Veteran California Congressman Chester "Chet" Holifield is retiring this year, after 32 years on Capitol Hill. Although a Democrat, Holifield, whose Southern California district includes Whittier, has known Richard Nixon since they served together in Congress in the late 1940's. So it was not too surprising to find Holifield aboard the Presidential jet on its way from Washington to San Clemente on March 26, 1971. As it turned out, the ride Holifield took that day aboard Air Force One was probably the capstone of his career. For on that flight Holifield, best known as the chief Congressional guardian of the nuclear power program, convinced the President that the as-yet impractical "breeder reactor"—a nuclear power reactor that produces more plutonium than it uses—was the answer to America's future energy needs.

As Holifield tells it, he reminded Nixon that President Kennedy had put a man on the moon for $50 billion, but that Nixon could provide the U.S. with an inexhaustible source of energy for $3 billion. Nixon, always a man with one eye on the history books, liked the idea, and decided to commit the nation to a multibillion-dollar breeder reactor development plan. By June of that year, Nixon was calling the breeder "our best hope for meeting the nation's growing demand for economical clean energy."

But despite the Presidential enthusiasm, and the generous Congressional funding (thanks, again, largely to Holifield), the breeder program, and the whole U.S. nuclear power program, may be in deep trouble. The first commercial breeder reactor nearly exploded when it started up in 1966, and was finally shut down for good after continued troubles and inefficiency. A demonstration breeder, about one third the size of those envisioned for commercial use, will not be completed until 1983, at a cost of a billion dollars.

Even more damaging has been a series of revelations casting serious doubt on the safety and reliability of even the current generation of nuclear reactors. In an effort to push the breeder program, the Atomic Energy Commission has virtually ignored the hazards posed by all reactors, against the advice of many of its own scientists. And as word of the safety problems leaks out to the public, the AEC has reacted with reprisals and censorship directed against its dissident staffers.

It has become increasingly clear that the AEC's role as a partner in nuclear development with reactor manufacturers and utilities industries has destroyed its ability to function as a disinterested regulator of atomic power. A few ritual "crackdowns" on the industry, and separation of regulatory and developmental functions in the AEC, have indeed taken place. But to this day chilling stories of suppressed reports, discouraged safety programs and AEC-industry collusion continue to emerge.

Just when the utilities have finally committed large sums of capital to a nuclear reactor building program, public awareness of safety problems threatens to bring the building program to a halt. Utilities, the Nixon Administration, and reactor builders such as Westinghouse and General Electric, have seized upon the "energy crisis" as an excuse for going ahead full steam with nuclear power plants. But that may soon backfire. For the rush to build reactors was based on the assumption that America needed an infinite supply of electrical power, no matter what the price. But the reality of temporary fuel shortages and the prospect of long-term supply problems has stimulated serious thought about the possibility that energy consumption can be realistically curtailed without cutting our standard of living.

The battle over nuclear power is far from over. In fact, accelerated development of nuclear power is at the top of the Nixon Administration's energy policy agenda. But it is now apparent that there will be a large public battle over nuclear power—something no one would have suspected a few years ago.

[THE UNEXPECTED DEBATE]

During the late Forties and the Fifties, nuclear power was America's glamor technology. North American Aviation, one of the first firms to get into the reactor building business, hinted in its advertisements that electricity from the atom was not only inexhaustible, but was also subtly different and more exciting than ordinary electricity. One ad was captioned "One of the most Revolutionary Events in the 20th Century Just Happened in this Room." The ad continued, "Just a moment ago the peaceful atom started supplying the electric power that lights this room. The room looks no different than before; yet the world is far brighter as a result. For the atom has proved itself an answer to man's growing need for electric power."

Peaceful atomic power in the Fifties, like the space program in the Sixties, was hailed as the showpiece of America's technological prowess. But unlike the space program, civilian nuclear reactors were supposed to be practical. So sure were the experts that the atom could produce an endless supply of cheap electricity that debate was limited to whether this resource should be developed for private industry or by a publicly owned nuclear TVA. The Eisenhower Administration, led by AEC Chairman Lewis L. Strauss, decided that the prize should be given to private industry.

But as soon as the glamor technology started to become a reality, a safety controversy developed. In 1957 the AEC's own Brookhaven Laboratory issued a report on the possible consequences of a major nuclear power plant accident, estimating that property damage alone would run to $7 billion for even a small reactor. The insurance industry refused to provide liability coverage for nuclear power plants, and the power industry would not build the plant without some sort of liability protection, which Congress provided with the Price-Anderson nuclear insurance act. Meanwhile, the AEC kept a tight lid on other sources of alarm.

One major problem shared by military and civilian nuclear energy programs alike is disposal of radioactive wastes. These waste products are extremely dangerous if dispersed, and remain dangerous for tens of thousands of years. In August 1958, a tank storing wastes from the Manhattan Atomic Project of World War II sprung a leak, and 35,000 gallons of radioactive material poured into the soil at the AEC's Hanford, Washington storage facility. No word of the spill reached the public until 1970. In fact, six months after the spill the manager of the Hanford works, asked at a Congressional hearing whether Hanford storage tanks had

by Tom Zeman

had any leakage problems, replied, "We are persuaded that none has ever leaked." Since then, the tanks at Hanford have spilled more than 400,000 gallons of dangerously radioactive liquid waste.

But despite continuing problems with leaks, the AEC moved ahead with the civilian nuclear reactor program. The big break came in the mid-1960's when General Electric and Westinghouse, the companies that had designed the reactors for the nuclear submarine program, decided to invest heavily in the nuclear power reactor business. In order to create a market for reactors, the two companies sustained multimillion dollar losses on a number of fixed-price contracts, and affirmed parts replacement guarantees to utility companies worried about the long-term economic viability of nuclear power plants. After 1965, orders for the reactors accelerated. By the end of 1972, GE had built or had orders for 85 nuclear reactors, and Westinghouse had 84. John W. Simpson, president of Westinghouse's Power Systems Divson, and current president of the American Nuclear Society, estimated last year that "Between now and the year 2000, the potential return to Westinghouse, just assuming it maintains its present share of the nuclear reactor market, could be $300 billion."

By the late Sixties, a powerful coalition in favor of nuclear energy had assembled, including the AEC; the two dominant electrical equipment companies, GE and Westinghouse; the oil industry, which had invested heavily in uranium resources; the utilities; and the Joint Congressional Committee on Atomic Energy, dominated by Chet Holifield. In the face of such a coalition, lone voices such as that of former AEC Chairman David E. Lilienthal, who warned that nuclear electrical power had proved itself too dangerous and too expensive to warrant further development, were easily ignored.

But within the last five years, two controversies have developed which raise questions about whether nuclear reactors will *ever* be a safe, efficient source of electrical energy. In the course of these debates, enough has been revealed about the AEC's role in discouraging research into safety problems and covering up reports of reactor safety hazards, to permanently destroy the Commission's reputation as regulator of the atomic energy program. Ironically, both controversies—one about so-called "background radiation" regularly released into the environment by nuclear power plants, and the other about the effectiveness of the plants' emergency safety systems—grew out of research conducted by scientists working for the AEC.

[BLUEPRINTS FOR CATASTROPHE]

In October 1969, two scientists from the AEC's laboratories in Livermore, Calif., told an engineers conference in San Francisco that if the average exposure to radiation by the U.S. population reached the allowable average dose set by the AEC, "there would, in time, be an excess of 32,000 cases of fatal cancer plus leukemia per year, and this would occur year after year." The cancer estimate given by the scientists, Dr. John Gofman and Dr. Arthur Tamplin, was 10 to 20 times higher than the figures previously reported by the AEC.

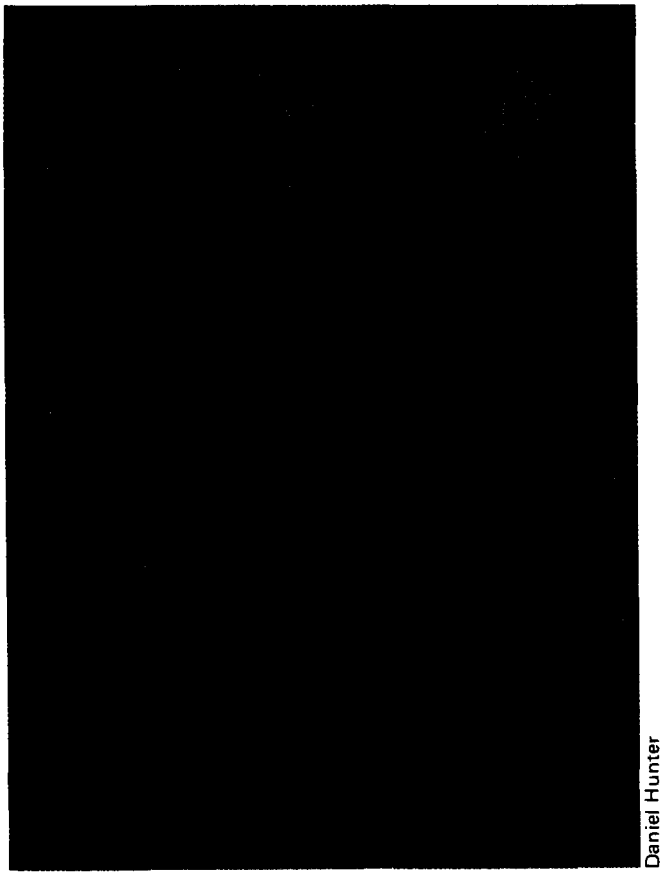
The AEC responded to the Gofman-Tamplin findings with an attack on both the scientists and their estimates. Gofman—an associate director of the AEC's Lawrence Radiation Laboratory and a distinguished biomedical researcher—was difficult to attack, but Tamplin, less well-known, was an easier target. In December 1969, all but one of Tamplin's 12 staff assistants were taken away from him. When Tamplin submitted to the AEC (at his director's request) a planned speech that was critical of nuclear power, an AEC censor crossed out almost all of it; Tamplin gave the full speech anyway.

Unable to make any headway within the AEC, Gofman and Tamplin took the case to Congressman Chet Holifield; Holifield rebuffed them, citing the same AEC estimates they were attempting to challenge. But the Gofman-Tamplin case was so meticulously constructed, and the original AEC guidelines had been so arbitrarily drawn, that the AEC had to make some concessions. About two years ago, it recommended (but did not make mandatory) that the maximum allowable radiation *inside* of a nuclear plant be reduced a hundred-fold. Unfortunately, the maximum allowable radiation dose for the general public—the main concern of Gofman and Tamplin—remains unchanged.

In the summer of 1973, the debate over radiation emission standards flared up again, this time within the Nixon Administration, when the Environmental Protection Agency proposed limits on power plant emissions much lower than those allowed by AEC regulations. The EPA charged that the AEC's radiation standards did not account for the long-term impact of radiation from long-lived nuclear particles emitted from power plants. The AEC denied this, and charged that the EPA's guidelines were "unworkable." And in December 1973, Roy Ash, Director of the Office of Management and Budget, revoked the EPA's higher standards.

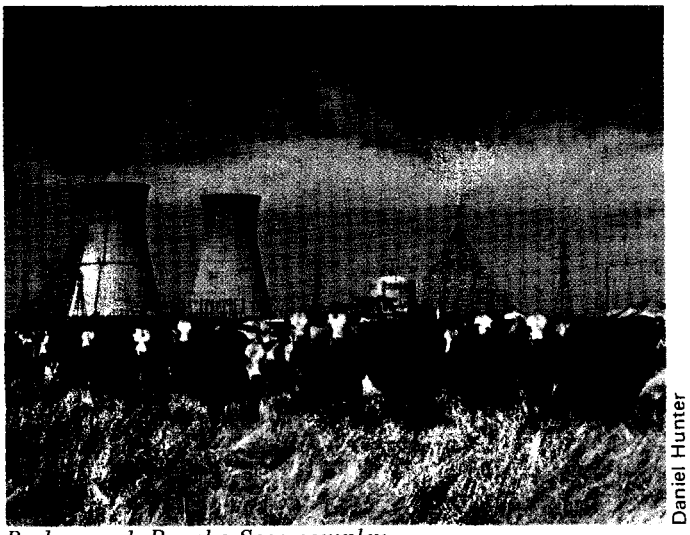
However since early 1972, the debate over "background radiation" releases has been overshadowed by a more frightening controversy over the Emergency Core Cooling System (ECCS), a vital back-up system that could some day be the only thing standing between reactor failure and catastrophe. A typical nuclear reactor contains about 40,000 fuel rods made up of uranium pellets clad in metal tubes. While the heat-producing chain reaction is taking place, the uranium heats up to thousands of degrees. The uranium and the metal rods are prevented from melting by a liquid coolant pumped through the core, and which in turn heats up the steam boiler that drives turbine generators. If a rupture occurred in the primary cooling system, the chain reaction itself could be stopped by inserting a control rod. But there are hot fuel wastes within the reactor core that continue to emit radiation and great amounts of heat. The Emergency Core Cooling System must flood the core within *seconds* to prevent it from melting down into an uncontrollable mass, burning through the reactor and escaping into the environment. Such an accident could, according to the AEC's own estimates, cause tens of thousands of deaths.

In 1970, Daniel Ford, a young economist then working at Harvard, decided to study the economics of nuclear reactors. In the course of his research he came across AEC documents indicating that all was not well with the ECCS. Perplexed, he approached MIT physicist Dr. Henry Ken-



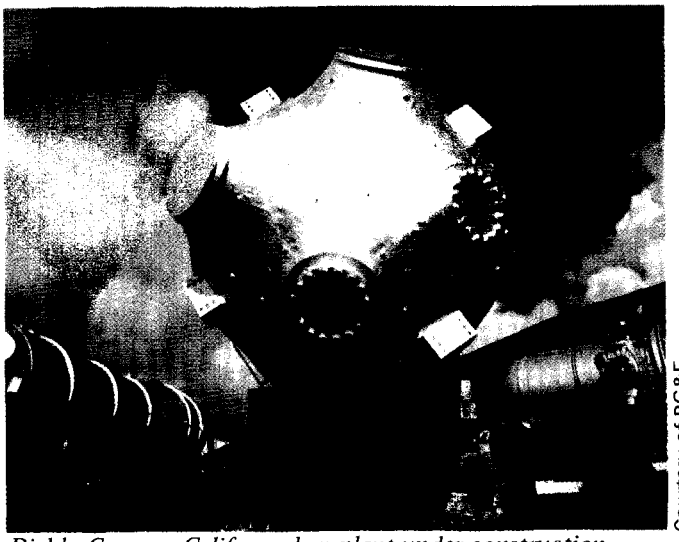
Daniel Hunter

Cooling tower, Rancho Seco nuclear power plant, Calif.



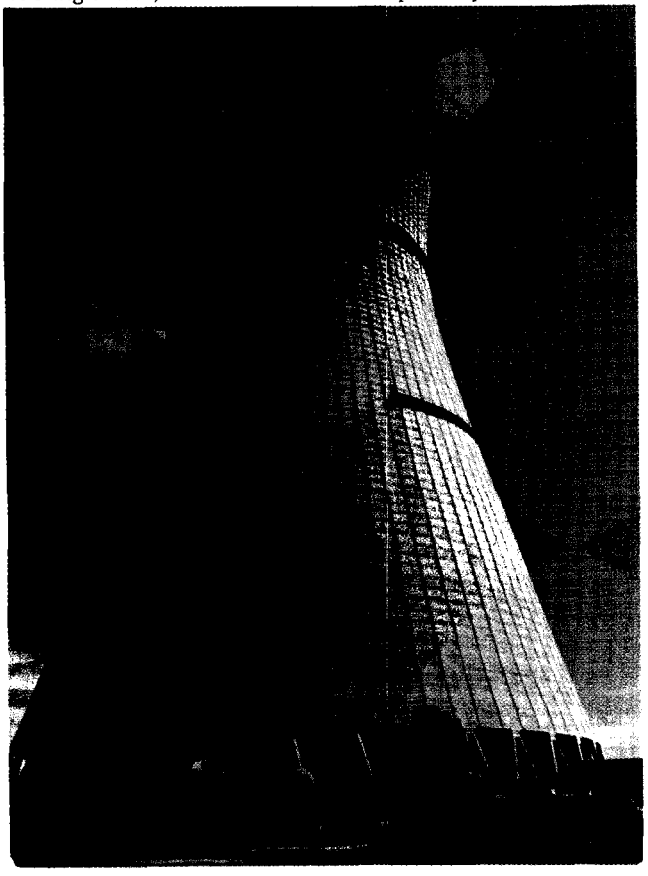
Daniel Hunter

Background: Rancho Seco complex

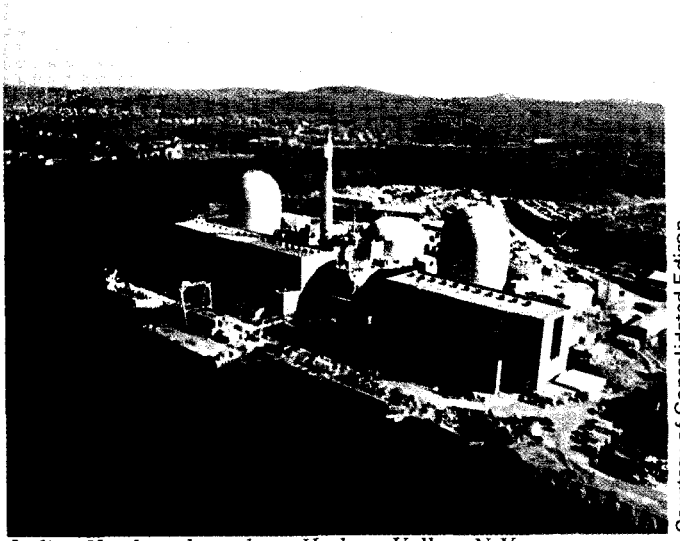


Courtesy of PG&E

Diablo Canyon, Calif., nuclear plant under construction



Daniel Hunter



Courtesy of Consolidated Edison

Indian Head nuclear plant, Hudson Valley, N.Y.

dall, who was active in the Union of Concerned Scientists. After some investigation, including visits to AEC labs, Kendall and Ford found startling evidence that the ECCS was not reliable, and that the AEC was hiding that fact. They published their findings in July 1971, and raised the ECCS issue at a power plant license hearing. Soon groups all over the country were bringing up the ECCS issue in reactor hearings.

Both the AEC and the "intervenors," as those who challenged plant licensings were called, wanted a showdown on the issue. So in January 1972, the AEC began a series of public hearings on the ECCS in Bethesda, Maryland. The intervenors, lead by Kendall, Ford, and lawyer Myron Cherry, had an uphill fight against the AEC and various reactor manufacturers taking part in the hearings. They were denied the power of subpoena or "discovery" procedures. Ford's testimony was limited on the grounds that he wasn't an expert. But the intervenors used the Freedom of Information Act to pry information from the AEC. And what was more important, massive amounts of material were leaked to them by dissident AEC scientists. In the middle of the hearing, the AEC called its own secret meeting of staff experts to reconsider their position on the ECCS and reactor safety. And by the time the hearing concluded, well over a year after it began, it had become apparent that the entire AEC reactor safety program had been in a state of paralysis since the mid-Sixties.

[SAFETY SECOND]

A key figure in the AEC's strange approach to reactor safety was Milton Shaw, Director of the AEC's Division of Reactor Development and Technology from 1963 through the period of the ECCS hearings. A former protege of Admiral Hyman Rickover, Shaw was an advocate of the breeder reactor, and was determined to push the development of the breeder the same way that Rickover had pushed the development of the nuclear submarine fleet. Shaw's admirers portray him as a "perfectionist" constantly pressuring the reactor manufacturers to improve the quality of their equipment. He had good reason to worry about shoddiness: AEC files are replete with cases of malfunctioning valves, leaks, and the like. But in the course of stressing quality of construction, Shaw's concern for back-up safety devices, especially the emergency core cooling system, became secondary. In the words of a favorable article in *Fortune*, "Shaw believes that if a reactor is built properly in the first place, there's little reason to worry about pipe breaks, lost coolant, and all the subsequent messy events"

It should not be forgotten that those "messy events" could conceivably include the death of more Americans than were lost in the Vietnam War.

Under Shaw's jurisdiction, the AEC's National Reactor Testing Station—a key facility for developing commercial reactor safety standards—had contracted out major projects to companies with an investment in building and marketing reactors. Aerojet Nuclear, which had its own floundering reactor program, got the job of managing the testing station. Then Westinghouse and General Electric—the two biggest reactors builders—were charged with testing fuel rods. The rods' ability to withstand heat is crucial to the operation of the Emergency Core Cooling System: if the rods swell or break in the moments between the loss of primary coolant and the inflow of the emergency coolant, it could block the channel into which the coolant must flow.

Certainly Westinghouse and GE are interested in operating safely. But they are also deeply interested in proceeding full speed with commercial reactor operations; and evidence of serious flaws in the fuel rods might have brought operations to a premature halt. Curiously, none of the GE tests used the proper combination of materials, heat and pressure necessary to simulate actual reactor conditions; while the Westinghouse test added *unheated* rods to the fuel rod test, producing temperatures lower than would be found in a real or operating reactor.

Meanwhile, scientists at the AEC's facilities in Idaho, and at Oak Ridge, began to suspect that Shaw and his superiors simply did not want to hear about safety problems, particularly problems with the ECCS. They even complained that between 1968 and 1971, Shaw's Division of Reactor Development and Technology (RDT) used for breeder development funds earmarked for reactor safety. One researcher at Idaho complained "The more we got into this the more it became apparent that RDT was very unhappy with all this. The problems we were raising were upsetting their cozy relationship with the [reactor] vendors and utilities, whose support they need for the breeder." An administrator at Idaho complained that whenever he sent a proposal for a safety research project to Shaw, Shaw would pass it on to the reactor vendors for comment. "In the end," he concluded, "RDT chooses to identify with the industry, not the regulatory staff."

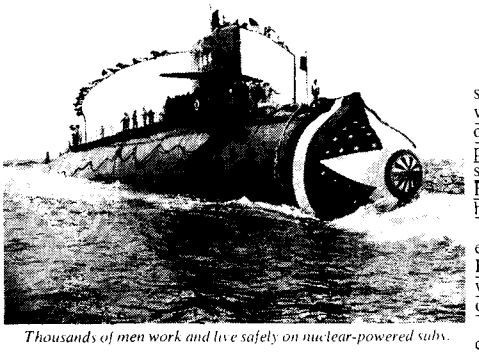
Shaw was at war with his own safety staff. Three highly regarded managers of water-reactor safety programs at the Idaho facility had been fired when they kept insisting that more safety data was urgently needed. Staff members complained about "slanted" results from the GE and Westinghouse rod tests. In February 1970 a reactor safety program plan was issued by AEC and industry scientists. The plan outlined 139 unsettled safety questions and designated 44 of them (in the document's emphasis) as "very urgent." The plan identified "all of the factors affecting ECCS effectiveness" as "the most urgent problem in the safety program."

Then in the autumn of 1970, six tests of the ECCS took place in a 9-inch scale model of a reactor core. All six times, the emergency core cooling system failed to operate. The computer analyses, which until that time (and to this day) provided the only evidence that the ECCS would work, completely failed to predict those results.

Panic stricken, the AEC called a meeting of officials from the Idaho and Oak Ridge labs and reactor manufacturers. A task force was set up under Dr. Stephen Hanauer to review the ECCS program, which in turn commissioned a detailed state-of-the-art report on the Emergency Core Cooling System. The report stated that in several areas, the ability to predict what would happen in case of an accidental coolant loss was "beyond the present capability of engineering science." Dr. Morris Rosen, then chief of the Sys-

(Continued on page 51)

WHY NUCLEAR POWER IS THE SOLUTION TO THE ENERGY PROBLEM.



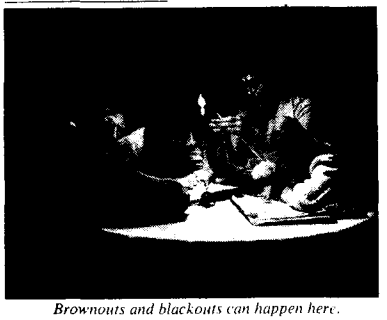
Thousands of men work and live safely on nuclear-powered subs.

1 The electric energy problem here in California is simply a matter of oil and natural gas shortages. The problem is going to plague us for some time to come, unless other forms of energy are used. The solution is to use energy wisely and to build more nuclear power plants. Nuclear plants are safe. They are practical. They are economical. They are environmentally clean. But they take time to build—about ten years.

2 There's no mystery about nuclear power plants. 3 There are 44 operating in the United States: more than that among other nations of the world. 4 There are more than 100 nuclear-powered ships in the U.S. Navy; even more in other fleets. 5 The nuclear industry has hundreds of reactor years of successful operating experience. The technology is proven.

Some people have questions about nuclear power. Some people give incorrect answers to those questions.

6 We at PG&E have had long experience with nuclear plants. We believe firmly in them. 7 So do other utilities, world-wide, both government-owned and investor-owned. And so does the overwhelming majority of the scientific community.



Brownouts and blackouts can happen here.

NUCLEAR POWER AND THE FUEL SHORTAGE

At present most of PG&E's steam-electric power plants burn scarce and very expensive low-sulfur oil to generate electricity. 8 We will have to buy about 20 million barrels this year and 35 million next year to meet our customers' electric energy needs. Our two-unit Diablo Canyon Nuclear Power Plant, now under construction in San Luis Obispo County, will displace a need for an additional 24 million barrels of oil every year in the future.

Delays in construction schedules of these and other nuclear units—delays, for a variety of reasons, over which utilities generally have little control—have had much to do with bringing about today's electric energy problems in California.

While nuclear power plants cannot solve the problem immediately, they can in time. As more come into service, they will free up 9 large amounts of oil, significantly alleviating the aggravating long-range fuel shortage—gasoline and all.

NUCLEAR POWER AND SAFETY

10 The safety record of commercial nuclear power plants is unmatched in industrial history. 11 Safety systems and their back-up systems function efficiently. 12 There have been no nuclear-caused deaths. Not even a significant injury. (For comparison, about 54,000 Americans are killed every year in auto accidents; 3,000 die choking on food; 160 are killed by lightning.)

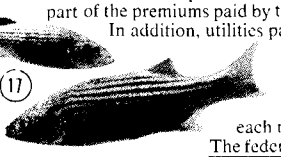
Actually, fissionable nuclear fuel for power plants is very dilute—so dilute that it's 13 impossible to create an atomic explosion in a nuclear reactor.

With all the safeguards that are built into each nuclear power plant, 14 the chance of a major accident is about one in a million.

NUCLEAR WASTE. WHAT HAPPENS TO IT?

When nuclear fuel is used, nuclear waste is created. 15 But more than 95 per cent of the original fuel is recycled for re-use. The 16 remaining waste is small—so small that such waste from a large nuclear unit operating for 30 years could be contained in a space no larger than a two-car garage. The waste is radioactive; but is treated as such. Very carefully. Safety first.

Used fuel is sealed in heavily-shielded, leak-tight casks and shipped to a facility which specializes in nuclear fuel reprocessing. Every safety precaution is taken to insure that no leakage occurs. Shipping and handling are carried out under strict regulations of the AEC and the U.S. Department of Transportation. After processing, the residual waste will be solidified and placed in secure, long-term storage 18 under rigid government control.



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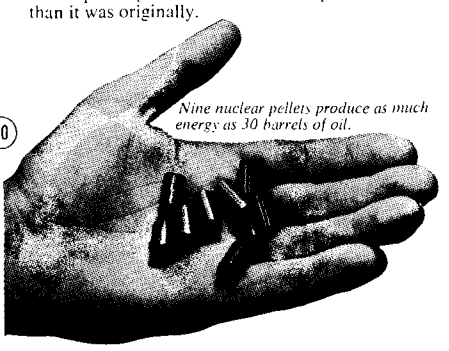
NUCLEAR POWER PLANTS AND MARINE LIFE

Some people have voiced concern because some power plants discharge warm water back into natural water bodies. These power plants—whether nuclear or fossil-fueled—use cooling water in steam condensers. 19 In a nuclear plant the cooling water is only about 19° warmer when returned to its source, and otherwise is harmless. Where the water source is large enough and cold enough to receive and assimilate it, like the Pacific Ocean, it has no significant adverse effect on marine life. The only appreciable change is that in the immediate water discharge area the balance between warm water species and cold water species of marine life may shift in favor of those liking warmer water. In fact, after 24 years of scientific study and many more years of operating experience, it is clearly established that marine life near PG&E power plants tends to be *more* plentiful than it was originally.



Nine nuclear pellets produce as much energy as 30 barrels of oil.

20

NUCLEAR POWER– CLEAN, ECONOMICAL

For both environmental and economic reasons, nuclear power is the solution to the electrical energy problem.

Most hydroelectric power resources are already developed. Fossil-fueled steam electric plants consume scarce and increasingly costly oil and natural gas. Barring technological breakthroughs, geothermal energy can meet 21 only a small part of future power needs. Fusion power is decades away. And other possible sources of energy, 22 such as solar, tidal and wind power, are in experimental stages of development, and the latter two may never become 23 practical for large-scale use. Coal can supply some help in California over the short run. 24 But nuclear energy is the power source which has arrived.

Nuclear power is economical. For example, 25 the electricity produced at PG&E's Humboldt Bay Nuclear Power Plant for $2.00 would cost $17.20 at a plant burning low-sulfur oil, at today's fuel prices.

Moreover, nuclear power generation is clean. Unlike burned fuels, 26 it releases no combustion products into the environment.

NUCLEAR POWER AND INSURANCE

Some people say that private insurance companies won't cover a nuclear power plant. That's false. Private companies provide $110 million worth of liability insurance for each nuclear power reactor location. There have been no claims against nuclear power reactors. In fact, the insurance companies have been refunding part of the premiums paid by the utilities.

In addition, utilities pay the federal government for indemnity insurance coverage of $450 million for each reactor location.

The federal indemnity program was created by Congress in 1957 (Price-Anderson Act) to help encourage development of a nuclear power industry in the U.S. 27 It has been good business for the taxpayers. And it gives the public greater protection than separate homeowner insurance policies could provide. That's one of the reasons why your homeowner policies have a nuclear exclusion clause.

The government has collected millions in indemnity payments from utilities—about $90,000 a year per large reactor—and has never paid out one cent. No claim has ever been filed.

NUCLEAR POWER AND THE PUBLIC INTEREST

One of the big PG&E nuclear units at Diablo Canyon is planned for service next year, and the other unit in 1976. But it will take about ten years to build additional nuclear capacity—including the time it takes to find and acquire suitable sites and obtain clearances and approvals from more than 30 governmental and public agencies.

Every year of delay exposes all of us to shortages and higher rates, and further drains our diminishing fossil fuel resources.

The energy problem simply must be solved, and nuclear power will go a long way toward solving it. Electrical energy is essential to everybody, and especially to the young people who will be forming families and needing 28 jobs. We don't intend to relax in our efforts to provide adequate and reliable service for all our customers in the future, just as we have provided it in the past. You can help now by 29 conserving energy at home and on the job.

If you or anyone you know would like more information on nuclear power, PG&E will be pleased to provide it. Just write: PG&E Nuclear Information, 77 Beale Street, San Francisco, California 94106.

PG and E

HOW ONE UTILITY HYPES NUCLEAR POWER

Northern California's Pacific Gas and Electric Company, the second largest private utility in the United States, has been running this advertisement in newspapers all over California and in West Coast editions of Time *and* Newsweek. *It does not exactly adhere to the principle of "Truth in Advertising."*

The numbers correspond to the numbers on the ad on the facing page.

1. There is no electricity shortage in California. There were no brownouts in California even during the height of the Arab oil embargo. PG&E refuses to tell us at what percent of capacity their plants presently operate. But California's Public Utilities Commission predicts that even by 1976 Northern California's electric utilities will have about 14 percent spare capacity, *even without* PG&E's Diablo Canyon nuclear plants. The "problem" is the utilities' outlandish and self-serving projection figures of future electricity demand.

2. According to the AEC's figures for 43 of those 44 plants (one more has been licensed to operate since April), there were 51 major (12 hours or more) shutdowns in April 1974:

25 due to equipment failures
3 due to operator error
12 for maintenance or testing
8 for refueling
1 due to regulatory restriction (this plant was shut down completely by the AEC)
2 for operator training

In addition:

At least 14 plants were not operating "normally": 12 were in a "power ascension phase" which means they were still being tested, were in repair, or were being refueled; at least 2 others were completely shut down. Of those remaining plants that were operating "normally," 7 were ordered by the AEC to run at below their rated capacities for safety reasons.

3. The SS Savannah, the first nuclear merchant ship, built at a cost of $54 million, was scrapped in 1971 after being subsidized at over $4 million a year. It had been denied entry in some foreign ports because of the potentially high costs of any accident. Despite their billion dollar costs, nuclear powered submarines *do* make a certain amount of military sense since they are underwater for long periods of time and cannot store enough fossil fuel. And in case of radiation leak or mishap, the immediate danger would be limited to crew members. That's no reason to build these power plants on land, near populated areas.

4. Dr. George Weil, former chief of the AEC's Reactor Branch Division of Research, recently calculated that the nuclear power industry had 81 reactor years of actual operating experience with plants larger than experimental size (100 megawatts or more); about 47 reactor years with plants over 500 megawatts. Since many safety problems only become acute with the larger plants, which operate at much higher core temperatures, the latter figure is probably the most relevant to the 1000+ megawatt plants PG&E is presently building.

5. The AEC has only interim acceptance criteria for licensing nuclear power plants, since it acknowledges that the safety technology has not yet been proven.

6. Foreign-built plants are safer than the ones PG&E uses. Sir Alan Cottrell, former chief science advisor to the British government, complained that the U.S. designed reactors require "superhuman engineering" to operate safely.

7. PG&E's "overwhelming majority" turns out to be 44 scientists, most associated with the nuclear power industry. The 44 called the reactors "reasonably safe," but most insisted that the plants were not "scientifically proved." Several reported that they were aware of information that had been biased to make the reactors appear safer, and many asserted that the AEC had submerged safety for development. On the other hand, the prestigious international Pugwash Conference on Science and World Affairs issued a statement questioning the wisdom of reliance on nuclear power "owing to potentially grave and unresolved problems."

8. The huge increase in oil use is not due to burgeoning demand, but a switch from natural gas to oil in some plants.

9. PG&E's plans call for increasing rather than decreasing their use of oil, even with the nuclear plants.

10. A 1972 AEC report stated, "In the recent past, there have been a number of occurrences at reactors where human error resulted in undesirable situations. *The absence of more serious side effects is largely the result of good luck.*" [emphasis added] There were 861 "abnormal" events at nuclear reactors last year, 371 of which were potentially hazardous.

11. The most crucial back-up safety system was tested on a miniature scale model in 1970 and failed to work six out of six times. The scale test has not been repeated, and the system has never been tested on a larger scale.

12. There have been no nuclear-caused deaths at commercial plants in the course of operation in the United States. There *have* been fatalities at AEC-run nuclear power test facilities. The AEC has not until recently collected statistics on cancer deaths due to radiation doses. Uranium miners have already died of radiation-caused cancer, and a 1969 U.S. Public Health Service study concluded that between 10 and 18 percent of men who have been uranium miners would die a similar death in the next 20 years.

13. It *is* possible to create an atomic explosion in the proposed "breeder" reactor, but this is not the point. Almost any kind of explosion (say a steam explosion), or sabotage, or a melt-down can release the radioactive material in the core, which would probably be more harmful than the explosion itself.

14. A 1973 AEC task force stated, "The task force ... does not believe that the overall incident record over the past several years, give the required confidence level that the probability for such an accident is 10^{-6} (one in a million) or less per reactor-year."

15. There are presently no fuel recycling facilities available, and probably won't be until at least 1977. Meanwhile, spent fuel rods are piling up in cooling ponds outside commercial reactors. The situation is so dangerous that several industry executives suggested that power plants may have to begin shutting down soon.

16. These two garages-full would contain an amount of long-lived radiation equivalent to 30,000 Hiroshima size A-bombs.

17. "The Atomic Energy Commission has ended its investigation of a massive fish kill at the Millstone Point nuclear power complex in Waterford, Conn. without giving a specific cause of the April incident in which thousands of fish, mostly menhaden, died. Analysis of fish and water samples scrutinized by several consultants failed to provide a consensus aside from the fact that the kill was plant-oriented, an AEC spokesman said." (*New York Times,* August 16, 1972)

18. So far the AEC has no idea where to store the wastes. If adequate storage is found, government control would have to be long term and rigid enough to keep people away from the wastes for 1000 years or more.

19. All power plants produce wasted heat, but nuclear power plants produce 30 to 50 percent more waste heat per kilowatt of electricity than fossil-fueled plants.

20. Power output at 10 nuclear power plants had to be cut back last year after it was discovered that these nuclear pellets were unexpectedly densifying, greatly increasing the chances of an accident.

21. A 1972 RAND Corp. report said that if the Imperial Valley geothermal reservoir were tapped over a 15 year period, California would need no other new power plants between 1985 and 2000, even if power demand grew at 3 percent a year.

22. A National Science Foundation/ NASA study reported, "if solar development programs are successful, building heating could reach public use within five years, building cooling in five to ten years ... and electricity production in ten to fifteen years." PG&E says it takes about 10 years to build one nuclear power plant.

23. Precisely. Alternate energy sources, especially solar and wind-power, are perfect for small-scale use. Every home could generate its own, instead of buying it from PG&E.

24. Twenty-five years ago, a Presidential commission predicted that by 1975 millions of American homes could be heated by the sun. Who decided that nuclear power would "arrive" instead? Certainly not the voters or the electricity consumers.

25. According to a 1973 energy study by the Joint Economic Committee of Con-

(*Continued on page 60*)

Powers That Be:

The NBC Documentary You Never Got to See

by Elliot Kanter

This year, KNBC-Los Angeles was responsible for three programs which, when added to its 1969 blockbuster, "The Slow Guillotine," gave it the lead in environmental coverage, local and network. Again, they were the work of Don Widener, who took his local crew as far afield as the Baltic Sea to gather evidence. "Timetable for Disaster" was a consideration of global water pollution problems. "A Sea of Troubles" covered the unhappy lot of fishermen and fisheries on both coasts due to mercury and DDT. "Powers that Be" was a harsh, frightening look at the activities of the AEC. It went on the air despite pressure from the AEC to keep it off and impede production along the way. Although these shows were of the highest quality and formed a series which any other local station in the nation would be hardpressed to match, they seemed to be at an end: Widener's contract was not picked up.

—The Alfred I. DuPont-Columbia University Survey of Broadcast Journalism, *1971*

For more than three years, Pacific Gas and Electric, the giant power company which services much of Northern California, has suppressed a frightening television documentary on the dangers of nuclear reactors. The hour-long film, "Powers that Be," produced by award-winning producer/writer Don Widener, and narrated for a token fee by Jack Lemmon, was shown on May 17, 1971, over KNBC-TV in Los Angeles. Shortly thereafter, PG&E launched a letter-writing campaign against the film and its producer, bombarding network and government officials alike with accusations of distortion and unethical conduct. An exchange of lawsuits followed—Widener asking for a $3 million libel judgment, and PG&E seeking a permanent injunction against use of the film, as well as $6 million in damages. For its part, well before any legal action had been taken, KNBC-TV hastened to withdraw the film from its library.

With nearly $5 billion in assets, PG&E is America's second largest private power company, only a step behind New York's Consolidated Edison. And where financially shaky Con Ed has had to turn over responsibility for its latest nuclear reactor to the state of New York, PG&E has been moving forward confidently into its nuclear future. Yet its sharp reaction to "Powers that Be" suggests that PG&E's confidence is giving way to a bad case of nerves.

* * *

Producer Don Widener sees himself as an environmentalist, not as an enemy of technology. Originally a public relations man at the NBC owned and operated television station in Los Angeles, in 1969 he decided to try his hand at making documentaries on environmental issues, well before ecology had attained the status of a movement. His first effort, a grim study of air pollution called "The Slow Guillotine," was aired in 1969; acclaimed as the year's best news documentary, it won both an Emmy and the Alfred I. DuPont award.

Armed with a budget of $50,000, Widener and his crew travelled across the United States, visiting nuclear power plants in California, filming nuclear waste disposal sites in New York, Colorado, Washington and Nevada, interviewing critics of nuclear power, AEC officials, and spokesmen for the industry. The result was "Powers that

(*Continued on page 57*)