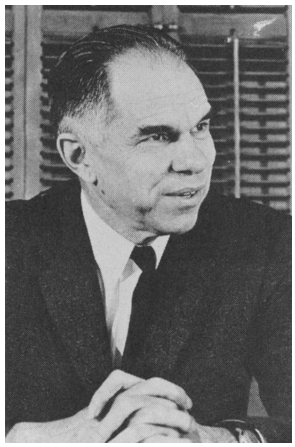
# COMMENTARY

## NUCLEAR PROGRESS: AN OPTIMISTIC OUTLOOK



The noted English author, G. K. Chesterton, once defined optimism as "the noble temptation to see too much in everything". In spite of this definition, I cannot help but call myself an optimist when it comes to discussing the future of the atom. All the facts and figures, all the events of the day, lead me to the belief that during the coming years the nuclear industries are going to show an encouraging expansion. The past has indicated, and I believe the future will prove, that there is a very large number of uses to which the atom can be adapted. This is not surprising. What else can offer us either the extreme sensitivity of a process such as neutron activation analysis or the tremendous power of a Plowshare device for earth moving or excavation? The range and versatility of nuclear energy make it a source of energy, the uses of which seem limited only by man's fertile imagination.

During the coming years the future exploration of nuclear energy and its many applications will be continued enthusiastically. The fact that there is a need for a new publication concerning nuclear applications is in itself a healthy indication of a growing interest in nuclear energy and the ways in which it can be put to work. Looking ahead I feel that the next decades will be decades of excitement. But also ahead of us lies a great deal of hard work. On the basis of our current programs and progress let me briefly indicate some of the directions this work will be taking.

Because of the rapidly growing demand for electricity the atom's greatest impact will probably be in the field of civilian nuclear power. Here we should see substantial progress in the coming years. The recently issued survey of the Federal Power Commission indicates that by 1980 nuclear power will be supplying 70 000 MW of electricity in the United States. This large increase in power will be generated primarily by pressurized-and boiling-water reactors employing the technology successfully in use today.

But during this period we will also be at work developing new reactor technology. Most of our governmental efforts will be toward the development of advanced convertor and breeder reactors. These reactors, designed to utilize more efficiently $^{238}U$ and $^{232}Th$ as well as $^{235}U$, will be necessary if we are to make better use of our uranium and thorium ore supplies. The construction of newer, larger and more efficient reactors will have a significant effect on power costs, making more electricity available to a greater part of the nation for less money.

Concurrent with the development of new reactors will be a continuing demand for innovations in supporting functions, ranging from the intial fuel processing through the management of radioactive wastes. All this should stimulate some healthy activity within the nuclear industries.

In addition to the use of nuclear power to generate electricity, we anticipate its successful use for desalting. A nuclear desalting program embodying international cooperation is one which is receiving the vigorous support of President Johnson. Many areas of the world will be looking forward hopefully to what we can accomplish in this field.

Aside from allowing us to extract fresh water and minerals from the sea, nuclear power is going to bring us closer to the sea in other respects. The Nuclear Ship Savannah having pioneered her way to distant shores, and into the confidence of those who have seen and worked with her, has encouraged the construction of more nuclear merchant ships. With the Savannah's success evident, talk of the advantages of nuclear propulsion is rapidly giving way to action. New nuclear ships are planned and will be constructed in the years to come, ships with smaller reactors, yet with more power and longer core life. Ships such as these may offer a

key to the revitalization of America's maritime trade. And while we cross the surface of the ocean, courtesy of the peaceful atom, we will have, through another type of nuclear propulsion, the means of better exploring the least known two-thirds of our planet.

Undersea exploration employing nuclear powered submarines carrying auxiliary nuclear research equipment should produce abundant scientific and practical knowledge of the oceans. The time may not be far off when man will spend a great deal of time at the bottom of the sea supported by power from compact nuclear reactors. Already SNAP isotopic power is being used to operate ocean buoys and floating weather stations as well as undersea navigational aids.

Auxiliary nuclear power from the radioisotope is now playing an important role in the nation's space program. The development of SNAP reactors for use in space is also moving ahead at an accelerated pace. The usefulness of these long-lived power sources will become more and more apparent the farther into space we go and the longer we remain there. To conquer these vast ranges of distance and time our space explorations will need the endurance of the nuclear rocket. The recent progress in the AED-NASA program, Project Rover, gives us hope that by 1980 rockets equipped with nuclear propulsion systems will be operational. It will be this type of rocket which will provide us with the capability of undertaking manned and unmanned solar system probes and planetary missions. And should we discover some celestial outpost at which we wish to camp for any length of time, it will most certainly be some form of nuclear energy which will sustain us during our stay.

But let me bring us down to earth, literally and figuratively, by saying that in the coming years some of our most immediate benefits from the atom will continue to come from the many applications of the radioisotope in medicine, agriculture and industry. Those applications in use today will find an expanding market, and many new uses will be discovered and adopted by a growing number of industries.

Offering other earth-bound uses of the atom, though of a far different magnitude, will be the peaceful applications of nuclear explosives. In the not too-distant future we believe that nuclear excavation will be utilized to perform significant engineering feats, probably calling for, and hopefully fostering, a great deal of international cooperation.

During the time that these newsworthy events are taking place, perhaps given less publicity but also of great importance, will be the accomplishments in the laboratory—the creation of new transuranium elements, progress toward controlled fusion, and the continued basic reasearch into the structure of matter and energy. All of these efforts will be vitally important and capable of revealing unique secrets and surprises at any time.

I am convinced that the nuclear field has a bright future and that it is going to provide us with some stimulating and challenging adventures in the years to come. I hope my optimism is shared—for now is the time to get on with the work—the business of transforming the many promises of the atom into realities.