 and the 1950–52 era, and they were significant.

Yet military considerations dominate the book because of the international pressures of the period. A recurring but generally unappreciated theme in this regard is the continuing conflict between civilian and military control of the atom, an issue that supposedly was put to rest with passage of the Atomic Energy Act of 1946. This led to tension and distrust between the Commission and the Military Liaison Committee and to the hostility of General Leslie R. Groves towards the new civilian officials.

Other high points include the unrelenting pressure of the Joint Chiefs for more and more weapons, the reluctance of the Commission and its General Advisory Committee to develop the hydrogen bomb, the Joint Committee's power play that forced the decision to proceed with the "Super" and the impact of the first Soviet nuclear-weapons tests.

If *Atomic Shield* has any shortcoming, it is in the authors' failure to convey fully the international tensions of the era, which necessitated many of the decisions on weapons production. Although they do acknowledge the Soviet threat in Europe, the Korean war and the Soviet rush towards becoming a nuclear superpower, the authors do not present the true gravity of the situation. The result is that both the decision to build up the fission stockpile and President Truman's go-ahead on the hydrogen bomb take on the appearance of mistakes.

Hewlett and Duncan were given access to a wealth of previously classified records and private journals, notably those of Gordon Dean, who succeeded Lilienthal as chairman of the Commission, and those of the powerful general manager, Carroll Wilson. *Atomic Shield* contains more new information than did the equally outstanding first volume in this series, *The New World 1939/1946*, published in 1962. The authors admit, however, that the book lacks many still-classified details and figures, particularly regarding development of the hydrogen-bomb, that would have added greater meaning to the decisions.

The authors are beginning work on a third volume, probably due in 1977, of Commission history that covers the Eisenhower era, including the Oppenheimer hearings, "Atoms for Peace" and the advent of the nuclear missile.

This book probably will not make any best-seller lists, which is unfortunate. After two popularized, emotional and highly inaccurate books early last year, *Careless Atom* and *Perils of the Peaceful Atom*, this book could give the public a far better understanding of the Commission, its problems and its enormous successes.

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Selected Scientific Papers Of Egil A. Hylleraas, Vols. 1, 2

J. Midtdal, K. Thalberg, H. Wergeland, *eds.*
445 pp. NTH Press, Trondheim, Norway, 1968.

Collected works have many uses. First of all they serve as an easy access of articles, published in journals and in more restricted reports. However, they provide much more; they are the raw material for the understanding of the psychology of invention; they also tell us more about the author's personality.

In the present case all three purposes are admirably served. Anyone who studied quantum theory knows Egil Hylleraas's name for his great success in exploiting variational approximations to describe correctly the ground state of helium. (It is amusing that the special variables, which make the calculations so successful, were called by him *s*, *t*, *u*—the same three letters picked by Stanley Mandelstam for another clever set of variables.)

His contributions, however, do not stop here. Reading his papers we face the works of a man who has found, in quantum theory, a comfortable home. His interests were not as much with the foundations of the theory but with its applications. These he pursued with great taste and elegance. Everywhere the brilliant interplay between physical insight and mathematical penetration is manifest. For example, his desire for physical applicability led him to pose for the first time the inverse-scattering problem: how to construct the potential from the phase shifts. His understanding of eigenvalue problems and the use of variational approximations served him well outside quantum theory too. Two papers deal with the normal modes of a closed rotating ocean.

Clarity and penetration can be perhaps best seen in his 140-page introduction to quantum mechanics and its application to one- and two-electron problems, published in 1932. Even today it can be read with profit. The approach is very straightforward; it uses both operator methods and the conventional methods of differential equations, whichever is more convenient. The hydrogen atom, for example, is solved utilizing the Lenz vector, the additional constant of the motion