TO Mr. John F. Ahearne, Chm
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Washington D.C. 20555

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SUBJECT: Docket 50-289 SP 50-289 DATE: 12/13/80

FOLD ◀ TMI - Unit 1 Middletown Pa

Dear Mr. Ahearne:

It has recently come to my attention that the accident at TMI-2 also forced the closure of TMI-1. Since this unit was not involved in any way it is obviously political discrimination that keeps it closed while other power plants are operating while making the modifications your agency is insisting on. What is sauce for the goose should be sauce for the gander.

I know your agency is subjected to tremendous pressure - pulling and hauling at you in all directions. However, show a little guts and get with it now before it is too late - on all the issues. Perhaps Carney's article can give you moral courage.

Sincerely,

Fred M. Emens

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Rev. FREDERICK S. CARNEY

An Ethical Analysis of Nuclear Power

Energy decisions pose dilemmas involving ecological, political, economic and even psychological factors, but even when ethical considerations are isolated, limited nuclear development is acceptable

Two-and-a-half years ago President Carter observed that "there is no dilemma more difficult to resolve than that connected with the use of nuclear power. Many countries," he said, "see nuclear power as the only real opportunity, at least in this century, to reduce the dependence of their economic well-being on foreign oil." He went on to say that "the United States, by contrast, has a major domestic source—coal—but its use is not without penalties, and our plans also call for the use of nuclear power as a share in our energy production." These earlier words of our President seem equally fitting today, especially those pertaining to the very great difficulty we experience in attempting to resolve the dilemma about the role of nuclear energy in the generation of electricity.

Among the components of this dilemma are ethical considerations. Other components include considerations of science, technology, economics, politics, law and (especially since the accident at Three Mile Island) social psychology. These varied components are intricately interwoven with each other in the actual assessments we are called to make about nuclear power, so much so that it is often difficult, if not impossible, to address any one component in isolation from the others. For example, whether we should locate a nuclear power plant near a geological fault line, and if so how near, involves considerations from all of these components. Nevertheless, in order to examine the issues involved in any one of them—whether economics or politics or whatever—it is often necessary to isolate that component as much as possible and to focus attention upon it, even to the partial disregard of the others. This is what I intend to do in focusing attention upon the ethical component in assessments of nuclear power.

It is unfortunate that not only in matters of nuclear power, but also of energy in general, the present state of ethical analysis has not yet reached the level of maturity we have some right to expect. Moral claims about the production, distribution and conservation of energy that have thus far dominated the public discussion are often very one-sided, or naive or crude disguises for the advancement of self-interest or ill-conceived attempts to impose some highly regimented utopia upon our society. As George Bernard Shaw once observed, some people think they are being moral when they are only being uncomfortable—and, we might add, gratuitously inflicting their discomfort upon others.

The present immaturity of the ethical discussion of energy matters is not a necessary condition of applied ethics. There are other areas in which ethical discussion has become well advanced. I call your attention, for example, to the ethics of medicine, or what is more commonly known today as bioethics. In that field the concepts and lines of argument are well developed, the literature, for the most part, is highly responsible both to the fact situation and to the moral tradition of our Western civilization, the discussion is well defined and rigorous, and the outcome is sufficiently deserving of respect that it has become an increasing part of the professional canons of acceptable medical practice or of government statutes and regulations. Consider, by way of illustration, the extensive and thoughtful contributions bioethics has made to our assessment of nontherapeutic experimentation on human persons. Or of the ethical contributions involved in the macroanalysis of whether the Federal Government should use some of its limited resources to bring it about that a new and expensive high-technology therapy, such as the implanting of a completely artificial heart, becomes a real option in the treatment of heart disease. Yet this rather advanced level of analysis in bioethics has not always prevailed. As recently as 15 or 20 years ago ethical immaturity and irresponsible literature often dominated the public discussion of highly complex moral problems in medicine. Recent and substantial progress in bioethics gives reason to believe that good ethical theory can be applied, jointly with the contributions of other disciplines, to perplexing practical problems confronting our society. Let us hope that we are also on the threshold of a similar favorable development in the area of energy ethics.

If such a development is to occur, it will involve the interrelating of various types of fact situations in energy, as was done in medicine, with the central moral concepts and traditions of our Western heritage, or what Matthew Arnold called "the best which has been thought and said in the world." And it cannot be the accomplishment merely of professional ethicists, sitting down in a corner somewhere and thinking about the problems. Rather it will come about only through a sustained and growing conversation on a national and even international level in which scientists and engineers, lawyers and economists, leaders of business and government and public interest groups, as well as philosophers and theologians, have appropriate roles to play.

For this essay, however, in the absence of such a development I must make do with what is available. No distinguished body of ethical literature focused on energy can be called on. No report of the present state of disciplined moral analysis of particular problems in energy can be made. No shoulders of those who have already made substantial contributions to an ongoing discussion of the ethics of nuclear power are available to stand on. So I shall draw upon

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Wayne should let this article sink in

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the general tradition of ethical theory, and focus my attention on the question, "What does it mean to think ethically in matters of nuclear power?"

In so doing, I could organize my comments around the three basic elements of ethical analysis, namely, values, obligations and moral character or virtue. Values respond to the question, "What objects or states of affairs are good or bad, and which are to be preferred to others?"; obligations to the question, "What morally ought to be done?"; and character to the question, "What qualities or dispositions of persons or, by extension, of society, are commendable or reprehensible?" These three elements, taken together, are inclusive of the entire territory of normative ethics, and it can be shown that each has a role in any adequate assessment of the ethical issues in nuclear power. Nevertheless, I cannot hope in this brief essay to cover each of these elements in all the ways it bears upon the moral assessment of the development of nuclear power in our society. I shall be content to address some major features of value analysis alone from the larger ethical terrain of nuclear power.

In carrying out this limited agenda, I shall also take a particular moral position on nuclear power. This position is one of qualified support for the increased deployment of nuclear power reactors in our society, at least for the next 20 years. This position of qualified support is the one I have come to believe from some years of study of the issues to be the best position to take from the ethical point of view. And I shall give ethical reasons for it. Certainly, some will disagree with me, but I would still hope that this essay would be useful to them by contributing to an understanding of what is involved in thinking ethically about nuclear power, including the taking of a moral position—pro or con—on the deployment of nuclear power.

I

Let us begin with values and disvalues, which you will recall pertain to objects or states of affairs so far as they are considered to be good or bad. The value around which so much of the debate over nuclear power centers is safety. We are all concerned about how safe nuclear reactors and their fuel cycles are because we value safety. But what kind of value is safety? Is it an intrinsic good, that is, something good in itself and nor merely as a means to some other vaue? Is it like happiness or human excellence? Both of these, I think you will agree, are intrinsically good. Surely safety is not this kind of value or state of affairs intrinsically worthwhile in itself. Rather we value safety because of some other values that safety serves. Thus it is an intrumental value, not an intrinsic value. But what values does safety serve, for the sake of which we rightly esteem it? The chief one is the intrinsic value of human life. We are concerned about the safety of nuclear reactors because we attach great value to human lives that might be destroyed or damaged by them. If you have any doubt about the commitment of our society to human life as intrinsically valuable, reflect for a moment on the deep concern of this nation for the lives of American citizens being held hostage in Iran. Or consider the willingness of Americans and others to do all that we reasonably can to try to make food available to hundreds of thousands of Cambodians threatened with death by starvation, even if our efforts serve no other end than that simply of the saving of human life.

Nevertheless, we must ask whether deep within the moral roots of our civilization we have held, and do hold today, that either the instrumental value of safety or the intrinsic value of human life is an absolute value. Is either a value that takes precedence over every other value, a value for the sake of which we would sacrifice any other value that comes into conflict with it? The answer, I think, is no. And the evidence is overwhelming. Here are some examples. We know that thousands of persons will die this year because of cigarette smoking, and yet our concern for human safety and respect for human life do not lead us to prohibit the sale and consumption of cigarettes. Why? Because we also value human autonomy, the principle that persons should have freedom when its exercise does not harm others to plan their own lives and to take the consequences for their own decisions. We know that by investing considerably more money in the design and contruction of highways we could improve their safety record and prevent the death of many persons every year. Why do we not do so? Because we are also committed to other values that make demands upon our resources, such as the education of our children, and we are unwilling to make absolute the saving of human lives at the price of the impoverishment of human minds. We know that the mining of coal causes over a thousand deaths every year, by accident and disease, and yet we do not refrain from buying and burning coal. Why? Because the burning of coal serves a number of values associated with the heating of homes and offices, the operation of industrial machinery and the generation of electricity.

If safety and human life are not absolute values, is there any value that is? If there is, it would have to be an inclusive value, one in the commitment to which we are thereby committed to all other true values. I can think of only one candidate that might have a legitimate claim to be an inclusive value, and thus absolute. That is the love of God. In loving God we presumably love everything worthwhile in His creation. All other values, including safety and human life, are relative, however important they may be. Thus they sometimes conflict with other values. And when they do, each one, including even an intrinsic or end value such as human life, must be assessed in terms of its importance relative to other values. Not to do so is to absolutize what is relative, which is a serious moral mistake. From a religious point of view, it is idolatry.

What then is the relative importance of safety in the nuclear generation of electricity? This depends upon what other values are also at stake. One way of answering this is to consider, along with safety, another instrumental value associated with nuclear power, and to ask what intrinsic values it serves. This other instrumental value I have in mind is the maintenance of the industrial base of our society. The operation and healthy development of our industrial base obviously requires a very considerable amount of electricity, and nu-

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'Our Western civilization has never absolutized safety over all other values, and does not do so today in nonnuclear matters, for example in its tolerance of cigarettes . . . . If the relative value of safety is to make a serious claim to priority over . . . our industrial base, then it must be able to point to the realistic possibility of catastrophe'

clear energy is one of the sources available for providing it. Indeed with the phasing out of gas and oil, it may be one of only two sources—the other being coal—available to us in the near future for major contributions to the supply of electricity for our industrial base. We shall look into this issue shortly. In the meanwhile, let us ask what intrinsic values seemingly depend upon this industrial base? First, there is human freedom, not only for America, but also for a good part of the rest of the world. Does anyone doubt that without a healthy industrial base we would not be able to defend our liberties, and contribute to the defense of other nations, from the aggressions of authoritarian nations? Second, there is humanitarian assistance to large numbers of persons in the third world in their attempts to overcome their poverty and to achieve a reasonable level of economic well-being. Without a lively industrial base we would be greatly impaired in our ability to provide them with aid and to contribute to the development of their economies by the purchase of their products. Third, there is humanitarian assistance to our own people living in poverty, in helping them to achieve through our economic system a significant improvement in their level of living. Would not our capacity to render such assistance be seriously compromised if there is disruption and decline of our industrial base through a deep and sustained energy shortage? Fourth and finally, there are the political liberties associated with the viability of our political and social institutions, and the threat to those liberties if drastic cutbacks in the American economy are brought about by the malfunctioning of our industrial base? Under such a circumstance could our free institutions withstand, and continue to function amidst the social unrest and turmoil that would occur? Or would they be replaced by the imposition of an authoritarian regime intent upon restoring order?

These four intrinsic values are weighty indeed. And any instrumental value essential to their actualization is thereby also weighty. Indeed, our industrial base is so important that any impairment of it, from whatever cause, could be catastrophic to our society and devastating to a wide range of intrinsic values to which we are committed. Such may be the true stakes in our energy controversies today.

Nothing I have said is intended to deny the very great importance of safety in our production of electricity. What I have wanted to make clear is two-fold. First, the ethical structure of our Western civilization has never absolutized safety over all other values, and does not do so today in nonnuclear matters, for example in its tolerance of cigarettes, its construction of highways or its mining of coal. Second, if the relative value of safety is to make a serious claim to priority over the maintenance of our industrial base, then it must be able to point to a realistic possibility of catastrophe at least as great as would be involved if our industrial base is seriously impaired by the imposition of safety constraints. It is difficult to conceive of any accident from nuclear power, however large and however improbable, that would meet this condition. The greenhouse effect on our planet by carbon dioxide emissions in the burning of fossil fuels, such as coal and gas, would seem to be a more likely candidate. Nevertheless, I have not shown in this value analysis that nuclear power is necessary, or even desirable, for the maintenance of our industrial base, but only that the maintenance of our industrial base has a value priority over safety considerations in all but the most extreme and improbable situation.

II

So what about nuclear power? Is it essential to our industrial base? In order to come to an informed decision on this problem, I shall first address issues related to the present generation of light-water reactors, and then comment on breeders and reprocessing. Regarding the first of these, the following questions of fact need to be addressed. 1) How much electricity will be needed annually in the next 20 to 40 years? 2) What energy sources (nuclear, coal, solar, etc.) can be made available for providing the needed electricity? 3) What is the relative safety of the sources that can be made available? 4) What prospects are there in the longer term for new sources of electricity?

Here are brief answers to each of these questions. 1. We now use in America approximately 79 quadrillion B.T.U's (or quads) of energy each year. About 36 percent of this (or about 28.5 quads) is electricity. Energy use grows every year, and estimates by experts of our use by the year 2000 range from a high of 143 quads (an 81 percent increase in 20 years) to a low of 85 to 90 quads (only an 8 to 15 percent increase). The middle ground runs somewhere around 115 quads (a 46 percent increase). In any event, the electricity component is expected to grow much faster than the other components, perhaps to as high as 50 percent of the total (from 36 percent), which on the middle range of energy estimates would entail a doubling of electrical use by the year 2000, or from about 28.5 quads to about 57 quads. There is some possibility of replacing electricity by other forms of energy, such as direct solar water and space heating. But there are a number of factors militating against much electrical reduction in this manner, the chief of which is that heating constitutes only a very small part of electrical use, most of it being done by direct oil, gas and coal burning. And it is quite likely that the net balance will move the opposite way, that is, electricity picking up roles now performed by other forms of energy, such as would be involved if we were to move massively in the direction of electric automobiles. A more promising possibility in restraining growth in the use of electricity is conservation, promising, that is, so far as both magnitudes and probabilities are concerned. But even though every reasonable opportunity to conserve electricity is pursued (as surely it should be), we shall still need to anticipate a very substantial increase in electrical use in the next couple of decades.

2. Present energy sources of electricity are the following: about 48 percent from coal, 17 percent from oil, 13 percent from nuclear, 11 percent from natural gas, 10 percent from hydro and less than 1 percent from other sources. Most of the 28 percent

from oil and natural gas will probably have to be replaced by the year 2000 in order to avoid being held hostage to foreign oil producers, or facing ferocious deficits in our balance of payments and uncontrolled inflationary forces as demand increases for less and less oil. And hydro will grow little, if at all, and shrink as a percent of total energy employed in electricity production. At the same time, the demand for electricity may well grow by 100 percent by then, if the middle range estimates I have provided turn out to be close to correct. From what sources can energy come in the near future to meet this annual increase in electricity demand and to replace the contributions of oil and natural gas? Perhaps a little from geothermal, even less from wind power and ocean gradients, and still less from solar reflector systems and solar photovolatic cells. I should be very surprised if all of these and other so-called "soft sources" combined (but not including hydro) were to provide 2 percent of our electricity by the year 2000. Nothing could be more pleasing to me than to be wrong on this point, but the weight of scientific and economic opinion today provides little reason for hope that I am wrong. So we are thrown back upon nuclear and coal. There is not much else available for doubling our electricity by the year 2000 plus replacing the present oil and natural gas contribution to electricity production. There are now 72 nuclear power reactors on line, another 92 under construction and up to 34 in the planning stage. But because of long regulatory delays, the lead time for building a new one is now about 13 years, and the cost has risen enormously. As a result, almost no new commitments to new nuclear power reactors have been made in America in the last three years. The conclusion is clear: We are either going to have to get nuclear power back on the track again, or rely upon coal for over 80 percent of our electricity production by the year 2000 (assuming we actually phase out oil and gas generation of electricity, and find no new and major sources of energy for near-term electricity production), or have a very serious shortage of electricity with its consequent weakening of our industrial base.

3. Why not happily rely on coal for the preponderance of our electricity production? The answer, which will come as a surprise to some, is safety. Earlier I pointed out that while the ethics of our Western civilization has never considered safety to be an absolute value, one that takes priority over every other value, it has held that safety is a very important instrumental value. If we rank the four major energy sources of electricity according to their actual track records regarding safety to human lives (not according to someone's projections as to what might happen), nuclear has been the safest, followed closely by natural gas, then oil and finally (with the worst record) coal. It ought to be noted, however, that the figures generally available on coal generation of electricity lump together all types of coal, as well as all forms of coal mining and coal transportation. This does not do justice to important differences within the overall category of coal-generated electricity. Nevertheless, the comparison of these aggregated results is still instructive. A study by the American Medical Association released a year and a half ago stated that "occupational and nonoccupational deaths directly related to coal-fired electrical plants averaged 300 to 1,500 times higher than those caused by natural gas or nuclear facilities." It also held that "disabling occupational injuries were also far more numerous for coal power plants—176 for coal versus 13 injuries for nuclear power in generating the electricity to supply one million person's needs." In the burning of coal to produce electricity, almost all estimates place the death rate from the emission of carcinogenics at over 1,000 per year, and John O'Leary, former Deputy Secretary of the Department of Energy, says 6,000 to 50,000 each year.

By contrast, there does not appear to have been a single person killed by nuclear fission or its products through a nuclear reactor used for electricity production in all the reactor years of atomic power, not only in this country but (with the possible exception of Russia) throughout the entire world. And even with the worst accident yet in nuclear power generation—the one at Three Mile Island—the H.E.W. conclusion is that of the two million people who lived within 50 miles, only one person would become an added cancer death in the future from the accident. This contrasts with 325,000 persons who will die of cancer from other sources in the same population. The more recent Kemeny Commission Report said that the radiation released is actually "so small that there would be no detectable additional cases of cancer." Dr. Eugene Wigner, a Nobel Prize winner at Princeton University, told Congress recently that "coal plants put out more radioactivity than Three Mile Island did."

The most troublesome aspect of the present switch from nuclear to coal generation of electricity is that we may be destined to end up killing a good many more thousands of persons thereby than by staying with a better balance of nuclear and coal. Our commitment to the value of human life might be served even better by switching out of coal burning altogether. An interesting additional thrust on this problem is that Chancellor Helmut Schmidt of West Germany thinks that the carbon dioxide greenhouse effect on the earth's atmosphere by the burning of coal may also require us to switch out of coal soon, and back into nuclear. He is quoted in Time magazine as pointing to the "great danger that if nuclear energy is not developed fast enough, wars may become possible for the single reason of competition for oil and natural gas."

4. In the longer term (that is, beyond the next 20 years) there may be new sources of electrical energy available to us beyond present light-water reactors. These new sources might include fusion reactors, breeder reactors and one or more forms of solar energy. But it is unlikely that any new sources that involve large-scale technology could shorten very much the more or less established pattern of 20 years' lead-time from the point that the decision is made that the technology is feasible and the building of a demonstrator should be undertaken to the point that producing equipment would begin to come on line. If any of these new sources do prove successful, we might then have the option of beginning to phase out light-water reactors. However, that decision would have to depend upon a relative assessment of what the issues at stake were at that time among different

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forms of electricity production. Until and unless we reach that point, I believe that it is going to be essential to pursue and expand our commitment to the nuclear energy available through light-water reactors.

'Nothing I have said supports the judgment that nuclear power itself should be absolutized either . . . . If other energy resources can be developed in the future that . . . produce an equal or better promise . . . there is no reason why we should not proceed to phase out nuclear fission'

Not only is the health of our industrial base at stake, but an industrial collapse would do irreparable damage to the intrinsic values of human freedom and humanitarian assistance. It is in this sense, then, that I am a qualified supporter of this form of nuclear power, at least for the next 20 years.

III

For a number of years a significant component of the American public, including President Carter, has believed that the development and deployment of breeder reactors should be avoided not only in the United States but also in the world at large. Although some persons opposed breeder reactors as part of their overall opposition to nuclear energy in general, others who were willing with proper safety arrangements to continue to deploy light-water reactors were nevertheless against the deployment of breeder reactors. What this latter group had chiefly in mind was a new dimension of the safety problem. For breeders require reprocessing of used fuel, which in turn opens up new possibilities of weapons proliferation by nation states and of terrorism by sub-national groups. Neither the original fuel of light-water reactors nor the used fuel thereof can produce a nuclear explosion in their present forms. Reprocessing may change that and, in so doing, make weapons proliferation much easier and add new options for terrorism. Certainly intentional acts of human destruction or the threat thereof through proliferation and terrorism raise safety questions that deserve careful attention, just as much as do the safety questions of the everyday operation of nuclear power reactors and of the possible accidents involving them.

With this in mind, President Carter in 1977 asked the International Atomic Energy to make an effectiveness and safety study of advanced nuclear technology (including breeders and reprocessing) and the extent of the need thereof. This agency is the organization based in Vienna composed of 111 nation states that has the responsibility, among others, of carrying out the inspections of nuclear power and research facilities in member states required by the safeguard provisions of the Non-Proliferation Treaty. The study was completed and made public in early 1980, and came to a strikingly different set of conclusions from those that President Carter had in mind in seeking the study. It argued that the limited world supply of uranium would be largely depleted in a generation or so, and this would lead to a termination or serious construction of nuclear power, if present light water reactors are not extensively supplemented by breeders and reprocessing. Furthermore, it held that fast-breeder technology is preferable to the technology of light-water reactors on virtually every score.

If this study were merely an ivory-tower analysis, it might be pushed aside, and efforts renewed and expanded to oppose or restrict the worldwide development and deployment of breeder reactors and of reprocessing facilities. But in truth the study is altogether consistent with the dominant direction that is taking shape throughout the world in matters of nuclear power. A number of leading industrial nations and some third world nations, who are without the vast amount of energy possessed by the United States in its coal reserves and have only limited access to dwindling worldwide oil and natural gas supplies, have already concluded that nuclear power is essential to their future beyond the period their uranium supply will be available for a nuclear matrix composed only of light-water reactors without reprocessing. Among the nations presently engaged in reprocessing or committed to it on the basis of their national interests, either in order to extend their uranium supply for light-water reactors or to provide for breeder reactors, are France, Great Britain, West Germany, the Soviet Union, Japan, Brazil, Argentina, India and Pakistan. There is little doubt that other nations will follow in their path. Furthermore, France, which plans to produce 55 percent of its electricity through nuclear reactors by 1985, already has one small breeder on line, another large one scheduled to come on line in 1982, two more in initial stages of development, and intentions to shift the bulk of its future electricity-producing equipment to breeders. The Soviet Union also has a breeder on line and is rapidly building more of them for its predominantly nuclear energy future, not only for electricity production but also for the direct heating of homes and industrial buildings. Britain too has a breeder on line. There seems little reason to doubt that, with their growing commitment to reprocessing, a number of nations are getting themselves in a position to follow France, the Soviet Union and Britain into breeder technology.

The value logic of this development outside the United States is apparently the same that I employed in discussing light-water reactor employment in an earlier section of this paper. Essentially it is that safety is a very important instrumental value to the intrinsic value of human life itself, but that this value does not, except in perhaps the most extreme of possible circumstances, outweigh or even equal the instrumental value of the maintenance or development of these nations' industrial bases upon which so much of the intrinsic values of their cultures depends. Furthermore, there is the belief that the safety problems caused by reprocessing and breeder reactors can be contained and reduced by a number of means, including the development that France is pursuing of a reprocessed nonproliferatable nuclear fuel.

It is worth asking what safety advantages now remain in the self-denying restriction by the United States against a breeder future. By denying ourselves the benefits of breeders and reprocessing we will not thereby reduce the availability of explodable plutonium overseas, either for weapons development by nation states or for terrorist activity. We are simply going to have to live with this new reality, and to seek means to make a worldwide plutonium society as safe as possible. The only safety advantage to us of not reprocessing spent fuel is that it will thereby be easier to deny a terrorist group operating in the United States the

option of using our nuclear fuel (but a group might still obtain such fuel from abroad). At the same time, the United States loses thereby the leverage we have previously had to influence the shape of nuclear power development and safeguards because we will no longer count very much as an international supplier of the most-wanted nuclear technology. West Germany, France and particularly Japan will have the largest part of that role in the near future, and will surely be joined by others.

There are, of course, two very real benefits to the United States of reprocessing. First, it makes the disposal of spent fuel much more manageable, a consideration fundamental to West Germany's commitment to reprocessing. The total bulk of high-level waste is considerably reduced thereby, and what is left possesses less risk of malevolent human intervention because of its greatly decreased utility. Second, reprocessing saves and makes available for future use an enormous amount of energy that would otherwise be discarded. I suppose only the United States, with its long history of energy profligacy, would seriously consider "throwing away" by far the largest part of its uranium potential—very much as some Americans used to kill buffalo merely to take a single tenderloin steak from among all the usable meat. Yet this is one of the outcomes that the false absolutizing of safety as a value has led us to in America.

Nothing I have said supports the judgment that nuclear power itself should be absolutized either. Its value, including what can be obtained by reprocessing and breeder reactors, is only a contingent value. If other energy resources can be developed in the future that, in combination with the vigorous pursuit of energy conservation, produce an equal or better promise of supporting our most cherished intrinsic values while at reasonable costs reducing our problems with safety, there is no reason why we should not proceed to phase out nuclear fission for electricity production. Until and unless that happens, however, I believe that moral considerations lead to the conclusion that we should vigorously develop the nuclear power of both light-water and breeder reactors.

«Frederick S. Carney *is professor of ethics at Perkins School of Theology, Southern Methodist University. This article is based on a paper presented at a symposium on energy problems by the John LaFarge Institute, New York.*»