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ROLE OF THE ATOMIC ENERGY COMMISSION

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ABSTRACT

Public health aspects of nuclear explosions fall into two categories: (1) operational safety during the conduct of the explosion; and (2) the regulation of by-product material resulting from the explosion. By statute, the AEC has the responsibility for both assuring operational safety and regulating by-product material.

Current AEC safety and regulatory practices are described; future problems or needs discussed; and relationship to federal, state and local governments outlined.

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It is with considerable trepidation that anyone presumes to speak on the future role of a government agency in a hypothetical future. As I am sure you are well aware, there are many factors that bear on this subject, not the least of which are the prerogatives of the U. S. Congress and the President in matters of executive branch organization and reorganization. Thus, anyone has to speak on this subject with certain qualifications.

I take some cheer, though, in the fact that one of the things carved in stone in Washington is: "What is past is prologue." With this in mind, I believe we can look at the present responsibility and authority of the Atomic Energy Commission (AEC) and their source in the Atomic Energy Act and draw some conclusions about the probable role of the AEC in the event that Plowshare technology finds large-scale use.

For purposes of simplification, I would like it understood that I am speaking about the role of the AEC solely in connection with the use of Plowshare technology in the U. S. However, in light of our obligations under Article V of the Non-Proliferation Treaty, it is clear that the AEC will also have a role in furnishing nuclear explosion services in other countries.

The basic mission of the AEC is found in the Atomic Energy Act of 1954, as amended, where the AEC is charged with promoting, "the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public." The Act further charges the AEC with establishing "by rule, regulation, or order, such standards and instructions to govern the possession and use of special nuclear material, source material and by-product material as the Commission may deem necessary or desirable to promote the common defense and security or to protect health or to minimize danger to life or property."

It is also worth noting that the Atomic Energy Act stipulates that subject to the paramount objective of assuring the common defense and security, atomic energy should be directed "toward improving the public welfare, increasing the standard of living, strengthening free competition in private enterprise, and promoting world peace." Strengthening free competition in private enterprise has provided a keynote that the AEC has faithfully followed in developing all the peaceful uses for atomic energy, including Plowshare. Basically, this provision has been taken to mean that in developing any particular use for atomic energy that the AEC role should be to continue its development only until it can demonstrate the practicality of a particular use. Once that has been done, the AEC has tried to confine its role to the minimum necessary to meet its health and safety or other responsibilities and to leave exploitation of the developed technology to industry or other entities which have such roles in our society.

To implement the Act, a Commission is established, composed of five Commissioners appointed by the President, one of whom the President designates as Chairman. The Commission is, of course, the policy making body of the AEC. The agency the Commission heads is then divided basically into two distinct and deliberately separate areas, one under a General Manager and one under a Director of Regulation. For purposes of understanding AEC roles, this distinction is very important.

Under the General Manager are the operational and promotional functions of the agency. These functions include research and development programs, such as Plowshare, in which technology is developed to be made available to others.

The Director of Regulation is responsible to the Commission for the licensing and regulatory responsibilities laid down in the Atomic Energy Act. These include the licensing of reactors, special nuclear, source, and by-product materials; the development of proposed standards for radiation protection as well as corresponding rules and regulations; the inspection of licensees for compliance; and the development and administration of programs with the States in the field of licensing and regulation.

Both the operational and regulatory sides of the AEC can be expected to have a continuing role in Plowshare in the event of its large-scale use.

Up to now, the operational side of the AEC has been concerned with developing the technology for peaceful nuclear explosions, including carrying out the necessary experiments to determine the feasibility of various applications, such as excavation, gas stimulation, gas storage, copper leaching, and oil shale recovery. In these experiments, such as Gasbuggy, the AEC has been responsible for insuring the health and safety of the public.

On the regulatory side of the AEC, in anticipation of the eventual commercial use of this technology, the staff has been looking at the question of regulations for distribution of products such as natural gas that will be produced with the aid of nuclear explosions.

Before proceeding further to talk about a "future role," however, I think it would be desirable to say a word about "present status" of the Plowshare technology. As we see it, the program has entered a transition period where some of the applications are approaching a practical or "commercial" level. I stress the words, "entered," "some" and "approaching." None of the applications being developed have as yet reached that stage; nor will they all reach it at the same time. Some applications are more advanced than others and will therefore be ready for commercial use sooner.

Since Plowshare began some twelve years ago, we have always foreseen and have been working toward a situation in which the AEC will be providing a "commercial" nuclear explosion service for "developed" activities. We have also recognized that because of the uneven rate of development of the various applications, we would continue to have an experimental program.

To provide for this future, Mr. Hosmer has introduced legislation in the U. S. Congress, supported by other members of the Joint Committee on Atomic Energy, which would provide the AEC authority to carry out detonations for other than strictly AEC research and development purposes. This legislation also charges the AEC with making provisions in its contracts, for the service, relating to the protection of health and minimization of danger to life or property.

Regarding this future "commercial" explosion service, I believe it is clear as far as we can see that the legal requirement for the government to maintain custody and control of the nuclear explosive will continue. Therefore, the "commercial" nuclear explosion service will consist of the design and fabrication of the nuclear explosive, its transportation to the emplacement site, supervision of its emplacement, and its arming and firing. The service is also seen as including appropriate technical reviews of the proposed detonation,

such as those necessary to fulfill AEC safety responsibilities connected with the detonation.

In other applications, where we would still be conducting research and development experiments, I do not foresee the situation being much different than it currently is.

In the foregoing discussion I hope I have conveyed my feeling that, because the program has been evolving gradually in the commercial direction, we do not foresee a dramatic, clear-cut transformation of Plowshare. We expect a continuing evolution, not a revolution. This is true not only for the technology, but also for the standardized procedures needed for commercial operations in such areas as security, indemnification, site disposal and health and safety. I believe various "roles" will evolve just as the technology and procedures evolve.

Having set the stage for the future, I would like to turn now to a more detailed discussion of how the future role of the AEC might evolve for providing a "commercial" nuclear explosion service, with particular reference to the health and safety field.

Essentially, I believe the health and safety role of the AEC can be expected to remain the same as it is now. From an operational standpoint, whether the detonation is for experimental purposes or for commercial applications, the AEC will undoubtedly be responsible for a final evaluation to insure that steps are taken or available to avoid any effects of the nuclear explosions materializing into a hazard to life or property.

A very significant step toward handling the safety function in a commercial situation has already been taken in our current procedures for working with industry in joint experiments. Starting with the Rutison experiment, the AEC has been expecting industry to collect the required data and to develop a comprehensive safety plan. In these early joint experiments with industry and until appropriate criteria are developed and published, the AEC is working closely with industry to provide guidance in the development of these safety plans.

Accordingly, using the rationale that our current procedures provide some useful clue to our future activities, I'd like to sketch briefly how we handle the safety function in joint experiments with industry today.

First, I want to emphasize that safety, even in these joint experiments where industry is assuming a greater role, is not simply an added factor to be considered after an experiment is designed. It is not, so to speak, an appendage to the main body of an experiment. Rather, safety is an integral part of an experiment, from its inception, through the planning, the selection of the proper explosive, its

fielding and execution. This may seem to be an obvious point, but we so often hear safety spoken of as something apart from an experiment--an afterthought to its actual design--that I believe it is essential to emphasize that safety has to be built into any future Plowshare project from the start, just as it is today in our experiments.

Currently, the Division of Peaceful Nuclear Explosives (DPNE) has assigned responsibility to the Manager of the Nevada Operations Office (NVOO) to work with industry in the planning and execution of these Plowshare nuclear experiments in conjunction with the scientific laboratories. This procedure insures that all the experienced organizations and technical and operational resources that have already safely detonated hundreds of nuclear explosions are available in the planning and execution of joint industrial experiments. This, of course, includes our hosts for this important symposium--the U. S. Public Health Service.

As the detailed safety plan is developed setting forth the monitoring and safety procedures, it is reviewed by Nevada's Effects Evaluation Division and other participating agencies such as the U. S. Public Health Service. Every effect of the explosion is analyzed in terms of its potential for creating a hazard. Specific problems not previously encountered can be referred to consultants from universities, industry, or other government agencies having expertise in the problem area.

In addition, plans for the explosion are reviewed by the Test Evaluation Panel. This panel's primary responsibility is to ensure that every feasible measure is taken to prevent inadvertent releases of radioactivity. Extensive reviews are made by the panel of the construction of the emplacement hole, the geology of the site, the location of other holes in the vicinity and the stemming plan for the emplacement hole.

After all the detailed planning, reviewing, cross checking and double checking is completed, and the Manager of NVOO is satisfied that the explosion can be conducted safely and that precautions have been worked out to cope with any eventuality, no matter how remote, execution authority is requested through DPNE from the AEC. Final responsibility for assuring the safety of any nuclear detonation resides, of course, with the AEC and the AEC must give specific authorization for each detonation.

The AEC's safety responsibility does not end with authorization of the detonation. Safety reviews continue up to the actual detonation. At any time, up to the final second, an AEC Test Manager can stop the test if any indication arises that it might create unacceptable hazards.

That briefly is the safety role the AEC plays in joint experiments with industry. Let me add that we recognize the need for and are developing some generalized guidance and criteria for radiation,

ground motion, and air-blast so that industry can know with some certainty what will be required of it in connection with Plowshare projects. Until formal criteria are available, however, we will continue to work closely with individual companies in providing them guidance on these matters.

I might add at this point that the AEC also has a general responsibility for seeing that the data on which our reviews and evaluations are based are continually reviewed and refined. In order to fulfill this responsibility, the AEC supports an active research and development effort in subjects related to safety. A specific example of this general effort in the case of Nevada is its Panel of Safety Consultants, composed of recognized authorities in such fields as hydrology, geology, structural engineering, geophysics and soil and rock mechanics. This Panel reviews the safety program associated with nuclear testing and recommends what directions new research should take.

In order to make this as comprehensive a commentary as possible, I'd like now to touch briefly on the AEC's regulatory role in the event of large-scale use of Plowshare technology.

The Atomic Energy Act of 1954, as amended, provides that the AEC is responsible for governing "the possession and use of special nuclear material, source material and by-product material...to protect health or to minimize danger to life or property." By-product material is defined as "radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material." As the radioactivity intermixed in products recovered by using Plowshare technology would be "by-product" material under this definition, it will be subject to regulation by the AEC.

The AEC regulates by-product material by granting licenses or exemptions from licenses where appropriate. That is, no person may manufacture, produce, transfer, acquire, own, process, import or export by-product material unless he has been granted a license or an exemption by the AEC.

The regulatory process as it applies to the distribution of products containing by-product material was discussed earlier in an excellent paper by Dr. Western and Mr. Rogers--for those of you who didn't hear it I urge you to obtain a copy and read it. Since they covered the topic so thoroughly, I don't intend to go into detail here.

Briefly, as Dr. Western and Mr. Rogers indicated, the distribution of Plowshare-recovered products on a commercial scale involves different factors than those considered by the AEC in its present

regulations. Accordingly, regulations, specifically addressed to Plowshare applications, will have to be developed. This is not to say that our present regulations and experience will not provide some useful guidance. Here again, as we found in our discussion of operational safety, and as Dr. Western and Mr. Rogers also pointed out, in controlling the public distribution of other products containing radioactive material, there are many factors that have received extensive consideration by the AEC that are also pertinent to the development of regulations for the control of distribution of Plowshare products.

For example, the AEC has exempted from license certain consumer products, such as luminous wristwatch dials or compass needles, containing by-product material. In those cases, it is simply not practical to regulate users of the product. Instead, the AEC has developed criteria for determining whether the product sufficiently limits its potential for exposure to members of the public to justify exemption of its possession and use from regulatory control. In these cases, regulatory controls are applied to the producers, importers or distributors of the product to assure that the exempt product meets the specified requirements. The consumer product exemption situation is similar to the situation of Plowshare recovered products where again it is not feasible to license directly all the users of products.

Dr. Western and Mr. Rogers pointed out some of the considerations that should be taken into account in developing suitable criteria for distribution of Plowshare products. These include:

1. The contribution of the Plowshare-produced product to the national welfare.
2. The feasibility of limiting radioactive contamination of the product, as released by a licensed producer or processor, to acceptable levels.
3. Possible and probable exposures to individuals and population groups as a result of exemption of the product from regulatory control under specified conditions.

In addition to these general considerations, as in other areas of regulation of radiation, the development of criteria and regulations for distribution of Plowshare-recovered products will be guided by the recommendations of the International Commission on Radiological Protection, the National Council for Radiation Protection and Measurements, and the Federal Radiation Council.

There are two other points that Dr. Western and Mr. Rogers brought out that bear repeating in this brief summary of their remarks. First, our regulatory staff does not believe it will be appropriate or reasonable to establish a single limit applicable to

all situations. Second, it is likely that the regulatory controls that will initially be imposed on distribution of Plowshare-recovered products will differ from those at a later time when the technology has been more fully developed, when pathways of exposure and the affected population groups are better identified, and when the accuracy of theoretical exposure models have been confirmed by field assessment.

In conclusion, I think it can safely be said that the role of the AEC in the event of large-scale use of Plowshare technology is expected to evolve gradually with time and the changing state and needs of the technology. We believe this is both administratively wise and technically sound. We hope you agree.