

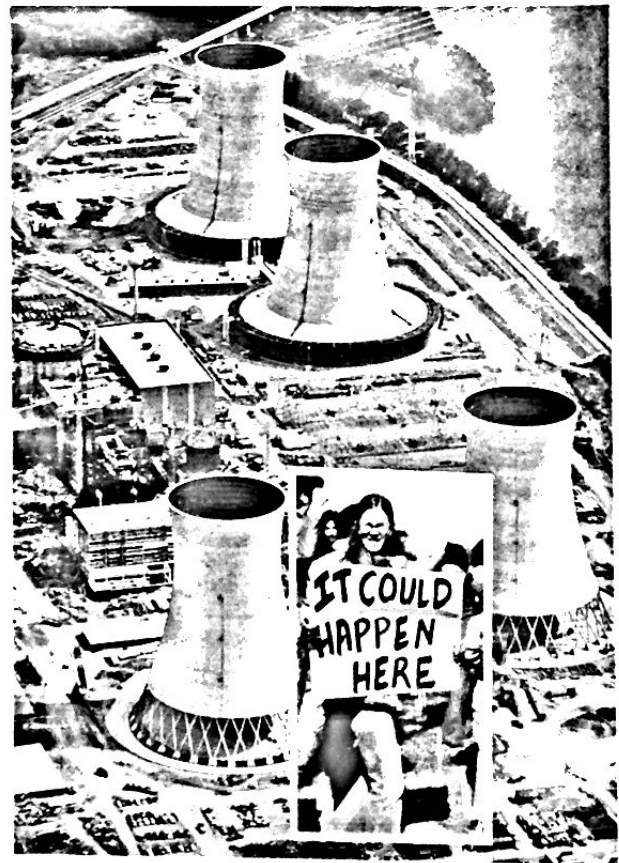
The 3 Mile Island Nuclear Disaster

- what the public is not being told -
- what antinuke organizers need to know -

a report from Science for the People

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Not until 48 hours after the beginning of the series of equipment failures and human errors that triggered off the disaster at 3 Mile Island (3MI) nuclear reactor near Harrisburg, Pa., did it become apparent to the officials of Metropolitan Edison (Met Ed) and to the Nuclear Regulatory Commission (NRC) that the lives of the nearly one million people in the surrounding four-county area were in immediate danger.¹ The unanticipated appearance of a growing bubble of hydrogen gas was preventing the complete cooling of the reactor core and threatening its complete meltdown and the potential rapid release of vast quantities of lethal radioactive material. This particular event, currently being popularized by the motion picture *The China Syndrome*, had been described in lurid detail in a report^{2,3} prepared for the Atomic Energy Commission (AEC).^{**} The report estimated that the immediate loss of life from such a meltdown might be 45,000 people, with 100,000 more seriously injured. The report predicted that permanent contamination could extend over an area the size of the state of Pennsylvania! With that prospect in mind, one surely would have expected the officials involved to order an immediate evacuation of the area. Instead, the NRC officials, the governor of Pennsylvania, the Secretary of Health, Education and Welfare (HEW), and the President of the United States spent the next several days issuing reassuring statements and pretending that they would have had the time to carry out an evacuation if one of the several very real possibilities had occurred to trigger a complete meltdown.^{1,4} Even when it became apparent that part of the core had melted and that lethal radiation was leaking from the highly contaminated containment building, all that was done was to recommend a voluntary evacuation of pregnant women and young children. Fortunately 200,000 people saw through the official propaganda and fled the area.⁵ Undoubtedly many more would have followed if their finances or job situation had



allowed. Those who stayed behind and those who returned prematurely were exposed to releases of radiation far above background levels. Workers in the plant, frequently without their knowledge, were exposed in a few minutes to more radiation than their normally hazardous working conditions would expose them to in a year. Indeed, workers who arrived at the plant several hours after the disaster had begun were allowed to enter without any warnings!⁶

The media coverage of the 3MI disaster was extensive, but with few exceptions the message presented to the public underplayed the true magnitude of the actual and potential hazards

* Science for the People is an organization dedicated to a science that serves the needs of all the people. For information about publications and activities, write to SftP, 897 Main St., Cambridge, Mass. 02139.

** The AEC was subdivided in 1974 into the Nuclear Regulatory Commission and the Energy Research and Development Agency. The latter was incorporated into the Department of Energy when it was formed in 1978.

and gave feature coverage to the NRC and government officials, who showed more concern about the future well-being of the nuclear industry than about the health and safety of the people. This is not surprising in view of the history of the past 30 years. The nuclear industry, with the help of their cronies and former colleagues in the agencies which are supposed to regulate them, has continually used coverups, distortions, lies, blackmail— and in the case of Karen Silkwood, a courageous worker who tried to expose unsafe conditions in the industry, perhaps murder—to convince an increasingly skeptical public that we could harness this uniquely hazardous and insidious energy source to provide safe and economical power. Indeed, the AEC report referred to above was suppressed for nine years until its existence was revealed following a threatened law suit under the Freedom of Information Act.^{3,7} When NBC showed the startling 1976 tv documentary *Danger: Radioactive Waste*, which exposed the incredible bungling and irresponsibility in past management of these lethal wastes and the bleak prospect of ever finding a safe way to deal with them, it was immediately threatened with economic blackmail in the form of advertising withdrawal by the Atomic Industrial Forum, the nuclear industry's propaganda organization. NBC never showed it again. Similar threats are being used against the tv promotion of *The China Syndrome*.⁸



What is this nuclear industry, and why is it willing to go to such lengths to push us down the road to disaster? It includes some of the same folks who brought us the 1973 "energy crisis" and who are manipulating the present supposed oil shortage to reap windfall profits. Exxon, Gulf, Continental, Getty, Kerr-McGee—the big oil giants—own much of the uranium mining rights.⁹ Together with the reactor builders (Westinghouse, General Electric, and Babcock Wilcox), the major utility companies, and the banks with which they have interlocking interests, they wield great economic and political power. This has allowed them—until recently—to control the media and manipulate many of our public officials. A growing number of scientists, technicians, health workers, economists, and politicians—many of whom were originally pro-nuclear—have come to recognize that the continued development of nuclear energy poses clearly unacceptable threats to our health and safety without prospect of cheap electricity. But they have been frustrated in their attempts to use the mass media to help educate the public to combat the

well-financed industry propaganda machine. In response to this situation, they have formed antinuclear groups of their own and joined the many grassroots anti-nuclear alliances, relying on mass rallies, demonstrations, alternate media, and a variety of other techniques. This growing, international movement has been fueled by a continuous series of events which the nuclear pushers, despite their increasingly desperate efforts, have been unable to hide from the people. The Harrisburg horror is only the most recent—and of course the most dramatic—of developments which have included repeated plant shutdowns on account of radiation leaks, equipment failures, and design errors.¹⁰ It's increasingly obvious that no one can figure out what to do with the radioactive wastes which must be isolated from the environment for hundreds of thousands of years. In addition, this technology requires constant upgrading of its safety features. Although their continued inadequacy is obvious, the necessity to pour money into (so-called) safety improvements is a significant contributor to the skyrocketing costs of nuclear power.¹¹

The Harrisburg disaster has resulted in a groundswell of anti-nuclear activity. It is clear that this is the time to end this nuclear madness. This will require a united effort by a well-informed people's movement. The nuclear industry and its government supporters are already issuing false threats of electrical dimouts and serious economic dislocations if the nuclear spigot is closed. They will not give up their considerable investments in nuclear resources and technology without a struggle. We can be sure that the mass media will be flooded with propaganda attempting to assure us that 3MI was a fluke and that some minor additional safety precautions are all that is required. President Carter has already announced his intention to support the construction of more nuclear reactors.¹² The study commission he has appointed will probably support his position. We must use every means at our disposal to combat all pro-nuclear propaganda.

Furthermore, the struggle must not end with the closing down of all nuclear facilities. Our immediate goal should include the promotion of presently available, environmentally compatible, renewable, and decentralized energy sources. This will require no less than the breaking of the monopoly hold on electrical power production now enjoyed by the utilities and the energy industry giants. The remainder of this pamphlet contains facts and suggestions which are not now common knowledge but which will be important to popularize during the growing struggle in the months to come. The people are on the move in every corner of the United States. If we are organized and armed with the truth, we are a force whose demands cannot be silenced by a government-corporate campaign of disinformation.

LOW-LEVEL RADIATION

One of the most irresponsible statements featured in the mass media's coverage of 3MI was the assurance by HEW Secretary Califano that the radiation released would result in no injuries or deaths among the exposed workers or the two million people living within 50 miles of the plant.¹³ Met Ed president Creitz admitted that the amount of radioactive material released during the first several hours of the disaster is not known, since it wasn't monitored.¹⁴ Since then, the NRC and other official agencies which control the information have issued sporadic reports of radiation levels in the area, making it impossible to determine the total public exposure accurately.

In striking contrast to Califano's assertion, some experts on the effects of radiation have calculated that approximately 60 excess cancer deaths had already been assured from the radiation level reported during the first week following the reactor failure.¹⁵ No estimates have been released as yet of the genetic damage which will show up as birth defects in the children of those exposed. Califano's statement is an echo of the industry's ludicrous claim that no one has been killed or injured by any commercial nuclear reactor. Those who spread these lies seek credibility from the hope that the public will not recognize that low-level radiation is an insidious killer. No immediate damage is apparent and laboratory tests will reveal nothing. Nevertheless, the hidden injuries will show up with absolute certainty during the next 30 years.¹⁶

Radioactive substances emit high energy x-rays (called gamma rays) and tiny particles which move at high speeds. Gamma rays can penetrate our bodies, while tiny alpha and beta particles are a threat when we swallow or breathe in the substances that produce them. These rays and particles cause chemical havoc within the cells they strike. If the chemicals that control cell division are affected the cell can divide wildly, producing cancer. If the blood-forming cells are affected, leukemia can result. The time between the damage to the cell and the onset of the disease is unpredictable—but can often be as long as 20 or 30 years, or more. If egg cells or sperm cells are affected, a wide variety of birth defects will show up in future generations.

The pro-nuclear propagandists stress the fact that we are all exposed to radiation from cosmic rays and small amounts of naturally-occurring radioactive material that is literally everywhere. This should provide no comfort since this unavoidable background radiation is suspected by most experts of being responsible for as much as 2% of the naturally occurring cancers and mutations! It has long been suspected by many radiation and cancer experts that any additional public exposure to radiation, no matter how small, will cause a statistical increase in cancer and mutation rates. This expectation is now being confirmed by long-term studies on workers at military nuclear installations. The results of noted epidemiologists and statisticians such as Samuel Milham, Thomas Mancuso, Alice Stewart, and George Kneale indicate that low-level radiation is far more hazardous than studies of Japanese survivors of Hiroshima suggested.¹⁶ As soon as Mancuso's painstaking studies began to produce these results, his contract was terminated by the NRC, which had originally commissioned the work.

In response to these revelations many radiation experts have demanded that the radiation standards for worker exposure be lowered. The industry has strongly resisted, since lowered standards would mean hiring more workers. In fact this may not be a progressive step since the total exposure and its effects would probably remain the same. They would merely be spread out over more workers!

Two weeks after the 3MI disaster, radiation is still being emitted by the heavily contaminated plant. The removal of the thousands of gallons of highly radioactive water and debris from the damaged reactor core threatens future atmospheric releases of unknown magnitude. Small amounts of radioactive iodine have already appeared in milk from the surrounding area.¹⁷ Yet the public has been officially informed that the emergency is over,¹⁸ and no worker in the threatened area can be absent from her or his job without fear of reprisals.

CORE MELTDOWN

THE ULTIMATE DISASTER

How close the 3MI reactor came to a complete meltdown we will probably never know. Uncharacteristically, Met Ed and NRC officials admitted that they were concerned over a period of several days that such a catastrophe might indeed occur. The extreme degree of concern and confusion is reflected in the transcripts of the NRC's secret hearing held during the emergency.¹

Immediately following a water coolant failure, the fission process by which atoms are split, releasing energy, is supposed to be shut down. This apparently did happen, but the problem is that reactor shutdown does not turn off the heat buildup. During the operation of the reactor more than 200 different types of radioactive atoms are produced in the fuel rods and cooling water. 3MI was in operation for only about three months. Even after this short period, its core was loaded with highly radioactive material producing intense radiation. So much heat was being generated by this radiation at the time the fission reaction was shut off that unless cooling water was quickly recirculated through the core the temperature would have rapidly risen above the 3200° F melting point of the fuel rods, causing their molten contents to dump onto the containment floor. This would rapidly vaporize the water present, causing a steam explosion that could rupture the four-foot thick steel and concrete dome, and spew forth its lethal contents into the air above. Alternately, the intense heat of the core could melt down through the base of the building, reach the water table (not far beneath 3MI or most other reactors), and produce a geyser of steam and debris containing huge quantities of radioactive materials. In either case the prevailing winds would then transport the waste which would fall to the ground over an area with a radius that might extend for hundreds of miles—especially in the downwind direction. Tens of thousands of people would die within days and hundreds of thousands of people would suffer serious short-term after effects—not to mention the incalculable toll of future increases in cancer and mutation rates. The contaminated area would be unsuitable for human habitation and agricultural production for hundreds of years—or more!

In the 3MI nuke, enough of the core remained uncooled for a sufficiently long time to cause considerable damage and a partial meltdown.¹⁹ In addition, the cooling water reacted with the overheated fuel rods to produce a large gas bubble, an event never imagined by reactor designers or safety regulators. This bubble interfered with the cooling process and prevented the serious threat of a hydrogen-oxygen gas explosion. Such an explosion could easily have ruptured the cooling pipes and triggered a complete meltdown, a catastrophic result which was fortunately averted—this time.

The radiation release which did occur was due to contaminated steam which was vented from the reactor containment building. This steam carried with it some of the more volatile radioactive atoms which had spilled out of the damaged reactor rods.

The threat to health and life posed by a radioactive substance depends on several factors. These include the amount of material released, the length of time it takes to disintegrate (measured by half-life, the time required for half of the atoms to decay away), the likelihood that the substance will enter the human body through inhalation or in the food we eat or drink,

and what happens to the substance inside the body.

The gasses released from 3MI contained radioactive krypton and xenon.²⁰ These were primarily responsible for the high radiation levels recorded within a one to fifteen mile radius of the reactor. The short lifetime of the xenon atoms and rapid dissipation of both of these gasses make them a danger for only a period of a few days. Another substance released was iodine-131. This substance, which can enter the body through milk, other dairy products, and seafood, was a contaminant in both the vented steam and the cooling water which was dumped into the Susquehanna River.²¹ Iodine-131 remains a hazard for about 80 days. It was detected in milk produced near Harrisburg a few days after the reactor failure.¹⁷ Iodine is concentrated by the human thyroid and poses a particularly serious threat to infants and young children. Another substance which may have been released is cesium-137. It was in the coolant water inside the reactor, but as of April 8, 1979, none had been reported detected in the surrounding countryside.²² This substance, which can also find its way into the food chain, remains potent for hundreds of years.

Many other highly radioactive substances which have higher boiling points remain in the reactor core and cooling water. Some may still be released during the reactor cleanup. The narrowly-averted total meltdown could have caused them to rain down on hundreds of thousands of people. One of these substances is strontium-90, which would remain lethal for more than two centuries. A close chemical relative of calcium, it would contaminate all dairy products and be deposited in human bones and teeth. Another substance present in all nuclear reactors is *plutonium*.

PLUTONIUM-----THE ULTIMATE POISON

Curiously, there seems to have been no mention of plutonium in the media coverage of the 3MI disaster. Could it be that the NRC and other government officials were afraid about the panic that might have been caused by calling attention to this super-lethal substance? Surely they must know that a reactor the size of 3MI which had been operating for three months would already contain over 200 pounds of plutonium.²³

Plutonium is one of the most lethal substances ever produced. It does not occur naturally on Earth, but is formed in all nuclear reactors from the uranium fuel. In a meltdown the hot plutonium would react with the oxygen in the air to form a cloud of tiny dustlike particles of plutonium oxide. Based on animal studies it can be estimated that if only one of these dust particles containing as little as 10 billionths of an ounce of plutonium is inhaled, the human victim will be almost certain to develop cancer within the following one to 30 years.²⁴ Put another way, if only one particle of plutonium in every ten million from the plutonium in the 3MI reactor core had ended up in the lungs of human beings, over 200,000 cancers would have resulted! What's more, plutonium can also get into the human body through the digestive tract. It ends up in the bones, gonads, and various glands where it can cause a wide variety of cancers. Plutonium-239, the form produced in the largest amounts in reactors, remains deadly for over 200,000 years!

The underestimation of the magnitude of the plutonium

threat has been recently confirmed by studies done by epidemiologist Dr. Carl Johnson. He reports a 140% increase in testicular cancer and significant increases in other malignancies due to small amounts of plutonium released during the manufacture of nuclear warheads at the Rocky Flats, Colorado military installation.²⁵ Dr. Johnson's carefully-controlled studies involved people living as far as 13 miles downwind from the plutonium source.

It requires less than 20 pounds of plutonium to make a nuclear bomb. The plutonium being manufactured in the fuel rods in all of the 72 presently licensed U.S. nuclear reactors--as well as the many others around the world--could be diverted through theft or sabotage to any nation or group interested in entering the atomic weapons club. In 1945 there were only a few hundred pounds of plutonium in the world. Today the U.S. alone has several hundred thousand pounds. Each reactor adds 1,000 pounds more per year to the inventory of this unimaginably hazardous material.

RADIOACTIVE WASTE ----- NO PLACE TO PUT IT

The failure of the nuclear industry and the NRC to take the problem of radioactive waste disposal seriously is one of the clearest examples of their criminal irresponsibility. For years the public has been assured that a safe disposal system was being developed. Recent reports by various governmental agencies make it clear that no such solution is anywhere in sight.²⁶ Indeed, a growing number of scientists believe that no acceptable solution will ever be found.

Hundreds of thousands of pounds of radioactive wastes are being produced by the nuclear industry each year. Mining and milling of uranium ore produces huge piles of waste material called tailings. These tailings release lethal radon-222 gas which threatens the lives of mine workers as well as residents of towns near the huge, dusty, windblown piles into which they are heaped. Additional wastes are generated in every other phase of the uranium fuel cycle as well as by the reactors themselves.

So-called low-level wastes are buried in rural sites in six different states. Leakages of radiation into nearby streams have occurred in at least two of the sites.²⁷ At Hanford, Washington 500,000 of the 65 million gallons of high-level wastes stored there have already leaked out into the ground only five miles from the Columbia river!

Each year one third of the fuel rods in each commercial nuclear reactor must be replaced. These rods containing their burden of plutonium and other high-level wastes are presently being stored in large pools of water at each of the reactors. The reason is that no plan exists to deal with them. They were supposed to be reprocessed at commercial plants which would remove the plutonium and remaining uranium for fabrication into new fuel elements. The only such plant that ever existed in the U.S. was operated for a few years by a Getty Oil subsidiary in West Valley, New York. It was an economic and ecological disaster.²⁸ A legacy of 600,000 gallons of high-level wastes remain, not so slowly corroding their way through storage tanks. Estimates of the cost of cleaning up that mess--if anyone ever figures out how to do it--run to a billion dollars. There is no plan to charge Getty a penny for this outrage.

CHEAP POWER? ----- FORGET IT!

Although the 3MI disaster has seriously discredited the "safe power" assurances of the nuclear energy industry, most people still seem to accept the "cheap power" claims of the utilities and their suppliers. Nothing could be further from the truth.

The costs of building a nuclear power plant have skyrocketed.²⁹ The reactor being built by the Long Island Lighting Company (LILCO) at Shoreham, New York was initially estimated to cost \$262 million. Now, 10 years later, with about 80% of the work completed, the current price tag is \$1.4 billion! And that estimate was made before 3MI, a disaster which is sure to lead to requirements for additional costly "safety" features. Shoreham may seem like an extreme example—but other reactors being built or planned are experiencing similar soaring cost escalations. For example, the Green County, N. Y. nuclear power plant proposed for 1988 was just cancelled by the Power Authority of the State of N. Y. because the latest cost estimate had risen to \$3.1 billion from "only" \$1.8 billion in less than two years!^{29a}

Other factors contributing to the steeply increasing price of nuclear-generated electricity include the fuel costs. Concentrated uranium ore (yellowcake) jumped from \$7 to \$42 per pound in only five years due to manipulation by the cartel that controls the international uranium market. Low operating efficiency is another key cost-increaser. Due to frequent shutdowns for repairs and "safety" improvements, nuclear plants have operated at less than 60% of their rated capacities.²⁹ (For example, the NRC recently ordered five nuclear plants along the East coast to shut down because a "design error" makes them vulnerable to damage due to earthquakes which geologists consider a definite possibility in the vicinity of these plants.) Nuclear plants are constructed in such large sizes (they're "cheaper" that way) that they actually increase the need for more power generating capacity by about 28% when compared to smaller coal, oil, or gas fired plants in order to provide equally reliable service.^{26b}

All this has led Charles Komanoff, the leading economic expert on comparative energy costs who is not connected with the energy industry, to conclude that within the next few years electrical energy generated by nuclear power will be far more costly than electricity produced by other means.³⁰ He estimates that electricity produced by new large nuclear plants will cost 9¢ per kilowatt hour (a unit of electrical energy) compared to 6¢ for the same amount of energy from a coal plant equipped with "scrubbers" to reduce air pollution.

WHO BENEFITS FROM NUKES?

Clearly if it isn't safe and it isn't economical there must be some other reason why it is still being pushed. It's not hard to see why Exxon, Gulf, Getty, Kerr-McGee, General Electric, and Westinghouse are pushing it. They all have large investments in mining rights or production facilities to protect. But why are the utilities also pushing it?

The answer is simple. In most states the laws which grant utilities a monopoly over production of electricity also guarantee them a "fair" rate of profit (in some cases 14% per year or more!) on all their electrical generating equipment.³¹ This means that the more expensive the facility they can convince their supposed regulators to let them build, the more profit they will reap. The



utilities continually resort to enormously inflated predictions of electrical energy need to justify new plant construction. This has been clearly proven in the case of New York State's utilities in a study done by the Energy Systems Research Group.³²

But there is a catch. In order to reap the windfall profits, they must be able to raise the capital to actually complete the project and put the plant into operation. The soaring costs are making an increasing number of utilities nervous about not being able to raise the capital to complete the job. Hopefully 3MI will contribute to this problem.

In response to this problem the utilities and the nuclear industry have been lobbying for help from the federal and state governments. They want more subsidies for the already heavily-subsidized nuclear industry. They also want changes in regulations, either to allow an individual utility to charge the public in advance for the full cost of building a new power plant or to permit several utility monopolies to pool their resources to help finance plant construction.

ARE WE HOOKED?

The nuclear energy pushers would like to convince us that we are already hopelessly addicted to nukes. Since 3MI the energy industry, the utilities, and their friends in government right on up to President Carter have been telling us that all sorts of dire consequences will result if we fail to build any more nuclear power plants and shut down the ones that are now operating. They talk about electrical shortages and dimouts, about the effect of oil supplies or fuel prices, and about potential loss of jobs. All three of these scare tactics are unjustified.

Nuclear power presently supplies about 12% of our electricity and about 4% of our total energy.³³ Nationwide there is about a 30% overcapacity of electrical power.³⁴ Since nuclear power plants are shut down an average of 40% of the time,^{29,31} all utilities operating these plants must have alternate means of producing power. These alternate means could immediately take up a great deal of the slack if all nukes were immediately shut down. Transmission networks allow utilities to buy power from one another, providing a second means by which nuclear-generated

electricity could be immediately substituted-for. In a very few areas of the country an immediate shutdown of all operating nuclear facilities may not be possible without creating some unacceptable hardships. Even in these cases a phase-out of nuclear power over a period of a few years is certainly possible. In view of the fact that new nukes produce more expensive electricity than other types of power plants,³⁰ there is clearly no justification for their future role in U. S. electrical power production.

Since only about 10% of our oil is used to produce electricity, shutting down nukes can not have an overwhelming effect on the supply or price of petroleum products. Improvements in automobile gas mileage and home insulation could more than make up for the oil required by utilities to replace nuclear power. *Business Week* reported in April 1979 that our supposed oil shortfall is "proving to be something of a mirage. Stocks of gasoline, heating oil, and crude are not seriously low by any measure."³⁵ The possibility of future shortages, according to this article, depends more on policies of the Department of Energy with regard to regulating the oil industry than on any intrinsic petroleum supply problems involving either imported or domestically produced oil.

As far as jobs are concerned, capital-intensive facilities like nuclear power plants have a negative long-term effect. During the building phase many jobs are created, mostly of a highly skilled nature. A large percentage of these jobs is taken by workers who move into the area rather than local laborers. There is little if any effect on the unemployment situation until after the plant is finished, when the temporary economic boom turns to bust. By contrast, decentralized power-producing facilities using renewable energy sources and conservation measures produce many more permanent jobs.³⁶

We aren't hooked yet. There is still time to break the nuclear habit!

WHAT ARE THE ALTERNATIVES?

The only alternative to nuclear energy which the public media present as immediately realistic is the increased use of coal.

They correctly point out that coal use—even with the "scrubbers" now available to remove much of the sulfur dioxide and other atmospheric pollutants—has undesirable environmental consequences. Present mining conditions are unsafe, unhealthy, and produce water pollution as well as general ecological devastation in the case of strip mines.

Much of this could be corrected by passing and enforcing new legislation. In countries like Wales, Australia, and the Soviet Union, coal mining is done much more safely and without the high incidence of crippling black lung disease which results from the dusty conditions in U.S. mines. The so-called "risk-risk" comparisons which attempt to show that coal mining is more hazardous than nuclear power production are totally invalid. They generally ignore or underestimate the considerable radiation hazards associated with every step of the uranium fuel cycle. Most significantly, they fail to recognize the unique potential for a totally unacceptable, catastrophic meltdown accident which is associated *only* with nukes.

Increased reliance on coal, though it may be politically unavoidable as a short-term measure to unhook us from our nuclear habit, has another serious disadvantage. Like nuclear, it is a tech-

nology which is suited for use only in centralized, capital-intensive power plants. Recognizing this, the huge oil companies and other energy industry giants have bought up much of our domestic coal mining land.⁹ Switching from nuclear power to coal will keep us in the grip of these huge corporations and the utility company monopolies which now control our electric power.

The utilities and the energy industry are fond of talking about renewable energy sources as if they were some vague hope for the distant future. This is sheer nonsense! Many of the³⁷ technologies for producing electricity are available right now. Aside from the direct conversion of sunlight to electricity, which admittedly requires more development before it will be cost-competitive, these include:

- (a) Wind power. A recent analysis shows that this one source alone has the theoretical potential for producing 75% of total U. S. energy consumption.³⁸
- (b) Methane digesters, which convert organic wastes into methane gas. China is one country where people in many localities build and use these for both illumination and cooking.
- (c) The burning of garbage. For example, the town of Hempstead, N. Y. has recently built a plant for recycling glass and metal which will, at the same time, produce 15% of the town's electricity!
- (d) Biomass conversion, in which fast-growing plants are produced on marginal lands for use as fuel either directly or after conversion to methane or alcohol.

The main obstacle to the development of these technologies is present governmental policy and legislation. Laws which grant a utility an absolute monopoly over electrical power production effectively block the development of decentralized electrical facilities which could be built by a community group or other small subdivision. Most renewable energy sources are uniquely suited for decentralized use. Their development is therefore directly at odds with the interests of the utility companies and the huge energy industry companies. When Exxon or a utility talks about developing solar energy, they mean some capital-intensive scheme such as a solar satellite beaming back dangerous microwave energy to a huge array of receivers. Such schemes will perpetuate control of our electrical energy by those who are currently ripping us off.

Federal energy research programs are presently focused almost exclusively on development of nuclear, coal, and other capital-intensive energy technologies. Only a very small percentage of our federal energy research budget goes to solar and other renewable sources, and these funds primarily support the inappropriate adaptation of these technologies for use in our present centralized delivery system.³⁹ For example, little money is being spent on reducing the cost of solid-state devices which could be installed on individual homes, apartment buildings, and factories for direct production of electricity from sunlight. Many experts in this field claim that with proper funding this technology could be made cost-competitive with coal and nuclear in less than ten years.⁴⁰

Many analysts have pointed out that our most neglected energy alternative is conservation.⁴¹ This doesn't mean doing without present comforts, but rather changing our totally inefficient and wasteful practices, which compare very unfavorably with other countries. Both district heating, the use of waste heat from power plants to warm factories and living space (a tactic which is not compatible with nuclear power plants) and cogeneration, the use of heat produced in industrial processes to make

electric power, are two methods in wide use elsewhere which are not widely used here and are frequently blocked by the legislation that gives our electrical utilities their monopoly control.

WHAT NEEDS TO BE DONE

First we must agree on a set of goals. The following are offered as a minimal set of demands which should be supported by the entire antinuclear movement:

- (1) Immediately cancel all plans to build new nuclear plants and stop construction of nukes now being built.
- (2) Shut down all presently operating nukes in areas where sufficient alternative electrical power exists to meet essential needs.
- (3) Phase out as quickly as possible the few remaining nukes by construction of alternative facilities.
- (4) Retrain and relocate all workers deprived of employment by these actions.
- (5) Change the many federal and state laws which both give the utilities and energy industry giants their monopoly status and which discourage the development of decentralized, renewable energy technologies.
- (6) Shift our present federal and state subsidies (tax write-offs, depletion allowances, etc.) away from support of nuclear development and replace them with incentives designed to encourage the development and use of decentralized alternative energy programs.
- (7) Redirect our federal- and state-financed energy research programs away from nuclear and fossil fuels and toward the exploitation of renewable resources.

HOW TO DO IT

The above program *can* be accomplished. It will require the building of an effective, *massive* movement to counter the well-funded opposition of the energy industry and its supporters in the Department of Energy. The movement began years ago, but the 3 MI disaster has given it new impetus and urgency. **YOU SHOULD JOIN IT TODAY.** Here are some suggestions for getting involved:

- (1) Educate yourself about nuclear power and its alternatives. (See resource list below.)
- (2) Find out about organizations in your area that are involved in



the antinuclear, pro-safe energy movement. (See resource list below.)

- (3) Join these organizations and convince your friends and neighbors to do likewise. If no such organization exists in your area, start one. The Long Island SHAD ALLIANCE has available a short organizers guide written by some Long Island residents who got activated by the 3MI calamity (send self-addressed envelop with 28¢ postage).
- (4) Set up forums, debates, living room discussions, town meeting meetings, and film showings in your neighborhood. Put the safe energy issue on the agenda in any organization you belong to.
- (5) Seek media coverage for the movement.
- (6) Organize letter-writing campaigns to local, state, and federal legislative and other officials.
- (7) Be creative in efforts to organize a wide range of activities to publicize the movement.

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RESOURCE LIST

Periodicals

Critical Mass Journal, monthly newspaper on antinuclear movement and safe energy. \$7.50/year. P.O. Box 1538, Wash., D. C., 20013.

Groundswell, monthly newsletter on anti-nuke organizing. Nuclear Information and Resource Service, 1536 16th St., N. W., Wash., D. C.

Not Man Apart, monthly newsletter of the Friends of the Earth, 124 Spear St., San Francisco, Ca. 94105.

Science for the People, bimonthly magazine of the organization of the same name. \$7/year. SftP, 897 Main St., Cambridge, Ma. 02139.

Films

Green Mountain Post Films, P. O. Box 177, Montague, Ma. 03151. Wide selection of excellent, international, anti-nuke films for rent or sale.

Mobilization for Survival, 3601 Locust Walk, Philadelphia, Pa. 19104. Audiovisual catalog 50¢.

Center for Documentary Media (sole distributor of *Paul Jacobs and the Nuclear Gang*), 1501 Broadway, Suite 1904, New York, N. Y. 10036. \$750 purchase of 16mm film; tv cassette also available.

Books and Pamphlets

No Nukes: Everyone's Guide to Nuclear Power, Anna Gyorgy and Friends, South End Press, 1978 (\$8). P. O. Box 68, Astor Station, Boston, Ma. 02123.

The Menace of Atomic Energy, Ralph Nader & John Abbots, Norton, 1977 (\$4.95).

The Poverty of Power, Barry Commoner, Bantam 1977 (\$2.75).

Nuclear Madness—What You Can Do! Helen Caldicott, Autumn Press 1978 (\$3.95). 7 Littel Rd., Brookline, Ma. 02146.

The Nuclear Fuel Cycle: A Survey of the Public Health, Environmental and National Security Effects of Nuclear Power. Ford, Hatfield, Hollocher, Kendall, MacKenzie, Ross, Sheinman, & Schurgin, MIT Press, 1975, \$5.25.

Jobs and Energy, R. Grossman & G. Daneker, 1977 (with 1978 update). \$2 from Environmentalists for Full Employment, 1101 Vermont Ave., N. W., Wash., D. C. 20005.

Comparison of Nuclear and Coal Costs, Charles Komanoff, 1978. \$10, from Komanoff Energy Associates, 475 Park Ave. South, New York, N. Y. 10016.

Soft Energy Paths, Amory Lovins, Ballinger, 1977 (\$5.95).

All Atomic Comix, Leonard Rifas. \$1.25 each (bulk rates available) from Last Gasp, Box 212, Berkeley, Ca. 94104.

People's Energy Primer, 1979. 50¢ from Syracuse Peace Council, 924 Burnet Ave., Syracuse, N. Y. 13203.

Nuclear Plants: The More They Build the More You Pay, R. Lanoue, 1978. Available from Critical Mass, P. O. Box 1538, Wash., D. C. 20013.

Some Antinuclear Organizations

(For an updated list of organizations, write to the Nuclear Information and Resource Service, *Groundswell* Monthly Newsletter, 1536 16th St., N. W., Wash., D. C. 20036.)

Abalone Alliance (California). Abalone Alliance Clearing House, 452 Higuera, San Luis Obispo, Ca. 93401.

Arbor Alliance (Mich.), P. O. Box 7828, Ann Arbor, Mi. 48107.

Armadillo Coalition of Texas (tx.)

Armadillo Coalition of Texas, P. O. Box 828, Fort Worth, Tx. 76101.

The Bailly Alliance (Indiana, Ohio, Illinois), 711 S. Dearborn, Room 548, Chicago, Ill. 60605.

Cactus Alliance (New Mexico & Nevada), 312 Mountain Rd. N. E., Albuquerque, N. M. 87102.

Catfish Alliance (Southeast), P. O. Box 20049, Tallahassee, Fla. 32304.

Citizen's Action for Safe Energy (Oklahoma), P. O. Box 924, Claremore, Okla. 74017.

Clamshell Alliance (New England), 62 Congress St., Portsmouth, N. H. 03801.

Crabshell Alliance (Washington), P. O. Box 7027, Olympia, Wash. 98507.

Detroit Safe Energy Coalition, Box 1074, Detroit, Mi. 48231.

Great Plains Federation (Iowa, Missouri, Kansas), 811 Cherry St., Room 319, Columbia, Mo. 65201.

League Against Nuclear Dangers (Wisc.) RR1, Rudolph, Wi. 54475.

Lone Star Alliance (Austin, San Antonio, North Texas), c/o T. Samusson, 2521 Enfield, Austin, Tx. 78703.

Mobilization for Survival (umbrella antinuke organization), 3601 Locust Walk, Philadelphia, Pa. 19104.

North Anna Environmental Coalition (Va.), Box 3951, Charlottesville, Va.

Paddlewheel Alliance (Ky.), 1426 Highland Ave., Louisville, Ky. 40204.

The Potomac Alliance (Wash., D. C.), P. O. Box 9306, Wash., D. C. 20005.

SEA Alliance (New Jersey, Delaware, Eastern Pa.), 324 Bloomfield Ave., Montclair, N. J. 07042.

SHAD Alliance (N. Y. C., Long Island Sound, Westchester).

L.I. SHAD, 333 Terry Rd., Smithtown, N. Y. 11787; NYC SHAD, 339 Lafayette St., N. Y., N. Y. 10012; Westchester SHAD, 255 Grove St., White Plains, N. Y. 10601.

Tennessee Valley Clean Energy Alliance, Solar Beat, 814 S. Webb Ave., Crossville, Tenn. 38555.

Trojan Decommissioning Alliance (Oregon), 215 S.E. 9th Ave., Portland, Oregon 97242.

Twin Cities Northern Sun Alliance (Minnesota), 1513 E. Franklin Ave., Minneapolis, Minn. 55404.

Union of Concerned Scientists, 1208 Massachusetts Ave., Cambridge, Ma. 02138.

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