# The Great Plutonium Hoax

*Exclusive to NSIPS*

Both the Wall Street Journal and the New York Times published featured articles Dec. 1 advertising a report by the U.S. Government's General Accounting Office as evidence that the breeder reactor component of this nation's nuclear energy program was properly on its way to the scrap heap. "GAO Says Ford Plutonium View Perils Future of Breeder Reactor," headlined the Times, referring to an Oct. 28 decision by the President to delay commercial use of plutonium in nuclear reactors. The Wall Street Journal added, "although the GAO report didn't say so, the breeder's future also is made uncertain by the election of Jimmy Carter. The President-elect, during his campaign, criticized the breeder program and also had views similar to Mr. Ford's in questioning the use of plutonium by the nuclear industry. It is probable Mr. Carter will propose that Congress drastically reduce the funding for the breeder program, or perhaps even kill it."

These and similar press accounts are intended to further legitimize the widely believed (and totally false) notion that increased plutonium use and nuclear fission generally represent a danger to humanity. Purposefully ignored in such accounts is the evidence that the elimination of plutonium as a nuclear fuel will mean the demise of the entire U.S. nuclear power industry and ultimately the human race itself. At stake in the short term, in addition to the breeder reactor program, is the well-established use of light water reactors (LWR) for generating electricity, since these must, within a matter of years, be fueled with plutonium as the limited reserves of their current fuel, uranium, run out.

The attack on nuclear fission programs is also directed at the more advanced more capital intensive nuclear fusion technology since the elimination of fission programs will wipe out the trained cadre force of engineers, scientists, technicians and skilled workers needed to develop fusion power. The growth of fusion power over the next two decades is absolutely necessary for the transition to a full fusion-based economy. *Only nuclear fusion* has the inherent capability of transforming industry to the necessary higher mode of production and output, as well as providing a limitless source of usable power in several forms, i.e. thermal, electrical radiative and charged particles, thus insuring the survival of the human race beyond this century. Fission power and conventional fossil power must be expanded and possibly even exhausted during this transition in order to guarantee the achievement of this goal.

Current predictions of available world uranium reserves used as fission fuel (excluding the Soviet Union and the socialist bloc) indicate that economically viable ore (at less than $20 per pound of U3O8), will run out within approximately fifteen years at even current rates of energy growth, while inclusion of the less certain reserves of more expensive ore ($20 to $40 per pound of $U_3O_8$) probably won't last until the end of the century. This means that nuclear reactors being built now will run out of uranium fuel long before their design lifetime of thirty years is completed. This fact is well known by those in the nuclear industry as well as the bankers who control capital investment.

Plutonium must be available in the near-term to fuel light water reactors and to insure that they are an economically viable energy source; otherwise the most technologically advanced industry in the U.S. will disintegrate, and with it, the potential for human survival.

### *Why Attack Plutonium?*

The campaign against plutonium is being carried out for two major interrelated reasons. The first involves the commitment of the principle New York financial institutions backing Carter to a totally regimented labor-intensive "pick and shovel" economy typefied by such Carter programs as the Humphrey-Hawkins jobs bill and proposals for a regional "Big MAC" in the northeastern U.S., both of which envision such relatively primitive operations of coal gasification, shale oil and wood-burning as major "alternate energy" programs. Nuclear energy, requiring high capital investment and a highly skilled workforce, is, from this standpoint, a dangerous interference with the monetarist financiers' plans to collect their debt. The anti-fission activities of Ralph Nader, various environmentalist groupings and the public watchdogs of the eastern press — in short, the entire Carter coalition — should be understood in that light.

Second, to the extent that nuclear power is still seen as operative in the short term, these same financiers want to establish total control over the nuclear fuel market as a means of procuring additional temporary liquidity with which to prop up the dollar debt system. At present a massive joint effort by the two leading financial powers, the Rockefellers and the Rothschilds, is underway to buy up controlling interests in the entire world's supply of uranium ore. Their essential goal is to be able to fix the uranium ore price at any arbitrary high level, creating "uranium hoaxes" similar to the 1973 "oil hoax." Like the petrodollars, these paper profits will be allocated for debt rollover rather than productive investment.

Plutonium is a monkey wrench in the way of such monetarist schemes. Expanded use of plutonium would actually reduce the price of nuclear fuel, since the expensive enriching process for U-235 can be eliminated. Furthermore, the Rockefellers and their ilk would effectively lose their ability to corner the nuclear fuel supply, since plutonium fuel could be generated within the reactors themselves.

### *Nuclear Power Compared to Conventional Power*

The cost of electricity generated by the established light water reactor power plants compares favorably with that produced by conventional oil and coal fire plants in most parts of the United States and in many countries throughout the world. In fact, given the currently inflated world price of oil ($11 per barrel), electrical power from nuclear reactors is much cheaper than oil and also generally somewhat cheaper than coal at the current $20 per ton rate. A recent economic analysis by Dr. Seymour Baron of Burns and Roe, published in the June 1976 issue of Mechanical Engineering, and based on a complete net energy balance, best clarifies the current electrical power cost situation. (See Figure 1) In addition to standard capital costs, his analysis takes into account the cost of all energy, both electrical and thermal, required to mine and-or process fuel, produce materials of construction, and construct and operate the power plant, as well as the energy efficiencies and net energy out.

Results of this study show that even based on non-inflated, real production fuel costs — oil at $1.35 a barrel, coal at $3.00 per ton and uranium at $8.00 per pound of $U_3O_8$ — all three means of producing electricity are economically comparable and the choice between them will generally be based on nearness to and availability of the fuel supply. For example, in the New England region of the United States, nuclear power is the clear choice since easy access to either cheap coal or oil is very difficult. In many regions of India, on the other hand, both coal and nuclear power can be considered, since large reserves of both coal and fission fuel are available. Of course, when plutonium becomes readily available, the nuclear option will become cheaper and the relationship between the three resources may change.

Potential near-term advance systems employing the liquid metal fast breeder reactor, and even fusion (which in this analysis was based on a very conservative first cut power plant design - the UMAK-I, Tokamak), look promising even though costs estimates were based on current state-of-the-art technology which, for fusion reactors, would represent gross over estimates.

Although all nine of the alternatives considered by Dr. Baron were calculated based on current state-of-the-art technology, only oil, coal and nuclear power (LWR) are in significant use today and, therefore, represent true operating systems based on current technology. A breakdown of current United States energy consumption shows approximately 45 per cent coming from coal, 15 per cent from oil, 10 per cent from nuclear power, and the last 30 per cent split between hydroelectric and natural gas.

### *Alternative Energy Boondoggles*

Dr. Baron's work on net energy comparisons also exposes the joke that is being foisted on the public concerning the "advantages" of alternate energy schemes such as coal gasification and solar power as major contributions to world energy needs. These results show these schemes' energy costs exceed even the very conservative estimates for fusion power. Gas or liquid fuel produced from coal will result in energy costs almost double that of direct use of coal and will wastefully use up coal resources at twice the rate while generating only the same power. Solar power is not even in the same league since energy costs are a factor of 10 to 20 times higher and it requires between 8 to 50 years to simply recover the energy expended in building and operating solar plants.

### *Nuclear Safety*

The great danger of plutonium to the human population has been manufactured by those forces pushing austerity and zero growth. Past and current studies of the real hazards of plutonium have shown that it is not "the most toxic substance known to man," and that in total, it is considerably less of a hazard than the large quantities of many chemicals which are processed and used every day in industry. Although this view is well documented and supported by competent researchers worldwide, it continues to be well hidden from the general public. A recent article by Bernard L. Cohen from the University of Pittsburgh, which appeared in the November 1976 issue of Nuclear Engineering International, entitled "Plutonium Toxicity: An Evaluation Indicates It is Relatively Harmless," provides an excellent review of this issue.

Since plutonium is dangerous principally as an inhalent, it is compared in Figure 2 with quantities of a few other poisonous inhalents produced in the United States. It should be noted that plutonium is not easily dispersed whereas the others are gases and hence, readily dispersable. Although plutonium will last far longer than these gases, which will decompose chemically, it is also true that nearly all damage done in plutonium dispersal is from the initial cloud of dust and very little from later re-suspension by wind or during the years it is buried in the soil. It is clear that plutonium rates low on the danger scale in this comparison.

More important is the actual history of the effect on people who have been exposed to plutonium. During the period from World War II through 1974, there have been 1155 cases in the U.S. where people have received significant doses of plutonium. So far, there have been no known deaths attributable to plutonium poisoning, nor have there been any cases of cancer. Included in these statistics are 25 men, some of whom received doses far beyond the current *Energy Research Development Administration* "maximum permissable body burden," who worked at Los Alamos scientific laboratory during the war when safety precautions were less stringent. According to the "hot particle" theory which the Naderites and other zero growth advocates use against nuclear power, each of these men should have experienced an average of 200 cases of lung cancer by now. Instead, they are almost all normally healthy individuals thirty years later; one has died of a heart attack. In 1965, another 25 workers were exposed to large amounts of plutonium in a fire that occurred at the Rocky Flats Colorado Weapons Plant. None have experienced any ill effects. Other cases could also be cited with similar results.

This is not to say that plutonium is not hazardous. On the contrary, it is potentially hazardous as are many other materials; it is currently treated with overwhelming precautions in its handling and use. Because of its well recognized potential danger — it is a long lived, low energy, alpha particle-emitter which, if ingested into the human body, has the potential of causing cancer — more is known today about plutonium and its effects than is known about most other substances that we face routinely. Extensive safety procedures and precautions have been developed in handling the material and in preventing its release during fuel processing or following a hypothetical accident in a nuclear power plant. Such precautions are more than sufficient to deal with the potential problems of plutonium.

Other major safety issues concerning plutonium are the more general questions of fission product waste disposal (the same as for uranium), nuclear plant accidents, and nuclear proliferation.

*Nuclear Waste Disposal*

Similar to the question of plutonium toxicity, the question of nuclear disposal is a legitimate one, but it is primarily an issue of providing the appropriate engineering design measures in processing, handling, transporting and storing radioactive material in order to insure that proper safety precautions are met. Contrary to current general public belief, the problem of waste disposal *is not* related to the quantity of waste; it is simply to insure the isolation of waste from the human environment for long periods of time — hundreds of thousands of years. This makes it a rather straightforward engineering and materials problem which for all practical purposes is already solved.

Figure 3 illustrates the amount of consumption and waste from a 1000 MWe nuclear plant compared to that of a coal plant. The tremendous magnitude of the differences are obvious. It is clear that the amount of waste from the nuclear plant is very small compared to the energy obtained. Putting it another way, it is estimated that all the nuclear waste that will be generated in the United States by the year 2000 could fit into a cube about 250 feet on a side, and of that, the "high level wastes" would occupy a cube about 50 feet on each edge.

Isolation of this waste from the environment is done now and for the foreseeable future by underground storage in leakproof tanks. For the first few months the waste is stored within the spent fuel inside the reactor building. It is then processed where reusable fuel, U-235 and Pu-239, is separated from the fission product waste, and the waste is stored as a concentrated liquid in underground tanks for five years. These tanks are now constructed with double-walled, impervious stainless steel and encased in concrete. Included are foolproof leak detection equipment, heat removal capacity and readily available spare tanks to which any filled tank could be emptied should a leak between the first and second wall occur. Simple engineering!

All older single wall design tanks such as those that were built after the war at Hanford, Washington are being replaced with modern equipment. Some of these older tanks started leaking in the early 1970s and although the nuclear critics howled and predicted the "end of the world" there was no danger to the public nor is any expected. The waste material was trapped in the surrounding rock and hardpan layers and did not enter the ground water table, a major consideration in locating the tanks there in the first place.

Finally, after five years of storage in these tanks, the decay heat levels are low enough so the waste can be concentrated even further, solidified by recently developed processes and stored essentially forever in underground vaults that are permanently removed from the human environment. To falsely assume that man has not advanced technologically since the 1940s and cannot today design and build a storage system that will completely contain safely and permanently this nuclear waste material is to deny the reality of human progress.

*The "Nuclear Reactor is an Atom Bomb" Fairy Tale*

A nuclear power reactor cannot explode like an atomic bomb, no matter what Ralph Nader and his crowd preach. Although both may use uranium or plutonium as fuel, there is absolutely no similarity between reactors and bombs. Bombs require the fuel material to be highly enriched and concentrated (50 per cent to 90 per cent) and fabricated as metal into precise, close fitting geometries, while reactor fuel is very dilute (3 per cent), fabricated usually as pellets of uranium oxide stacked in wide-spaced arrays of tubes with cooling water circulating around them. This reactor fuel cannot create an atomic explosion unless it were to be removed from the reactor, reprocessed in a separation plant, concentrated or enriched, changed to metal and machined into parts to an atom bomb. So-called reactor explosions are merely versions of an extremely low probability accident scenario. None have ever occured nor has there ever been a hint of one occuring. For an LWR, this postulated event assumes that somehow a main primary coolant pipe carrying high pressure water completely ruptures, the water flashed to steam and all the reactor coolant blows out to the containment building. Although the reactor has several built-in emergency core cooling systems which would continue to inject cooling water into the reactor if such an event occurred, it is further postulated that none of these emergency systems work or if they do, water does not enter the reactor core.

Finally after stripping away as useless, all equipment and safety devices that have been designed and built into the plant to prevent any of these failures, these nuclear critics ask, "So now what would you do if?" At this point the reactor core will sit there at shutdown decay heat levels, the fuel rods will melt, maybe into a molten puddle, then perhaps through the reactor vessel, then maybe through the two or three containment barriers and dispersal mechanisms, possibly through several feet of concrete floor and then on through to China! This has historically been referred to by professionals as the "China Syndrome."

Literally thousands of analyses have been performed on currently operating as well as proposed nuclear power plants by all four major reactor manufacturers--General Electric, Westinghouse, Combustion Engineering, and Babcock and Wilcox--as well as several national labs. All have consistently confirmed that none of the accident scenarios will actually occur. Tests simulating such accidents are already scheduled, and will further demonstrate their impossibility.

Such accident scenerios are like postulating that for some unknown reason, all four engines on a filled-to-capacity Boeing 747 jetliner fail while it is traveling on a non-authorized course and the jet crashed in the Rose Bowl at half-time of the New Year's Day football game.

*Nuclear Proliferation and Terrorism*

As has been pointed out frequently elsewhere, nuclear terrorism a la "five Palestinians and a shoebox filled with plutonium" is a hoax, as are all "backyard atom bomb" schemes. Nuclear terrorism could in reality only occur if a government handed over a nuclear explosive device, ready made, to a so called "terrorist group." Nuclear terrorism is a political question and must be dealt with on that level.

The question of nuclear proliferation — the distribution of nuclear power plants to other countries and therefore the potential for manufacturing nuclear weapons — is simply a choice between world develpment for the future of nuclear war sometime in 1977. The Carter "solution," article most recently promoted by a Dec. 5 *New York Times* magazine titled "How Atoms for Peace became Bombs for Sale," is to withhold nuclear power from other advanced countries and all developing countries and cut back its use across the board everywhere else. That is, completely deprive most of the world's population of energy for development, and use solar energy and other equally bad alternatives elsewhere.

Interestingly enough, Carter, the renowned opponent of nuclear proliferation takes a position 180 degrees opposite to his stand against commercial nuclear power by backing "proliferation" of nuclear weapons, specifically "utopian" militarist Admiral Hyman Rickover's plans for a nuclear navy. Nor should it be forgotten that Carter's one-time commander Rickover is now giving Carter frequent briefings on Soviet military and strategic weaknesses which do not exist, steeling him for a nuclear confrontation with the USSR.

The alternative to such insanity is full and rapid development of nuclear power for world progress.

Figure 2

**LETHAL INHALATION DOSES PRODUCED ANNUALLY IN THE UNITED STATES ($x10^{12}$)**

| | |
|---|---|
| CHLORINE | 400 |
| PHOSGENE | 18 |
| AMMONIA | 6 |
| HYDROGEN CYANIDE | 6 |
| PLUTONIUM | 1 |

(This assumes all U.S. power is from fast breeder reactors)

Figure 3

**FUEL CONSUMPTION AND WASTE — 1000-MEGAWATT POWER PLANT***

| | Hourly | Daily | Annual |
|---|---|---|---|
| FUEL CONSUMPTION | | | |
| Coal | 690,000 lbs. | 8,300 tons[a] | 2,300,000 tons |
| Uranium | 0.3 lbs. | 7.4 lbs. | about 1 ton |
| WASTE PRODUCTION | | | |
| Coal (ashes) | 69,000 lbs. | 830 tons[b] | 230,000 tons |
| Uranium (total) | 2.7 lbs. | 64 lbs. | 11.6 tons |
| High-level fission product waste | 0.26 lbs. | 6.1 lbs. | 1.1 tons |
| Other waste | 2.4 lbs. | 58 lbs. | 10.5 tons |

*1000 megawatts is enough electricity for a city of about 1 million people
[a] Equivalent to a 100-car trainload every day
[b] Equivalent to a 33-car trainload every day (not including airborne wastes)

Figure 1

**COMPARISON OF COST AND PRICE OF DELIVERED ELECTRIC POWER**

| | Oil | Coal | Coal Gas | Coal Liquid | LWR | LMFBR | Fusion | Solar Collectors | Solar Cells |
|---|---|---|---|---|---|---|---|---|---|
| Total Energy Costs, mills per kwhr (1) | 25.1 | 24.2 | 41.7 | 46.3 | 27.8 | 33.7 | 45.2 | 490 | 680 |
| Total Energy Price, mills per kwhr (2) | 45.7 | 31.7 | 55.7 | 58.8 | 28.5 | 33.9 | 45.2 | 490 | 680 |
| Approx. 1975 Fuel Prices (3) | $11 | $20 | $20 | $20 | $20 | $20 | 0 | 0 | 0 |
| Capital Investment (x$$10^9$) (4) | 0.94 | 0.97 | 1.67 | 1.87 | 1.16 | 1.43 | 1:92 | 20.9 | 28.9 |
| Energy Payoff Time, years | 0.2 | 0.2 | 0.4 | 0.5 | 0.4 | 0.4 | 0.4 | 8.3 | 48.0 |
| Net Cycle Efficiency, % | 26.6 | 32.4 | 17.5 | 19.4 | 24.9 | 34.7 | 24.6 | 2.6 | 3.9 |

(1) Real, non-inflated fuel costs
(2) Fuel costs based on 1975 fuel prices
(3) Prices are per barrel (Oil), per ton (Coal, Coal Gas, Coal Liquid), or per pound uranium (LWR, LMFBR)
(4) 1985 dollars less fuel

This analysis was done on the basis of a complete net energy balance with all systems producing 1000 MWe. The results represent a useful procedure for comparing electrical energy costs, however a much more in-depth analysis would be needed to compare fusion energy in such a table since its eventual contribution to an industrial society is much more than electricity.