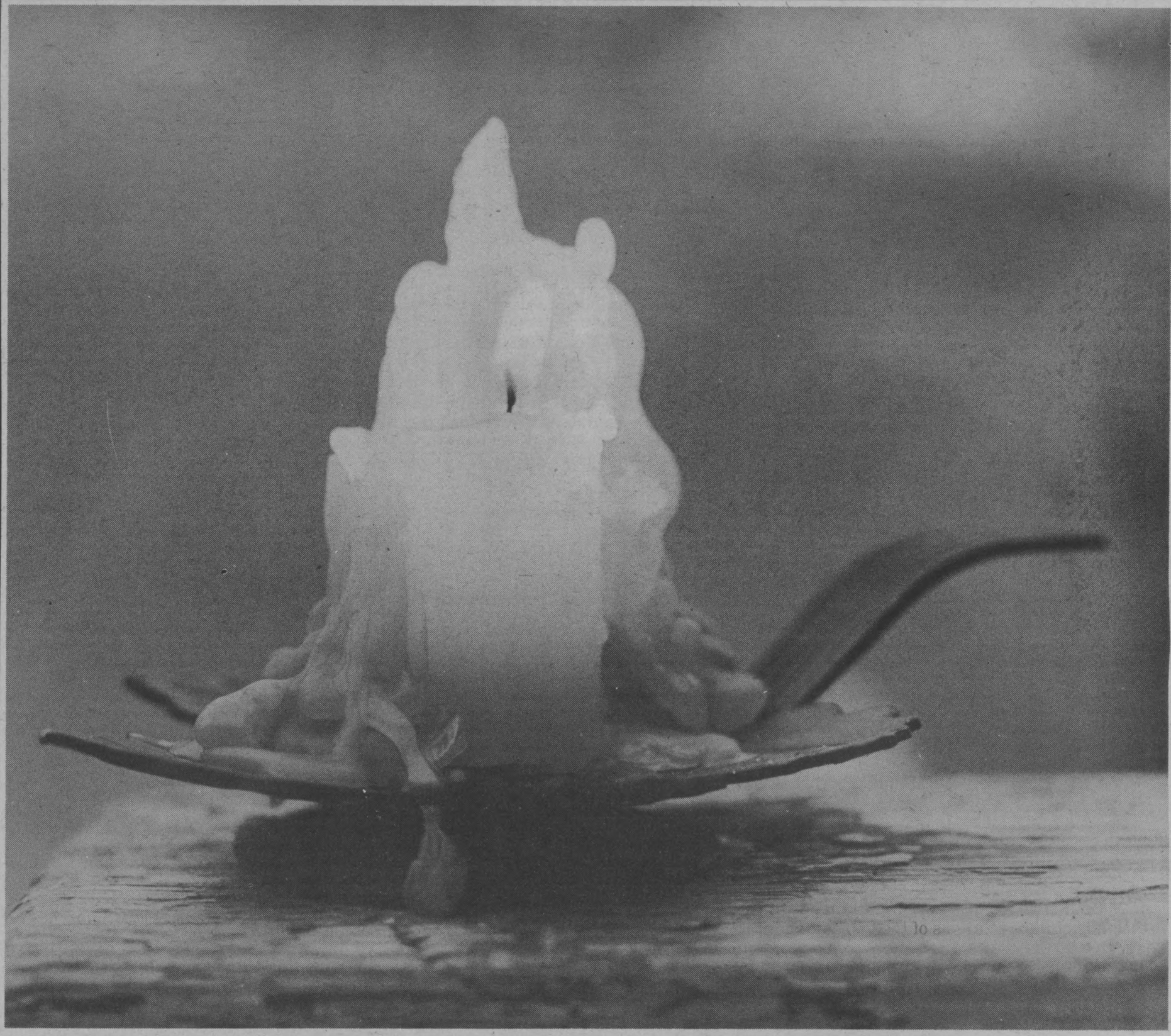


# PORTAL



**energy**  
energy  
energy

# PORTAL

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## In This Issue . . .

The energy crisis is perhaps this country's greatest single problem because it affects almost every aspect of American life. Our ever-increasing dependence on OPEC oil has caused the runaway inflation and declining stature of the American dollar worldwide. In addition, many are quick to attribute our weak and failing foreign policy to our desire not to offend our "benevolent" OPEC friends.

In this issue of Portal, we examine some of the alternative energy sources that are now being considered and their effects, as well as our present oil-based economy.

At the beginning of a new quarter for Portal, we once again welcome and encourage any letters or comments as well as your contributions in articles, short stories, poetry or other artwork.

So, please enjoy our efforts and feel free to submit your criticisms and contributions in the future.

—the editors

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### PHOTO LAB DROP-IN HOURS

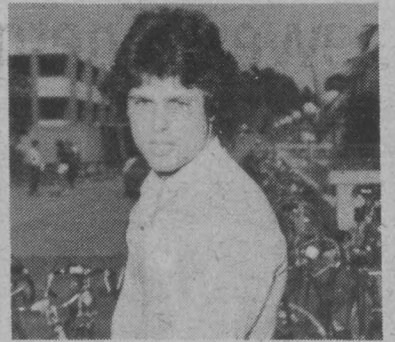
April 11 - June 13

Sunday	Noon-8 p.m.
Monday	Closed
Tuesday	6-10 p.m.
Wednesday	Closed
Thursday	6-1 p.m.
Friday	1-9 p.m.
Saturday	9 a.m. - 5 p.m.

# VIEWS...

## Do you favor nuclear power?

Cliff Ashley, junior, political science.  
I'm against nuclear power. I'm for solar power. I think there are too many dangers involved with disposing of nuclear wastes and the possibilities of a nuclear disaster or something like that. I think that there are alternatives that can be found; alternative resources that could be utilized. I think the risks involved are not worth the costs that may someday arise.



Leslie Bandle, senior, political science.  
I think its terrible. I think the biggest problem is that people don't know just how dangerous it is. There are people in Washington that are afraid for California just because of Diablo Canyon. I don't think that there is enough known about the dangers.



Will Perdomo, graduate student, chemistry.  
As long as they can make it safe, I'm in favor of it. I don't think they've reached the standards for me to say that it's safe. I think that with the shit that's going on at Three Mile Island, no way. I don't feel like making any criticisms on the waste problem because I know that they're trying and I don't have anything to contribute to the problem.



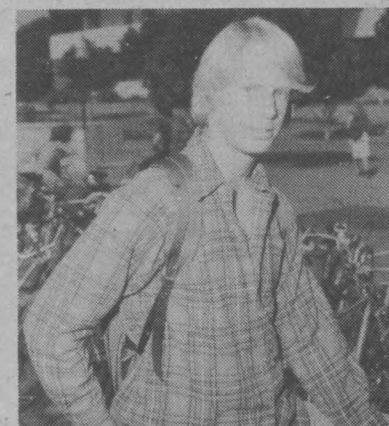
Jeanne Murphy, freshman, business economics.  
I think we need nuclear power in the immediate future, but I think it needs to be restricted more than it is now. We need more laws. Three Mile Island should not be allowed to go back into operation. People that are for it don't know what they're up against. I believe that we definitely should have it, but we need to improve the technology and insure the safety of the people.



Steve MacDonald, sophomore, communication studies.  
I think that man doesn't have enough control over it yet. We don't have the technology yet. I think that there are serious problems with waste disposal. I think that until they figure out what to do with it, they shouldn't create any more wastes. I think that the existing reactors should be shut down until the problems are solved.



Mark Hooker, freshman, economics.  
I used to be for it but I've seen that the people in control of it are pretty incompetent. A friend of mine lives about ten miles from Three Mile Island. Until they can show that they can make it safe for five or ten years I won't have much confidence in the people that run nuclear power. I think we need it but it's a pity that they're bumbling so badly. You have to keep the safe for a few thousand years and they can't even keep the reactors safe for five.



Steve Sellman, senior, physics and history.  
I think that it's a fine source of energy but the element of human error makes it a very risky source of energy at the present level of technology. I think that we should maintain the plants that we have and develop alternative energy sources. I think a good case can be made for supplementing our energy needs along with a rigid conservation program to maintain our standard of living.



Graham Metcalf, junior, music composition.  
Fission energy is not the way. If there was a way to develop fusion energy, which has no wastes, than that would be the way to go. Unfortunately, the anti-nuclear movement is so strong that we will probably never be able to develop fusion.



## Conservation: America's Newest Energy Source

By LESLIE DEWEY

Conservation's increasing prominence during the past decade has caused it to be called "the cheapest source of energy." Currently, conservation is often considered the most viable solution to the energy crisis. However, disparity between perspectives on what constitutes conservation often leads to disagreement and continuation of wastefulness.

Although Americans are beginning to buy more fuel-efficient cars and to cut fuel consumption by insulating their homes, it is the increased energy prices and limits on oil imports which will be the major incentive to make people conserve energy, stated a U.S. energy policy strategy which recently appeared in *Newsweek*.

Several suggested methods of making energy efficiency more attractive are:

—Tax reforms which would give quicker write-offs for investments in energy-efficient equipment.

—Increased tax credits for homeowners who insulate homes and make other energy-saving modifications.

—Utility reforms to improve the utility-rate structures, as well as requiring the utilities to give advice to homeowners and commercial customers on how to conserve energy.

—Cogeneration, an extremely efficient production of electricity from industrial steam, is a viable possibility and should be instituted where ever possible. Fearing competition from industry, the utilities have resisted cogeneration but the resistance is starting to be worn down in some areas pressed to meet power needs.

California's Pacific Gas and Electric Company, which serves a large portion of California, is attempting to increase public awareness of the need for conservation of fuel and increased energy efficiency. The utility offers a service whereby customers interested in saving money and energy can call in for advice and information. "The program has been quite successful," said Roberta Palm, director of public information at PG and E.

According to Palm, a consistent reduction of both gas and electricity used in areas where PG and

E operates coincides with a national trend towards conservation. "King City and Salinas, to name a few cities, used 30 percent less gas in 1979-80 than in 1978-79," she said.

Palm speculated that the reasons for the decreased amount of energy consumed were:

—Temperature. In most of the areas served by PG and E, the temperature this winter over last winter was approximately five degrees higher.

—Prices. As utility rates increase, more and more people are sincerely attempting to cut back on the amount of energy used and are searching for methods to conserve.

—Patriotic reasons. Many people are insulating their homes and keeping the thermostat at a lower temperature because they consider it their duty to this country.

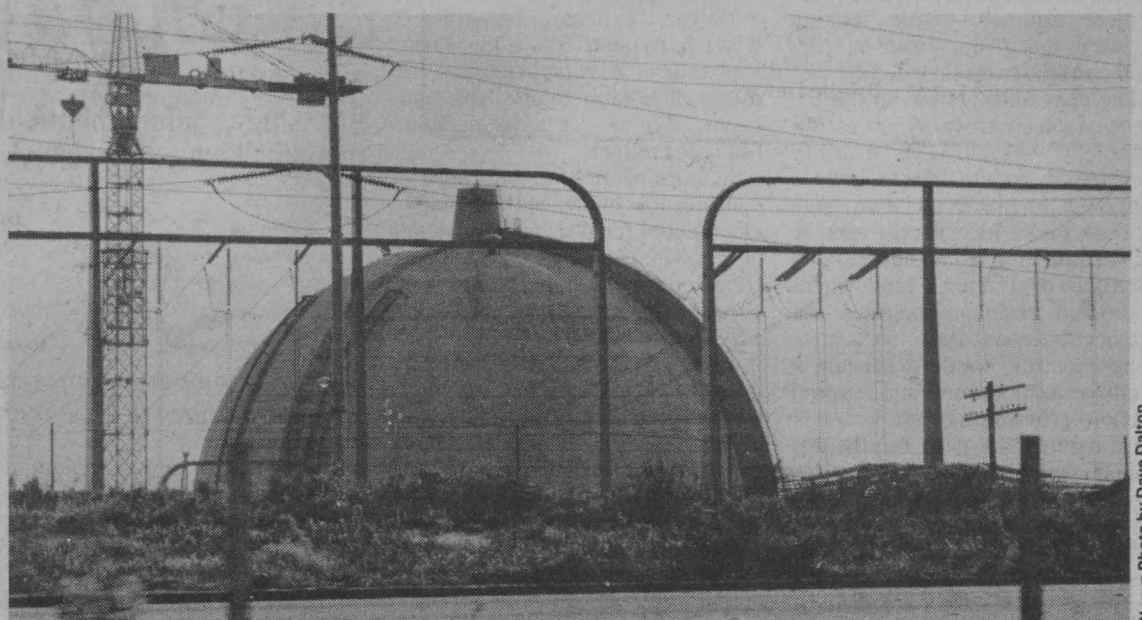
"Although temperatures will fluctuate from year to year, we can expect to see a consistent reduction of our fuel consumption, I think," said Palm.

People are beginning to be more energy conscious with the realization that the world's resources are finite and the fuel prices will be ever-increasing. Americans are presently being forced to make some critical decisions which could have tremendous impact on this country.

Should we, as citizens try to continue as usual; pursuing the goals of economic growth and material progress without concern for long-term consequences? Should we attempt to change our course and adopt an alternative lifestyle? Few questions are more important to the future of mankind than the ones just presented.

"We're finally beginning to understand that the world is finite in its supply of resources," said professor of environmental studies, Mel Manalis. Commenting on the recent trend toward conservation during the last decade, Manalis suggested that while the present energy crisis is an adjustment to the realization that the earth does not contain an infinite supply of resources, a more serious energy crisis is an adjustment to the realization that the earth doesn't contain an infinite

(Please turn to p.10, col.4)



This reactor at San Onofre is one of many nuclear plants operating throughout this country and the world.

Nexus Photo by Dave Dalton

## Nuclear Fission Effective According to Advocates

By CATHY KELLY

Like it or not, we're running out of oil. Like it or not, the price of what oil we have left has skyrocketed in recent years, taking with it the cost of gasoline, electricity, and just about everything else. And, like it or not, one of our most economical substitutes for this oil as a power generating source is nuclear fission, according to many advocates of nuclear power.

"In California, roughly 50 percent of the electricity generated uses low sulphur oil as a source of energy. Because of the quality of the oil we have to use, it is generally purchased from OPEC at up to \$38 per barrel.

"The citizens of California, just in paying their electric bills are paying off OPEC. \$4 billion annually goes right out of our pockets to make wealthier the already wealthy sheiks of Saudi Arabia. This massive flow of wealth means we have less money for capital investment and productivity. It tends to produce a decrease in the standard of living," said Glen Wade, a UCSB professor of electrical and computer engineering.

Hence Wade, and others advocate the use of nuclear plants to generate the electricity that both California and the rest of the nation have come to depend on. They argue that nuclear power is

inexpensive, and question its impact as a health hazard.

Once a nuclear power plant has been commissioned, Wade said, there is "very little cost escalation due to increases in fuel price because the cost of uranium constitutes less than 10 percent of the generating cost, compared to 75 percent for the cost of oil in an oil-fired plant and 50 percent for the cost of coal in a coal-fired plant."

In addition, a nuclear power plant pays back the energy investment made to construct and fuel it in an average of 12 months, according to testimony by W.K. Davis of Bechtel Power Corporation before the California State Committee on Resources, Land Use and Energy in 1975.

When completed, nuclear power plants are still more economical than other energy sources, Wade claims. "According to official utility reports, nuclear power generating costs are 30 percent lower than coal and 50 percent lower than oil," he said.

Cost projections from Southern California Edison demonstrate that as of 1980, nuclear energy generation costs only 2.5 cents per kilowatt hour, said UCSB Associate Professor of Chemical and Nuclear Engineering Robert Odette. This is comparable to approximately \$3-3.5 cents for coal, 6 cents for oil, 10 cents for wind and 80 cents for solar energy per kilowatt hour.

Conceding that the figures for solar and wind are "strictly speculation (because of their limited utilization)," Odette pointed out that high cost of solar energy was "almost entirely in capital costs, with some maintenance and operational costs." And, while the difference between coal and nuclear costs is "marginal," coal costs are associated with oil costs as both are fossil fuels, Odette added.

The operational capacity of nuclear plants is also cited as a factor in its low cost.

"All of the cost factors are tied to capacity. Coal and nuclear fired plants are base load. That is, they like to run as often as possible," Odette explained. Solar plants operate at about 20 percent capacity, he said. However, in 1978 nuclear plants were operating at 65 percent capacity. In 1979, they were more expensive, operating at 59 percent capacity. Odette attributes this decrease in capacity to measures taken as a result of Three Mile Island.

Opponents of nuclear power

argue that however economical nuclear power may seem, the concept itself is essentially unnecessary. "I think the key is in what context you operate out of. Their context is that we've got to have large, centralized energy sources. But it's better to have several, smaller sources with a lower technology. Not only can nobody understand these (nuclear) plants, but they break down all the time," pointed out Tony Mitchell, of Santa Barbara People For A Nuclear Free Future.

"These men don't know not to promote nuclear energy. It's all they've done all their lives...But when you are promoting that (nuclear energy) in opposition to conservation, and renewable energy sources, like solar power, it smacks of lunacy," Ed Maschke, of SUNRAE said.

However, proponents of nuclear energy argue that it poses little health risk. Describing nuclear plants as "benign in terms of health hazards," Wade said that "we have close to 500 reactor years of life without a single fatality. There is only a .7 chance that there will be one cancer death as a result of TMI. This out of a population of 2,164,000. Out of that same population, we can expect 325,000 natural cancer deaths."

"This is where we set up the nuclear elite. There already reports of increases in infant mortality, miscarriages and leukemia. Does it take the death or irradiation of a major city before they will admit it is wrong?"

"The pro-nuke argument is more than economical. It's an available, practical and safe way to generate electricity...Conservation can only be pushed so far, and effective alternatives are not likely.

The feelings of many nuclear advocates may be summarized by Ken Davis of Bechtel, who said, "...The public and much of the Congress has been bamboozled into believing that advanced technologies such as solar energy and/or conservation—however one might define it—will make it unnecessary to come to grips with the difficult problems and decisions which we face."

Or, as Odette concluded, "We are in a period of energy transition. It is an era of economic and political instability. Our chances of successfully developing a long-term energy economy depend on how wisely we use what we have. This means we have to nuclear power." Like it or not.



Nexus Photo by Suzy Samson

# Pt. Concepcion Project Still Facing Opposition

By TOM BOLTON

Despite continued efforts to prevent construction of the West Coast's first Liquefied Natural Gas terminal at Pt. Concepcion, the project appears to be inching forward, though opponents have by no means given up their fight.

The opposing factions in the Pt. Concepcion controversy are rather clear cut. Western LNG, a utility consortium, would like to build a receiving terminal and two huge storage tanks in order to receive LNG shipments from Indonesia. A coalition of Indians, landowners and local residents opposes the project because they feel it is dangerous and would desecrate a pristine and, some say, sacred section of the South Coast.

In arguing the case for the Pt. Concepcion site, utility executives have said there will be an urgent need for more natural gas in California during the 1980s. Joseph Rensch, president of Pacific Lighting Company, a Western LNG partner, was quoted in a speech late last year as saying, "What we're trying to do is bring in energy supplies needed to bring a tolerable future, not a prosperous one."

Rensch noted that delays in the project are costing hundreds of thousands of dollars each day, a

burden that will ultimately be borne by consumers. He also dismissed opponents' contention that LNG is dangerous because it is highly explosive.

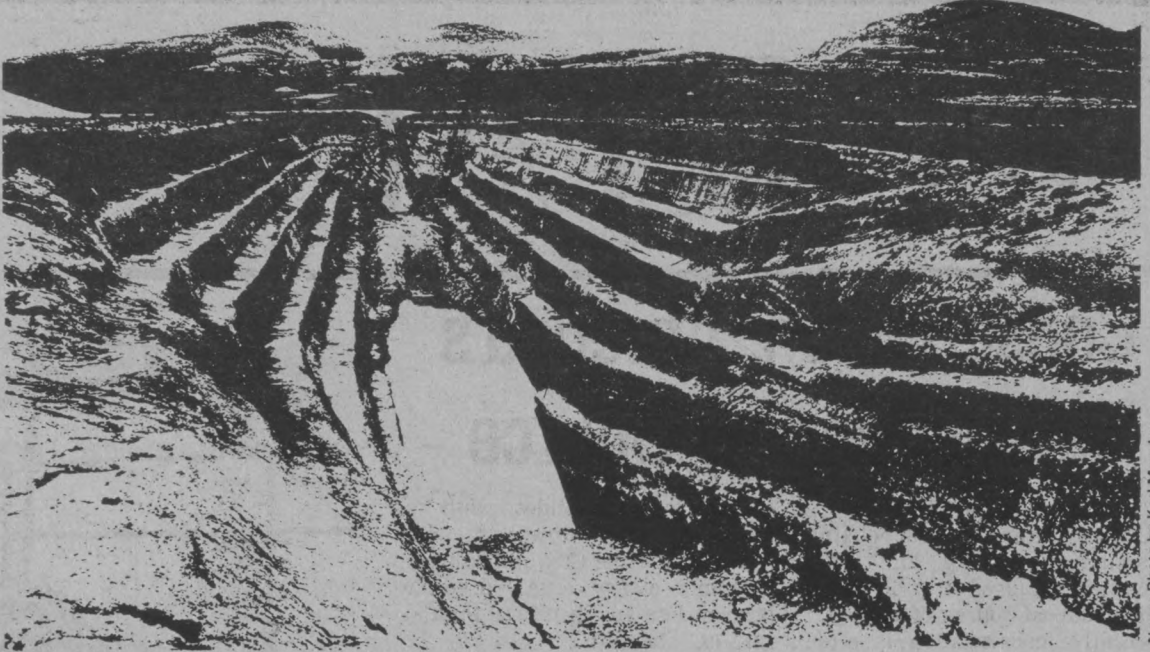
"It can't explode," he said. "It won't burn until it's in gas form. And talk of a vapor cloud is the most ridiculous thing ever conceived. We've got a tremendous fail-safe method."

Such assurances aside, there is considerable evidence that a vapor cloud could form if large amounts of LNG were released. Lee Niedringhaus Davis, author of *Frozen Fire*, has reported that an LNG cloud, which is odorless and invisible, could travel as far as 30 miles from its source.

"The fire can spread through the cloud all the way to the source of the spill, incinerating everything in its path," she said.

As examples, Davis cites the 1948 Cleveland accident which killed 130 people and razed 30 acres of the city; and the 1978 crash in Spain of a truck carrying propylene (another liquified gas) which took 150 lives.

One of the ironies of the LNG terminal siting fight is that early concern over the danger of LNG was largely responsible for the eventual selection of Pt. Concepcion. Western LNG had ac-



Debate over the proposed LNG terminal at Pt. Concepcion continues, though the project appears to be inching forward.

tually hoped to site the plant at Oxnard, but the state legislature, reacting to concerns over explosion dangers, passed the LNG Terminal Siting Act of 1978. It mandated that the terminal could not be located in a populated area such as Oxnard. Of the remaining possible sites, Pt. Concepcion appeared most desirable to Western LNG, and the consortium has pursued that option vigorously since then.

Though the State Coastal Commission favored an offshore

location over Pt. Concepcion, the state Public Utilities Commission decided last year that the need for gas was great enough to override environmental and possible religious concerns, so it went ahead and issued a conditional construction permit.

But the final siting authority rested with the Federal Energy Regulatory Commission, which held hearings in Santa Barbara last year with an administrative law judge presiding. After days of testimony both for and against the

project, the case was taken under submission for several months before the go-ahead was given last summer.

Although Pt. Concepcion is laced with faults and potential seismic hazards and experiences rugged wind and wave conditions, the Indians' opposition has not focused on safety but on religious freedom.

According to several sources, Pt. Concepcion is considered by many Native American tribes to be the sacred "Western Gate," through which the souls of the deceased pass on their way to the underworld.

To demonstrate their commitment to the "sacred" land at Pt. Concepcion, local Chumash and their supporters rebuilt what they say was the ancient village of Shishilop adjacent to the proposed LNG site in May of 1978.

"We're here and that's a fact people are going to have to accept—that we're back on the land and we're going to stay here if it takes another thousand years to protect this place," Kote Lotah, Chumash spiritual leader, said last March.

However, subsequent legal action has severely limited the Indians' access to the site and they no longer inhabit the village. Presently, the Indians are pursuing their own legal action at the federal level, joined by the Hollister Ranch Owners Association, which still runs a cattle operation on the property.

The most recent legal action in the controversy occurred last week when Western LNG filed suit challenging new federal regulations for liquified natural gas facilities. The regulations, issued by the Department of Transportation Feb. 11, require that LNG facilities on which storage tanks are moved must comply with the U.S. Pipeline Safety Act of 1979, which prohibits the placement of tanks within one mile of a fault that shows more than five feet of displacement within the last million years. Previous rules applied only to new projects.

Al Pizano, a Western LNG spokesman, said that the Pt. Concepcion project is exempted by a "grandfather" clause in the new regulations, even though geological trenching at the site has uncovered a fault with six feet of displacement that is estimated to be only 200,000 years old.

Pizano said Western LNG is only pursuing legal action "because we think projects should be evaluated on a case-by-case basis."

"The new rules don't have any impact on us since we're only modifying an existing design that's already been approved."

But George Allen, an attorney for the Hollister Ranch Owners Association, sees things differently. "I really don't think that if they were sure these rules didn't apply to Pt. Concepcion, they would spend the kind of time and money they have in opposing them," he said.

Meanwhile, little actual construction is likely at Pt. Concepcion until and unless all legal challenges have been exhausted.

Nexus Photo by Karl Mondon

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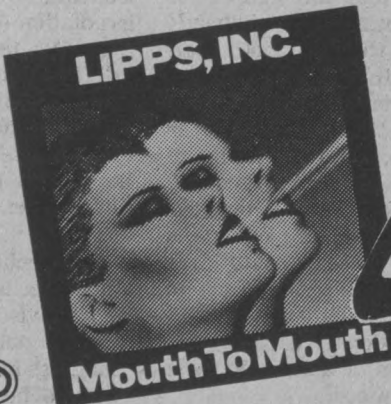
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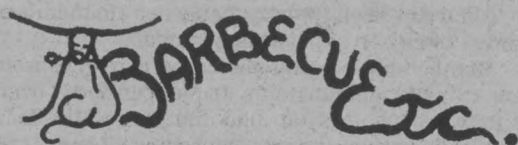
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Power for the

# Nuclear Power

## A Short History of the Anti-Nuclear Movement

By CRAIG ZEROUNI

During the '50s, the promise of energy from the atom was a dream that was hard to resist. Proponents claimed that nuclear energy would be clean, safe, and so cheap that the utilities would not even bother to meter it — customers would simply pay a monthly service charge for all the electricity they could use. By 1990, it was said, the United States would have 1,000 nuclear reactors, supplying all of our home and industrial needs.

Through the '60s, there was no reason to doubt all that was said, and activists turned their attention to other problems, especially the war in Vietnam. Sharon Cohen, of the UCSB People Against Nuclear Power, said, "it (nuclear power) just wasn't a political issue — there was just a fringe anti-nuclear group."

But by the early '70s, people suddenly began to discover that having nuclear power for an entire country meant that most of us would have to live near nuclear power plants. Early protesters — people labeled by *Time* magazine as "a loosley knit coalition of environmentalists, '60s rebels, disaffected youths, and newly politicized Americans," were largely involved because suddenly they were directly affected by the drive for nuclear power.

As people began looking deeper into the issue of nuclear power, the protest grew. But it wasn't until the middle '70s, when two different but related events occurred, when the movement began to take any meaningful direction. The first of these was the announcement of a nuclear power plant to be built in Seabrook, New Hampshire. With leftover '60s tactics and a suddenly concrete purpose, The Clamshell Alliance was formed to protest the building of the plant.

The Clamshell Alliance is significant because it represented the first major, concentrated and coherent opposition that proponents of nuclear power had ever faced. Dozens of alliances sprouted all over the country, with names like Oyster, Conchshell, Catfish and Abalone, a California-based group.

The second event was Karen Silkwood. Karen Silkwood was a lab technician in a plant, owned by Kerr-McGee Corporation, that produced fuel rods for nuclear accidents. In 1974, on her way to meet a *New York Times* reporter to document her claims that Kerr-McGee was constantly and recklessly exposing its employees to plutonium, her small car went into a concrete embankment and she was killed.

Nuclear opponents instantly claimed that she had been murdered by Kerr-McGee, and they seized upon this as an example of the brutality of the nuclear industry. The evidence, they claim, is overwhelming. The papers that Silkwood was known to be carrying had vanished by the time the media arrived. There were marks on the bumper of her car that were claimed to have been made when Silkwood was allegedly forced off the road. The local police had routinely dispatched a tow-truck to the scene, but then suddenly called it back. And Kerr-McGee officials were at the scene of the accident within minutes of its occurrence.

Silkwood's family brought suit against Kerr-McGee, and they were recently awarded \$10.2 million for her contamination by plutonium. But the question of the circumstances of her death remains unresolved.

For the next few years, the anti-nuclear forces gained momentum as national organizations ranging from the Friends of the Earth to Ralph Nader's Public Interest Research Group came out against nuclear power. In Cambridge, the Union of Concerned Scientists, a coalition of scientists who had soured on nuclear energy, was formed.

In California, the debate focused, and still focuses, on the reactor at Diablo Canyon. While the reactor has yet to go on-line, it is now "fourth on the waiting list," ac-

ording to Cohen, and the fight to stop it is still being waged.

And then came Three Mile Island.

In March of 1979, without warning, the nuclear reactor at Harrisburg, Pennsylvania, came as close as any ever has to a meltdown — an overheating of the nuclear fuel that causes it to melt straight through the walls of the reactor and into unknown nuclear havoc. It can reasonably be said that Three Mile Island, and the months immediately following it, was the high water mark of the no-nuke forces. The name has come to represent the most unthinkable of catastrophes; the crippled plant stands as a sort of landmark to the voices of nuclear opposition. And the disaster itself gave the anti-nuclear movement its biggest surge ever.

"You can't believe what happened (to membership)," says Cohen. "It started happening."

Memberships in anti-nuclear groups mushroomed — on campus, membership tripled literally overnight. "Between *China Syndrome* and Three Mile Island, the public became super aware," relates Cohen.

So aware, in fact, that a march last May on Washington to protest nuclear power drew an estimated 70,000 people. At that time, it seemed as if the anti-nuclear forces had the nuclear energy proponents against the wall. Morris Udall, chair of the House Interior Committee, remarked after the rally that "the potential is there for making nuclear power the centerpiece of politics in 1980. It has an intensity of its own."

A protestor in Washington told a reporter "we're going to turn this country's energy policy around."

Last May, the national magazines spoke of a growing trend, of a building force. They predicted that nuclear power could be the issue of the '80s, and that it could be to Jimmy Carter what Vietnam was to Lyndon Johnson.

While it is still too early to tell just how true these things will become, it has become obvious that the anti-nuclear movement has lost much of its momentum in the months following Iran and other foreign policy blunders.

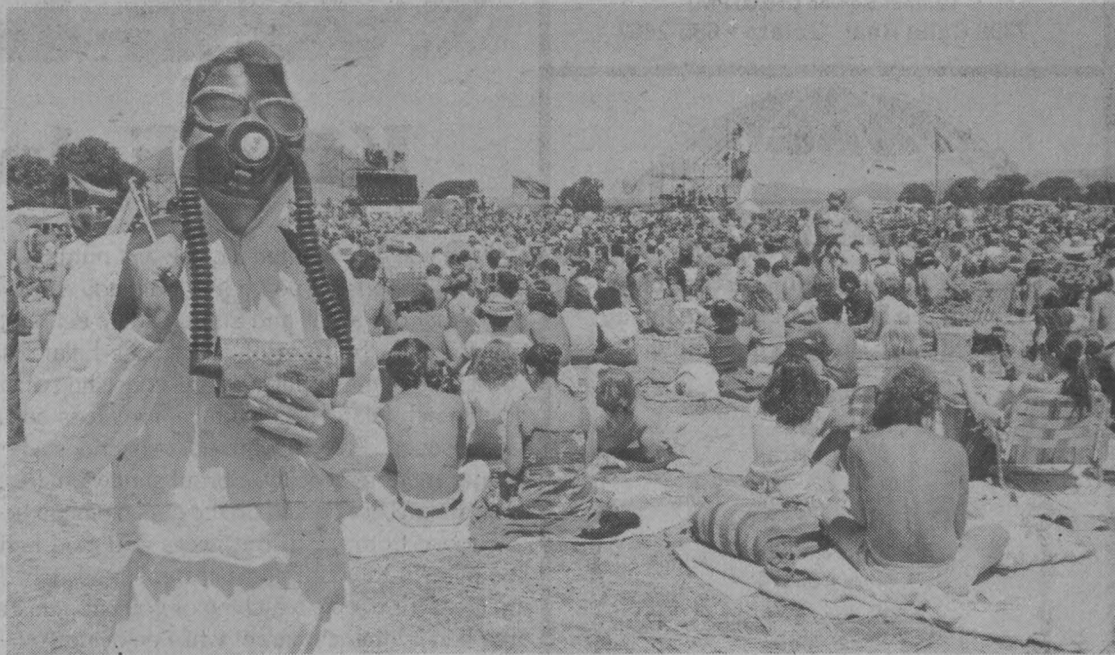
In March of 1979, without warning, Harrisburg, Pennsylvania, came as close as any ever has to a meltdown — an overheating of the nuclear fuel that causes it to melt straight through the walls of the reactor and into unknown nuclear havoc.

Cohen admits that "the anti-draft movement has taken away a lot." There is the very real fear that the movement may turn out to be just a passing fad, an ideology to latch onto. It has been said that students, the usual backbone of such things, seem ambivalent — but then, they seem ambivalent about everything.

Still, the movement presses on. Evan Freirich, of Colorado's Rocky Flats Action Group, explains the anti-nuclear movement: "We're not Democratic or Republican, left or right. What holds us all together is a belief that nuclear energy is hazardous to our health."

And so the groups, whittled down in size after the faddists left, go about their business: raising funds, publicizing the evils of nuclear energy, enlisting recruits. But underneath it all is an optimism that cannot be shaken, a belief that ultimately they will be proven right.

When Representative Edward Markey, a Democrat from Malden, Massachusetts, was at the march on Washington, he spoke to a man in his seventies about the goings-on. "You know," the man said, "I think those kids may be right again."



Anti-nuclear protestors, like these at Diablo Canyon, claim that nuclear plants are unsafe.

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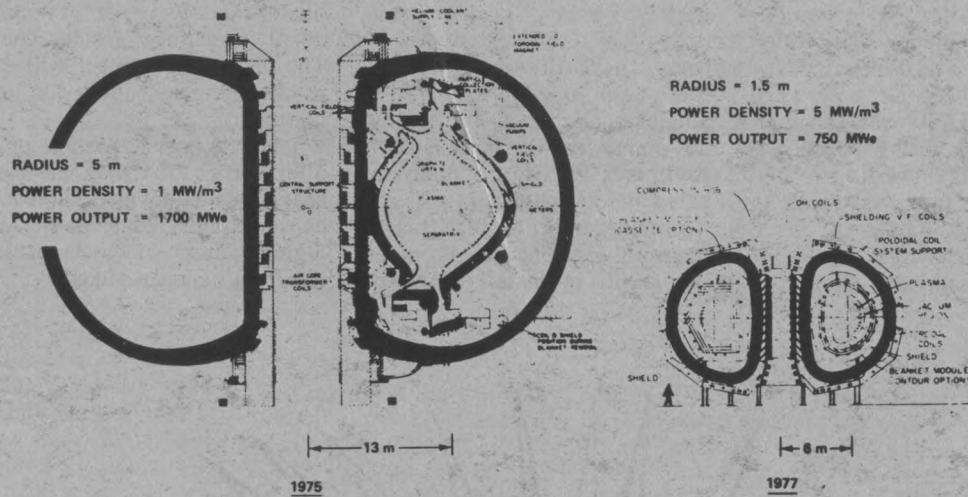
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the Future?

# Power in the U.S.



This diagram demonstrates the reduction in fusion reactor scale as a result of present research and improved technology.

## Nuclear Fusion Power: A Safe Nuke for the Future

By DAVID W. DALTON

Experiences with long gas lines during the early '70s have made Americans aware of the country's serious energy shortages. With the prospect of the world's fossil fuels becoming exhausted by the end of this century and our growing dependence on Third World oil supplies, we are desperately searching for an alternative energy source, rather than conserving and risking a compromise in the two-car family American lifestyle.

We have turned attention on developing nuclear fission, but the waste disposal problem and the growing fear of a devastating plant leak, along with the proliferation of nuclear weapons and estimates that the world Uranium supply may not outlast our oil reserves, serve to demonstrate that fission reactors are not the definitive answer.

or "mini-stars," on the earth. Scientists understand how energy is produced in the sun, but as of yet, have no way to imitate the immense pressures and 100 million degree temperatures that are present at the center of the sun. There is no known substance that will contain such a reaction without instantly vaporizing.

However, there is still hope. The products and reactants in the fusion process are charged gas particles, a state of matter known as plasma. These particles can be influenced and directed by the presence of a magnetic field. The current research in the fusion area is attempting to discover both how to heat these particles to the necessary temperatures and how to contain them with magnetic fields. Once these problems have been overcome, a means of harnessing the energy to produce electricity will have to be found, but this problem is relatively insignificant compared to the others.

Fusion research is rapidly growing throughout the United States and the world. Significant progress is being made and many researchers are optimistic about the future. Dr. Robert Odette of the UCSB Department of Chemical and Nuclear Engineering stated that if all goes according to plan, a working scaled-down model will be functional by 1995, and a commercially-operated power plant should follow in five to ten years.

According to Odette, the outlook is good for solving the physics problems such as plasma containment and heating. In fact, he said that no insurmountable obstacles have yet been encountered and that research is proceeding better than most expectations. For example, until recently it was assumed that the outer diameter of the most promising fusion reactor now being designed, the tokamak, would have to be on the order of 30 meters to avoid possible plasma escape. However, research has shown that a reactor of less than half this size will be possible. This discovery is crucial if the tokamak design could ever be used for commercial power production, since, according to Odette, a large reactor would be economically infeasible to build or maintain.

The fuel of the fusion reactors which are currently being designed would be deuterium, a naturally occurring form of hydrogen, and tritium, a form of hydrogen that must be synthesized from other elements. Dr. Edward Profio, also of the Chemical and Nuclear Engineering department, has received a National Science Foundation grant to study a possible method of synthesizing tritium. Odette's engagement in "reliable material research" is an attempt to find materials that will be able to withstand the severe environment of a fusion reactor. He added that the fusion research budget at UCSB is now at \$200,000 per year.

Many other problems in designing and building a fusion reactor exist. A way must be found to insulate the 1 million degree Celsius core from the surrounding electromagnets which must be kept at near the freezing point of helium or -269 degrees Celsius. In addition to the insulation problem, the plasma must be kept absolutely clean or the reaction will cool and no energy will be obtained. Also, the deuterium-tritium fusion reactor will not be entirely free from radioactive wastes, but according to Odette, the wastes produced in a D-T fusion plant will probably be ten to 100 times less dangerous than those produced in current fission-type reactors.

If current progress is any indication of the future, these problems will be solved and fusion will become a major contributor to the energy needs of the next century. In the next few centuries, a fusion reactor similar to the core of the sun will undoubtedly be developed. Fusion reactors will provide enough energy so that scientists will be able to synthesize everything from food to gasoline when this occurs.

"People have looked at a world capable of sustaining five to ten billion people at our standard of living, but it will take two to three times our present consumption of energy. Fusion will be that source," Odette stated. "Our biggest problem is developing a stifling pessimism; now is not the time to give-up."

warning, the nuclear reactor at as close as any ever has to a melt-nuclear fuel that causes it to melt reactor and into unknown nuclear

According to current estimates of our present technological ability, solar, geothermal, and other alternatives could supply only small fractions of our current and projected energy needs.

Is there an answer? Can we develop a feasible alternative to what our friends from OPEC have to offer? The answer is a definite "yes."

Nuclear fission, the process that is currently in use in atomic power plants around the world and the power source of the atomic bomb, derives its energy from the splitting of a heavy nucleus such as uranium into smaller "daughter" fragments. Combined weight of all these smaller products is slightly less than the original nucleus. This slight difference in mass accounts for the huge amount of energy released, according to Einstein's famous equation  $E = mc^2$ .

While this slight conversion of mass into energy may seem trivial, if we could convert all the mass in a nickel completely into energy, we would have the equivalent energy of 100,000 747s traveling at twice the speed of sound colliding in mid-air simultaneously.

Unfortunately, the "daughter" products such as Plutonium are among the most toxic substances ever known to man. In fact, it has been said that a single pound of Plutonium could cause lung cancer in nine billion people if it was directly inhaled. To make matters worse, many of these deadly substances remain lethal for hundreds of thousands of years.

Nuclear fission has a distant cousin which produces energy in the same way, by converting mass into energy, but by a completely different type of reaction. Nuclear fusion does exactly what the name implies; the process involves the fusion of lighter nuclei into a larger, more massive nucleus. Again, in this process, the product has slightly less mass than the starting nuclei and that's where the energy comes from.

This whole concept may seem somewhat strange. It should not because every day of our lives we are subjected to staggering amounts of radiation from a huge fusion reactor: the sun.

The sun, an average star in the universe, is a huge ball of "burning" hydrogen gas. That hydrogen is not burning in the sense of what we consider to be burning on the earth, but at the center of the sun where temperature and pressure are extremely high, hydrogen nuclei are fused together to form helium nuclei and high energy light called gamma rays, as well as other particles. The gamma rays eventually leave the sun as a variety of different types of light, some of which travels to the earth. At the sun's core, an average of four million tons of matter are converted into energy each second.

The problem is finding a way to build fusion reactors

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## More than Just Sun

## Solar Energy: Cheap Fuel

By CAROL BAIRD

The sun can produce much more than a good tan. Properly applied, solar energy reportedly has the potential to meet at least 25 percent of the United States' present energy needs. Many people have a positive attitude towards solar energy as "natural," answer to diminishing oil supplies, but few people know about the limitations and possibilities of solar energy.

Throughout history, men have used the sun for heating and cooling. The Greeks used solar energy extensively in five B.C. and records show old Roman "sun rights" property laws. In Pasadena, 30 percent of the homes used solar water heaters in 1897. Only with the advent of cheap fossil fuel energy did solar energy uses decline into their present secondary position.

"Solar energy" includes more than just the sun. Windmills, dams, and combustion of organic matter also fall in the solar energy category to provide alternatives for electricity and fuels. Even municipal waste and garbage can be converted to electricity in small amounts. But direct sunlight remains the most prevalent form of solar energy.

Today, California is the biggest solar consumer with approximately 85,000 solar systems in operation. About 50,000 of these heat swimming pools. California weather adapts well to solar heating and cooling due to the abundance of sunshine. But systems have also proven effective

in the eastern United States, even during winter months. Businesses also profit from solar energy. A Maryland dairy and a Sacramento soup factory have both had great success using solar energy in sterilization processes.

There are two basic types of solar energy: passive and active. Passive solar energy works by natural means, mainly through heating and cooling water, convection or conductors. Active solar energy requires mechanical assistance, such as fans, pumps and collectors. Each has storage capacity that allows solar heating/cooling to continue throughout the night. The sun works as a non-polluting, free, readily available energy source. Although cold or cloudy regions may have to rely on solar energy as only a partial answer to the energy shortage, California's heating needs could be almost entirely met by solar systems.

If solar energy is so efficient and clean, why aren't more people using it? On the surface, converting a home to solar heating seems prohibitively expensive. New homes often include solar systems, but most people prefer to pay smaller gas and electric bills rather than buy a whole new system. However, a long range look proves solar energy to be the more cost effective choice. Whereas gas and electric prices continue to soar, sunshine remains free. The cost for solar heaters also declines as technology provides a better understanding of how to

harness solar power.

The major expense is the original investment in the system. In 1977, this expense was cut. California instituted a solar tax credit which allows a 55 percent income tax credit for solar water heaters. Thus, a \$2,000 heater now costs the homeowner only \$900. The nation is in a state of transition looking for alternative energy sources, and tax breaks are one way the government is trying to encourage and hasten a move towards solar energy.

Bob Wilkinson, the Staff Co-

ordinator for Energy Programs in Housing and Residential Services at UCSB stresses that conservation is the main key for efficient energy use, regardless of the type of energy. "If people would just turn off their lights when they leave the room and use simple conservation measures we wouldn't need more LNG or nuclear power." Wilkinson foresees "much greater solar application in the next five to ten years." UCSB already implements solar power to some extent. Both campus pools use solar heating, and plans for the new student apartments include a laundromat heated by solar panels.

On a larger scale, SUNRAE, a non-profit organization, is joining with UCSB to install a passive

"breadbox" hot water heater in the West Campus apartments. The heater is the biggest of its kind in the nation, and will serve as a test to determine the feasibility of solar heating for UCSB. The installation will come as the culmination of a weekend workshop on April 25-27. SUNRAE plans to combine with 25 UCSB students to construct the heater and to inform the public about the nature of solar energy. The completed project will serve as a demonstration of solar theories.

Solar energy is one proven alternative to rising costs and scarce fuel supplies. Coupled with conservation, solar power is a logical step towards solving America's energy needs.



## Solar Energy Comes to UCSB

By MARK OHRENSCHALL

Utilization of the sun as an energy source is not a phenomenon limited to the technological era of the 20th century.

As far back as 1600, Germans were reported to have used large lenses to harness the sun's energy and melt ceramics.

In 1880, a Frenchman named Pifoe used a mirror, lens and sunlight to produce steam which powered his printing press. Calling the resulting newspaper "Le Soleil", he distributed it free to demonstrate the efficacy of solar power.

A large mining factory in Chile, located on the sea, used solar energy in 1870 to convert 6,000 gallons per day of salt water to fresh water.

Despite these instances, it is only in the past ten years of so that large-scale use of solar power has been developed. UCSB's experiences mirror this trend.

The Departments of environmental studies, engineering, geography, geology, chemistry and physics have professors researching some areas of solar power. The E.S. Department offers a class in solar energy.

The latest UCSB foray into solar energy will occur later this month. On April 26 and 27, as a finale to Earth Week, SUNRAE will construct and install a solar bread box collector for the Married Students Housing laundry room.

SUNRAE has already built six of the heaters in the Tri-County area as part of a contract they have with the State of California, which wanted SUNRAE to construct the heaters for use in low-income areas.

UCSB, along with other governmental institutions, was not eligible for the program, but expressed an interest in it. The Office of Housing and Residential Services, with the cooperation of the E.S. Department, arranged the contract with SUNRAE.

About 25 volunteers who live in Married Students Housing will assist SUNRAE in building the heater, "the largest bread box solar heater in the country," according to SUNRAE member

Peter Alper.

"The laundry room is being used because it uses water mostly when the sun is out and the collector will be working," said Alper. "It won't need lots of storage." He said the collector should supply 30 to 50 percent of the rooms' hot water needs.

The collector will actually function as a pre-heater, according to Alper. "We'll take a 250 gallon hot-water tank, paint it black and put it inside an insulated box, with one side glazed to the sun.

"The water line will be run through the collector, so the water, which in Santa Barbara is usually 60 degrees before it goes into the hot-water tank, will now go in at 90 to 120 degrees," said Alper. "The majority of the heating will be done beforehand." Alper said the advantages of the design are twofold.

First, it has no moving parts, making breakdowns highly improbable, and it will be made with steel instead of the expensive copper used in most collectors. The only copper used will be in the plumbing. According to Alper, the lack of copper will cut the cost by as much as one-half to one-third.

An environmental studies thesis by Bob Silsbee investigated the potential energy savings of the bread box collector. He estimated that over its expected 15 year lifespan, it could be expected to save 3,200 therms of natural gas, worth about \$1,100 at today's prices. Also, 8,200 kilowatts could be saved, worth about \$350.

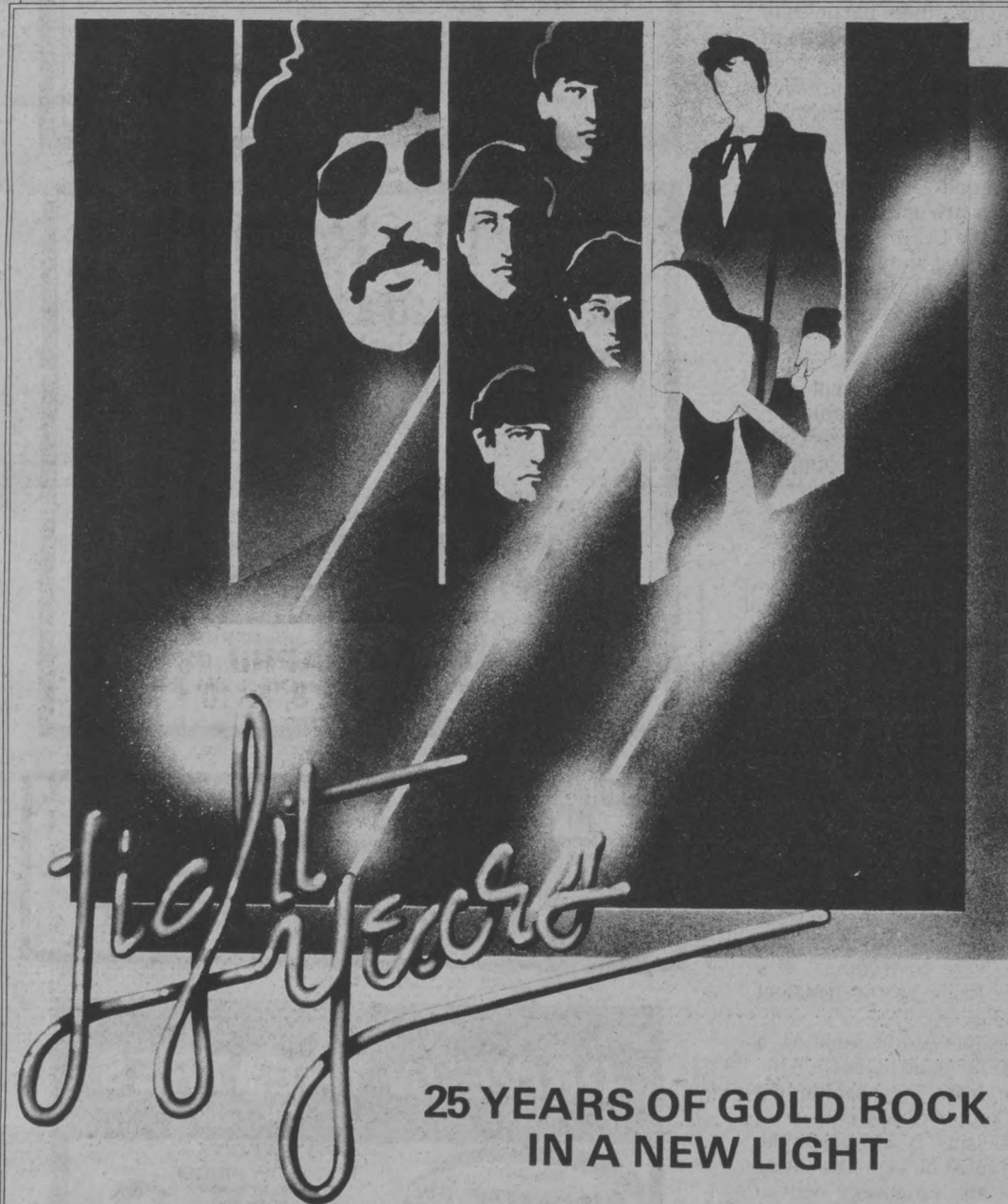
Citing the collector's \$1,000 cost, Alper said, "It's a cost-effective system, one that will pay for itself. Santa Barbara is very, very good for solar energy."

SUNRAE will continue to monitor the collector for six months to a year, mainly to verify the anticipated savings. "If it goes out well, we hope it will be a catalyst for an ongoing solar system at UCSB," he said.

One start on developing a solar energy system is the campus pool, which since January 1979, has been partially heated through solar energy. It is UCSB's first non-

(Please turn to p.9, col.1)

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# Oil Drilling in Santa Barbara: A History of Constant Dispute

By DENNIS HERMAN

On Tuesday morning, Jan. 28, 1969, the *El Gaucho*, UCSB's newspaper, ran a photo of Goleta Beach above a caption asking students to suggest ways to keep area beaches cleaner. That afternoon an offshore oil rig burst, precipitating what was to become the greatest offshore oil drilling accident in the history of the Santa Barbara Channel.

The spill, originating from Union Oil's Platform A, would eventually wash up on parts of every major beach from Carpinteria to Rincon and spread over an area in excess of 800 square miles.

It took 12 days, until Feb. 8, before the well could be capped. At the height of the spill, Platform A was gushing 500 barrels—20,000 gallons—a day into the waters of the channel.

The history of oil in the Santa Barbara Channel has taken many twists and turns since that time with two distinct factions continually arguing over the future of oil in the channel.

On one side stand the environmentalists calling for the cessation of oil operations in the channel. Ideally they would like to see the channel returned to its natural state and the platforms dismantled. The search for oil is both dangerous and harmful to the environment, they claim, and the benefits derived from offshore oil drilling do not exceed the risks that must be taken to secure that oil.

On the other side are the oil companies. While the full extent of the channel's resources are not

known, their geologists claim they are extensive enough to warrant further exploration and development. In a world that is quickly running out of energy, we must exploit all our available resources in order to keep up with the present rate of consumption, argue the proponents of oil drilling.

Steve Boyle, president of Get Oil Out, typifies the opponents of offshore oil. His organization, over 1000 strong, has kept up an unceasing battle against the oil companies in an effort to control and minimize the impact and amount of drilling that occurs in the channel.

"We keep fighting, but we keep losing," says Boyle. He believes that GOO's main strength lies in their mitigation tactics—acting as a kind of watchdog to ensure that oil developers keep a close eye on their own operations.

"Neither the government or industry is fully committed to mitigation," claims Boyle. "The oil industry can be characterized as a risky business in that the people involved (in the industry) are willing to take risks."

One such risk that proved costly was the decision of Union Oil's engineers not to extend the well casing in Platform A's drill hole to the proper depth, despite warnings from their own geologists. It was the absence of well casing that led to a blow-out when the drill hole was pressurized.

"It's a matter of keeping pressure on the oil companies, keeping up a steady drumbeat of opposition to their activities," says

professors Richard Watts and Peter Ford are exploring the possibility using solar energy to produce hydrogen.

The researchers received \$45,000 this year from the Department of Energy.

Producing hydrogen by splitting water molecules into its constituent hydrogen and oxygen parts would be a good way to store energy, even better than batteries, according to Malcolm Finlayson, a chemistry graduate student working on the project.

If hydrogen can be produced from water by use of the sun, it would also provide an unlimited fuel supply because hydrogen itself is a fuel.

"There's more water on earth than oil," said Finlayson, in reference to uncertain future petroleum supplies.

Presently, the group is using lamps and other high-energy lights on other types of molecules, which raises the molecules to an excited state.

"Hydrogen has been produced from water by other complexes. It's eventually feasible, but a lot more work needs to go into it. We're on the right track," he said.

Boyle.

However, GOO's activities don't always turn out as planned. As one example Boyle cited their continuing efforts to get shipping lanes moved outside of the channel—a move greatly opposed, until recently, by the oil companies.

GOO cited the danger of tanker-platform collisions and the lack of an effective marine traffic control system in the channel as primary reasons to move the shipping lanes.

The oil companies had stated that they opposed such a plan because the likelihood of such an accident was minimal according to their statistics.

Recently, however, both the Coast Guard and the oil developers have supported such a plan. Their support stems not from their realization of the accident potential, claims Boyle, but rather from their desire to begin exploratory drilling in tracts that are within the current shipping lanes.

Oil industry sources, on the whole, were unwilling to discuss the future of the channel, or their own expansion plans, because of the highly competitive nature of the oil business.

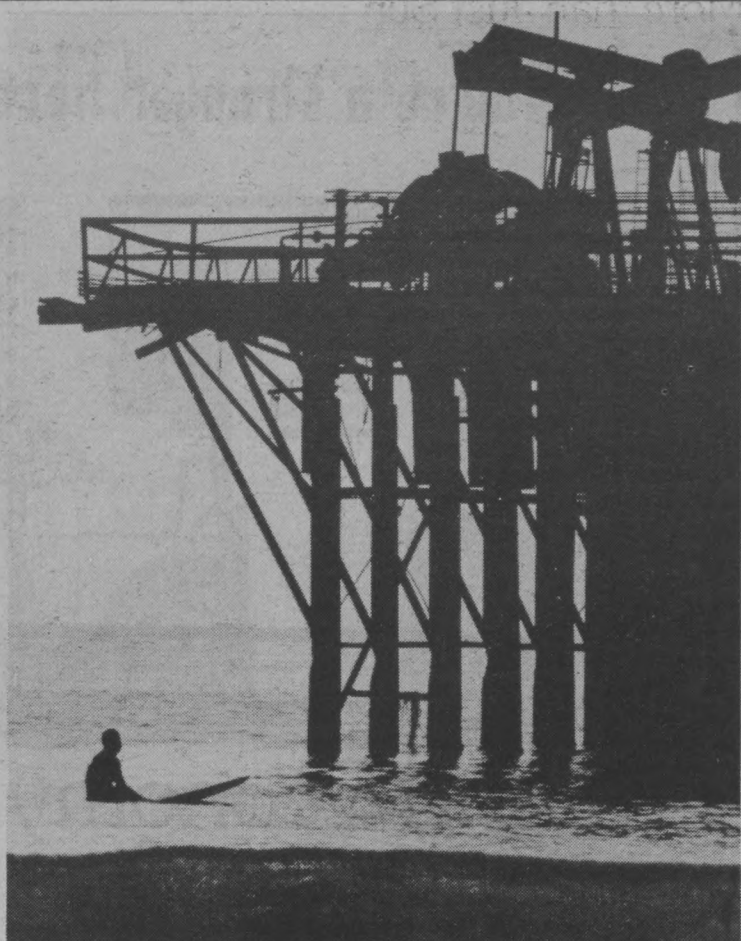
According to one industry source, new technologies are continually being developed and implemented on the platforms in order to make them both safer and more environmentally benign. However, according to some opponents of offshore oil, many of these new technologies are implemented only after an outside agency lobbies for an improved design.

Currently, the hottest area of contention revolves around the Department of Interior's Outer Continental Shelf Lease Sale 68, to be completed by 1982. The Channel Islands Marine Sanctuary and the Santa Barbara coastal ecological preserve and buffer zone are both listed as high priority sites in the Bureau of Land Management's initial proposal.

The preserve was created in 1969 by an executive order from then Secretary of the Interior Walter J. Hickel, who claimed its purpose would be to "protect and preserve the values of this area...for the benefit and enjoyment of this and future generations."

While the consideration of the area does not in itself mean that the area will be exploited for its oil resources, county and state officials are fearful that the channel will see development taking place in the preserve.

Keith Shone, a representative of the BLM office in Los Angeles,



Nexus Photo by Karl Monden

stated that the preserve will be considered because "those are areas which have not been looked at in ten years" and the DOI wants to keep the option to drill open until further studies into the area's hydrocarbon potential can be completed.

On Monday, the Board of Supervisors voted to send a letter to Secretary of Interior Cecil B. Andrus condemning this inclusion of the buffer zone and officials of the California Coastal Commission have reportedly begun looking into the possibilities of taking legal action against the DOI.

"If they're allowed to continue," says Boyle, "we're going to have platforms sitting on our beaches."

"The oil in the channel isn't going to go away," states Boyle, "and now it's been alienated from public ownership. A lot of people think we need every drop of oil immediately. If we wait, though, we may get more money (for the oil) in the future when oil becomes more valuable."

According to the industry, however, the oil from the channel is needed, and it is needed now. "The country currently depends on foreign oil for 50 percent of our

energy needs," stated Sharon Wescott, a representative of Exxon, which operates one platform, Hondo, in the channel.

"We're urging conservation to cut down the demand," Wescott said, "but we still need the oil. Look at the number of gallons of gasoline we use in Los Angeles, that will show you why we're drilling in the channel."

GOO's bottom-line stand, according to Boyle, is that oil drilling cannot be safely carried out within the channel. "We don't think that the technology exists to drill safely in the channel—it's too close to shore and too hazardous an area," he concluded.

## Energy

(Continued from p.8)

teaching solar heater.

Consisting of black-coated copper tubing mounted on aluminum fins, it is designed to supplement a gas-fueled heat exchanger in warming the pool to 78 or 80 degrees.

"The solar unit has cut heating requirements by approximately 45 percent in summer and 15 percent in the winter," according to Tak Shibata, a mechanical engineer in the UCSB Facilities Management Office. "We won't know exactly until we get a meter installed this summer."

Shibata also said that during hot summer days, the solar collectors heat the pool without utilizing the heat exchanger.

If more roof space had been available, more solar units could have been installed, according to Shibata.

Solar energy research has been increasing dramatically across the country. At UCSB several professors in the E.S., Geography and Geology Departments have worked on solar research.

One group of five people working under the direction of chemistry

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13 Auditions	14-15 Buford		16-17-18-19 Rockabilly Rhythm Band
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Nexus Photo by Karl Mondon

## Oil and Economy Linked By Some Strong Bonds

By KARLIN J. LILLINGTON

Everyone is aware that he has been paying consistently higher prices for gasoline as well as for just about everything else. And although the price of a pair of Levi's or a Tom Petty album may not seem to have a lot to do with that of gasoline, oil and the economy are tied together by some very strong bonds.

But to look at the role oil plays in today's problem-plagued U.S. economy, one must go back to the post World War II period when the country's economic health was considerably better. During the time between 1951 to 1973, the gross national product in the advanced industrial nations of the Organization for Economic Cooperation and Development was 4.8. Since 1975, the GNP has sunk to around 3.8, and economists believe

it will bottom out at an even lower rate over the next decade.

Many reasons are listed for the high rate of growth during those years. Perhaps some of the most important are, first, that the governments concerned accepted the free trade principle. Over the years, there has been a close correlation between the growth of the gross domestic product in individual countries and the growth of world trade.

Countries were also using demand management techniques, and the United States was helping to finance the deficits of countries damaged by the war and was helping to finance developing country's deficits.

Another factor was that the world was using cheap energy and very cheap oil. The real price of oil actually fell by half between 1950

and 1970, and 20 years ago the U.S. imposed quotas on oil imports to keep the price of domestic oil up.

But all these conditions which contributed to post-war growth have since disappeared. Trade has slowly been restricted. Middle Eastern countries have also begun to exploit their political independence from the West at the same time as the West's dependence on imported oil has increased. As a result, the energy problem has turned into a major factor in the international and national economy.

According to many economists, inflation in the early '70s was not connected with oil. Instead, it was the result of the failure of American administrations to fund the war in Vietnam out of current revenue; several bad harvests;

(Please turn to p.11, col.1)

## Conserve

(Continued from p.3)

supply of resources, a more serious energy crisis is likely to occur around the year 2,000. "The one thing we can do now," he said, "is conserve our resources."

Although many UCSB students support conservation efforts, most do not advocate a severe change in lifestyle and doubt people's willingness to conserve energy. "I think Americans are going to have to change their lifestyles somewhat," said Deborah Harmon, an environmental studies and geography major. "The change won't come voluntarily and government intervention will probably be necessary."

Through UCSB's environmental studies department, students have the opportunity to explore conservation and all its possible ramifications. Nevertheless, students disagree as to whether or not conservation is necessary, what methods should be employed, and whether the government should intervene or whether the free enterprise system should be

allowed to do what it can to solve our present energy crisis.

"Conservation alone can't solve our problems," said history and environmental studies major Margaret Mangoovian. "Although many people are going to be forced to conserve, I honestly don't think a severe change in lifestyle could be achieved," she said.

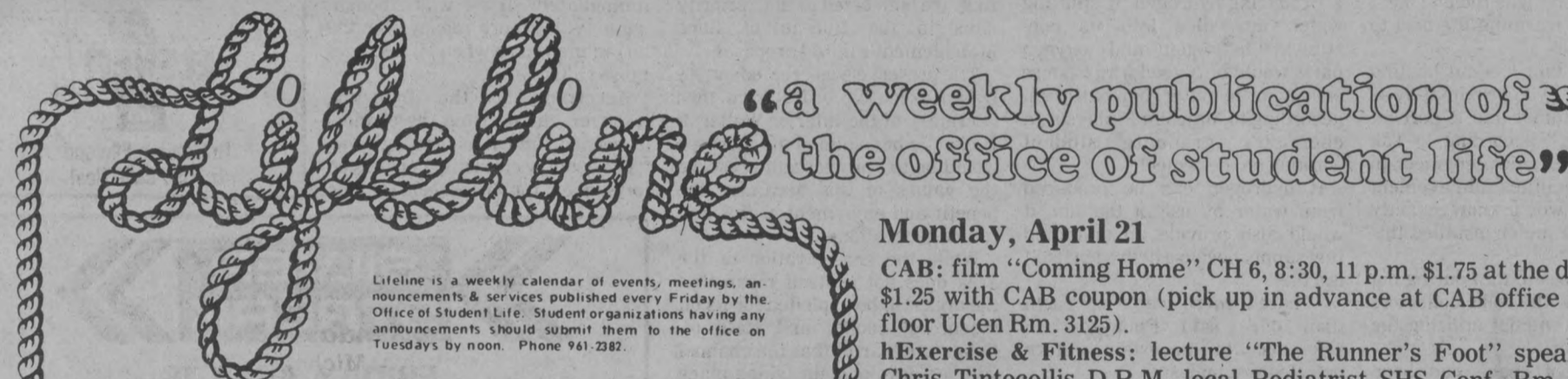
One undergraduate said people are becoming more receptive to doing away with electrical throw-away gadgets. "People are willing to change, but the change has to be subtle. Naturally, no one wants to go back to the way people lived in the 1800s," she said.

According to one chemistry graduate student, the free enterprise system should be allowed to work as it was intended, and someone will eventually come up with a solution. Conversely, several students advocated socialism, as the most expedient way to make American citizens conserve energy. However, nearly all agreed that while conservation will not solve the problems of limited resources, it ought to be implemented enthusiastically anyway.

### GOING STIR-CRAZY

Making cookies late at night  
Getting fatter bite-by-bite.  
Roommate knows my boyfriend's gone,  
A cup of oatmeal, "Here's to John."  
Stir a little, add the egg,  
She's alone too, thanks to Gregg.  
—Looking back, an afterthought,  
Nuts and raisins, "Here's to Scott!"  
Men can't hurt us, no siree;  
Not as long as we've cookies and tea.

Peggy Cooper



Lifetime is a weekly calendar of events, meetings, announcements & services published every Friday by the Office of Student Life. Student organizations having any announcements should submit them to the office on Tuesdays by noon. Phone 961-2382.

### Friday, April 18

National Soc. of Professional Engrs. & A.S.: film "Silver Streak" Chem 1179 6, 8, 10 p.m. \$1.75.

Gay People's Union: Dancing/Party Cliff House-Deveaux 9:30 p.m. \$2.00

Kundalini Yoga Class: Creative Studies Bldg. Rm. 143 10:30-11:50 a.m. bring mat/blanket.

Studies in the Old & New Testament: Bible Study UCen 2292 7-8:30 p.m.

Overeaters Anonymous: UCen 2293 2-3:30 p.m. Newcomers Welcome

Merhaba Folk Dance: Dance Old Gym 7:30 p.m. Everyone Welcome.

### Saturday, April 19

UNIVERSITY DAY — WELCOME TO ALL

MARKET DAY — STORKE PLAZA 9-4

INTERNATIONAL FOOD FAIRE 11-2 UPPER STORKE PLAZA

SPRING SING ECen 7 p.m.

Merhaba Folk Dance Festival: 11-1 classes/teaching 7 p.m.

Party Old Gym \$2.00 each event \$5.00 pkg. price.

Gong Meditation: Creative Studies Rm. 120 7:30 p.m. \$3.00 one night \$5.00 both (4/20) bring a mat/blanket.

### Sunday, April 20

Broadway Musicals: film "West Side Story" UCen II Pavilion 6 & 9 p.m. \$1.50

Gong Meditation: Creative Studies Rm. 120 7:30 p.m. \$5.00 bring a mat/blanket.

### Monday, April 21

CAB: film "Coming Home" CH 6, 8:30, 11 p.m. \$1.75 at the door \$1.25 with CAB coupon (pick up in advance at CAB office 3rd floor UCen Rm. 3125).

hExercise & Fitness: lecture "The Runner's Foot" speaker Chris Tintocollis D.P.M. local Podiatrist SHS Conf. Rm. 3-5 p.m. Free

Coalition to Stop the Draft: film "Alice's Restaurant" UCen II Pavilion 6 p.m. \$1.50.

### Tuesday, April 22

Sociology Film Club: film "Everything You Always Wanted to Know About Sex" LLH 5:30, 7:30 & 9:30 p.m. \$1.75.

EARTH DAY: Storke Plaza 12 noon-3 p.m. speakers & displays.

"Sexuality: Exploring Personal Values": SHS Conf. Rm. 5:30 p.m. Free for info 961-4163.

Overeaters Anonymous: UCen 2294 1-2:30 p.m. Everyone Welcome.

Graduate Students Associaton: Businss Meeting SH 1432 7 p.m. refreshments 6:30 p.m.

Capitol Hill Program: Orientation meeting 7:30-9 p.m. Everyone is welcome.

### Wednesday, April 23

Student Hunger Action: Weekly Meeting UCen 2292 5:15-6:30 p.m.

### Thursday, April 24

'60s Retrospect: film series "Easy Rider" & animated short "The Doonsbury Special" 7 & 9 p.m. UCen II Pavilion \$1.50.

## •ANNOUNCEMENTS•

The Office of Student Life has new office hours — we will be closed during the lunch hour 12 noon to 1 p.m.

O.C.B. applications due today (4-18) in Office of Student Life.

# Economy

(Continued from p.10)

and a large increase in raw material prices because many countries achieved unusually high growth rates at the same time. Currency instability also added to inflation. There was already a high rate of inflation even before oil price increases took place.

OPEC, or the Organization of Petroleum Exporting Countries, then raised the price of oil for a number of reasons, resulting in a \$65 billion OPEC surplus in the first year and a huge price boost. But OPEC countries were able to absorb their new earnings by increasing their exports, and their surpluses decreased to \$5.5 billion. Few OPEC countries still have surpluses.

Some economists believe the sudden increase in the price of oil may be partly the reason for the change in the economy, which has resulted in inflation and a low level of economic activity.

A small reduction in oil output because of the troubles in Iran managed to send prices soaring again. OPEC raised its prices again last summer, following a market created largely by Western consumers.

However, the recent second "oil shock" differs from the first in many ways. The immediate percentage reduction in world demand is much less than it was six years ago. OPEC surpluses appear to be about \$50 billion as opposed to \$65 billion in 1973-74. But with the devaluation of the dollar and the higher GDP of consumer countries, the impact of OPEC surplus on demand will be smaller than it was five years ago.

The government now is also more concerned with inflation than unemployment. Some governments have adopted more restrictive policies because of the oil increase, which will result in fiercer competition for less trade.

Another difference between then and now lies in economic per-

formance. The balance-of-payments performance is much smaller. The divergence in inflation rates between different countries is greater.

There is also a big difference in savings behavior between the United States and other countries. Americans save less than 4.5 percent of their incomes, whereas in Europe the figure hovers around 12 and 16 percent.

Risks of turbulence on the foreign exchanges is greater because of these differences in performance, especially because the price of the oil increase will vary greatly between countries.

Presently, there are signs that oil producers may reduce the supply of oil both to conserve their resources and to maximize prices, and perhaps also to exert political pressure.

On the other hand, some analysts believe heating oil prices will soon peak. Currently they average about 85 cents per gallon retail. World oil stocks are also at record levels, and there are signs that the demand for crude oil is declining.

Some economists, like Stanford's Kenneth Arrow, believe that cutting back oil imports by one million barrels a day will decrease the power of the OPEC monopoly, because it would keep \$25 million a day, or \$9 billion annually, from heading for the Middle East. In a recent *Forbes* interview, he suggests decontrol of gas prices as the best method to decrease consumption, since it would raise prices at the pump considerably.

A windfall tax on oil profits is President Carter's attempt to get a grasp on the oil and economy situation. Although inflation would increase in the short run because of the tax, Carter hopes it will decrease in the long run.

Undoubtedly, though, oil and inflation will continue to be two major problems that government officials at every level will have to deal with (not to mention the consumer). And if nothing else, both topics should make for some interesting rhetoric throughout the year from the presidential candidates.



Nexus Photo by Dave Dalton

## Ocean Offers Powerful Source Of Potentially Useful Energy

By LISA RENEE HARRIS

For the UCSB community, the ocean is a quotidian focus for jogging, surfing, and Hallmark-photo romantic interludes. Beyond the obvious advantages, the ocean offers a powerful source of energy. At present, many researchers are interested in harnessing this potential, and have proposed or experimented with several different methods. Following is a very general layman's list of some of these methods.

One technique, being explored on this campus, involves wave buoys. According to Paul Lee of the Physics Department, existing theories regarding generating electricity through waves and

holding it in batteries were ineffectual. They generally failed to consider all the pitfalls of engineering for the ocean, and this prompted Lee to collaborate with Mel Manalis of the Environmental Studies department in procuring a Sea Grant to devise a new buoy system.

Basically, their model involves a hermetically sealed buoy which prevents anything from moving from inside to outside the buoy and

vice versa. Because of the static of the buoy's contents, this method uses inertia coupling. The battery is self-rechargeable, removing the need for the Coast Guard to periodically change it. In addition, there are minimal external parts, so it is relatively safe in ocean conditions.

The Sea Grant was cut off in the middle of its two year expected duration "for political reasons I

(Please turn to p.12, col.4)

### Free Gre Preparation

The Academic Skills Center has practice sessions for GRE preparation. Topics for study include: test format, test taking techniques, and methods of preparation.

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## Elegant Farmer: It Wasn't

By MEG McCANDLESS

After living in Isla Vista for several years, it is easy to fall victim to the misconception when eating out, that chips and salsa come with the meal and that somewhere on every menu there is a flauta. Although this may often be the case, there are restaurants—the kind mom and dad used to take you to—which serve that nebulous type of food known as "continental cuisine."

Usually the food at these family restaurants was pretty mediocre, but it was always fun to be going out to eat, and you were usually safe ordering the chicken. The Elegant Farmer in Goleta is one such restaurant.

The atmosphere at the Elegant Farmer is one of its best assets. It is like that of many family restaurants — quiet and friendly. Little touches like spring bouquets on every table add to the overall effect. For those used to dining off formica table tops with disco blaring from the juke box in the corner, the atmosphere of the Elegant Farmer is a welcome change.

Offering entrees ranging from spaghetti and meat balls at \$4.95 to prime rib at \$10.25, the Elegant Farmer provides a wide range of meals at reasonable prices. The teriyaki chicken at \$6.75 was fair but not great. Although the teriyaki sauce was outstanding, the chicken itself was so tough we really did think it might fly off the plate any minute.

Other entrees at the Elegant Farmer include the New York steak at \$8.95, beef kabob with shrimp at \$8.75 and old fashioned beef ribs at \$5.95. A choice of baked potato, stuffed potato, steak fries, vegetables or spaghetti and soup or salad, accompanies the complete dinners.

The stuffed baked potato was definitely undercooked, thus instead of being light and fluffy it was rather dry and heavy. The clam chowder was good, but like most chowder it had lots of potatoes and very few clams.

Overall the food was fair — not something you'd write home to mom about but definitely nice as a change of pace from "burrito and beer" meals so common in Isla

Vista.

If the Elegant Farmer's atmosphere was its best quality, however, the service was definitely its worst. I'm not sure what our waiter's problem was, but first of all it took us over 30 minutes to be waited on. A couple who had been seated after us, had finished their salads before our order had been taken.

After assuring us three times that the soup of the day was French onion (since they never had clam chowder), our waiter appeared 20 minutes later with, you guessed it, a bowl of clam chowder. Fortunately, I like both French onion soup and clam chowder.

Little things like water with dinner were lacking. Twice we had to ask for water to go with our meal, and then we had to ask again to have our glasses refilled.

Problems with service aside, however, the meal was an enjoyable one. So if you're looking for a nice change of pace, at a reasonable price and if you don't mind waiting, you may want to try the Elegant Farmer.

Here it is . . .

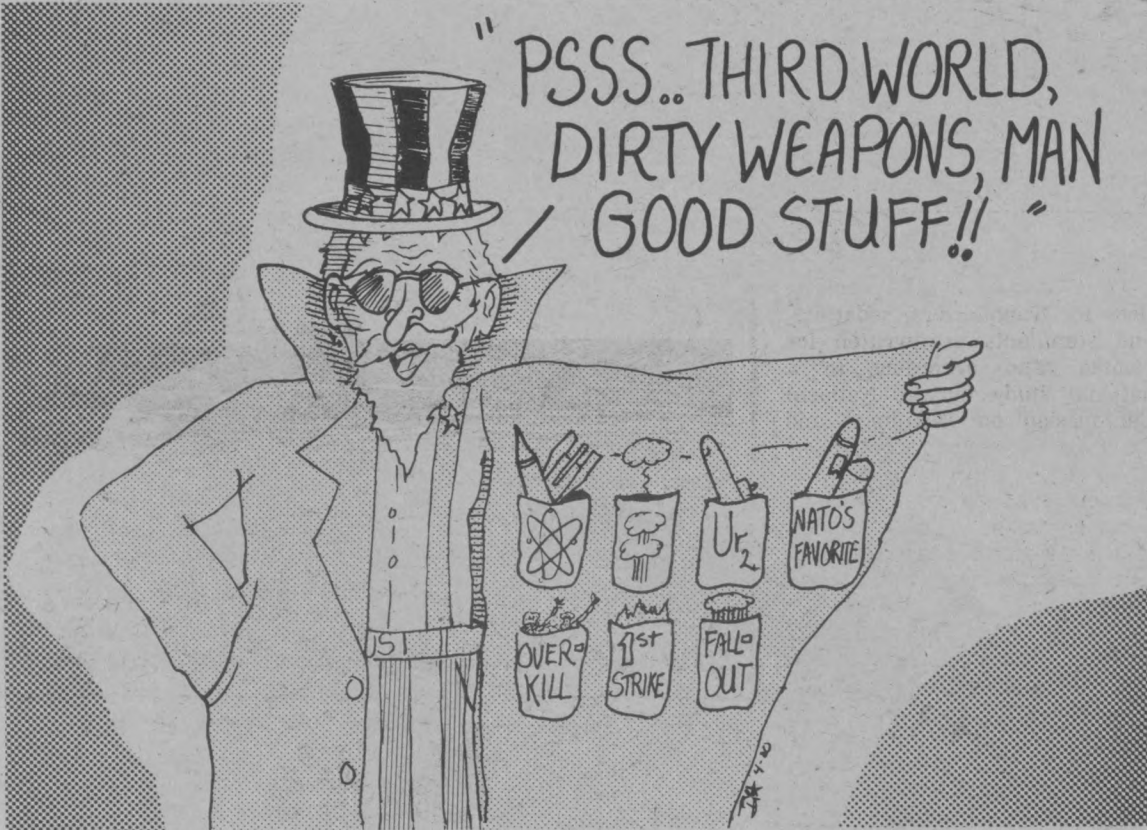
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9 am to 4 pm

International Food Fair  
11 am to 2 pm



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# Weapons Proliferation

By DAVID W. DALTON

Nuclear fission power may be a necessary alternative energy source for our immediate future, but no one will deny that there are both political and technological problems which must be solved before we will all feel comfortable with fission reactors in our communities.

We must decide on a method of waste disposal, improve reactor safety standards and upgrade existing plants. Perhaps, most importantly, we must institute absolutely rigid control of the use, sale and transportation of all fissionable materials if we are to avoid widespread nuclear weapons proliferation.

After the signing of the atmospheric nuclear test ban treaty in 1963, the United States launched a series of observational satellites to determine any possible treaty violations, as well as any detonations by countries that did not participate in the treaty signing. Since their launching, these "Vela" satellites have monitored 41 confirmed nuclear explosions.

On Sept. 22, 1979, at 3 a.m., the last of these Vela satellites was monitoring a region of the ocean off the tip of South Africa when it registered a dark circle of close to 3,000 miles in diameter. The sighting was typical of other nuclear detonations except that it was very low-powered and Vela's sensors failed to record any of the radiation or atmospheric electromagnetic disturbances that had accompanied the previous blasts.

After careful study, the experts now feel that it was not a natural phenomena but a scaled-down or unsuccessful nuclear explosion.

The South Africans immediately became the primary suspects. South Africa was the nation closest to the blast site and is the only nation in that part of the world with technology sophisticated enough for such a detonation. However, South African diplomats very quickly denied any responsibility for the blast, suggesting that a nearby Russian submarine was the perpetrator.

This blast drew more attention from the press and the public than any of the dozens of U.S. or Russian underground or Chinese or French atmospheric detonations, despite its diminutive size compared to other tests. This small South African blast signified that, like it or not, we were welcoming yet another nation into the elite group of nuclear nations. This almost inconsequential blast demonstrated that nuclear proliferation is not a "someday" problem; it's upon us now.

If South Africa does not yet have their own bomb, then they undoubtedly soon will. Until 1976, the U.S. supplied South Africa with approximately 100 pounds of enriched Uranium 235. This

enriched uranium was easily convertible for the U.S. in nuclear weapons. Are we to believe that the South Africans used all of this fuel for power generating purposes?

Unfortunately, South Africa is not the only nation that is suspected of joining the nuclear roster. India has assembled a thermo-nuclear device from materials and technology supplied from the U.S. and Canada. Pakistan already has a bomb or is very close to one. Many believe that the Pakistani device is the "Islamic" bomb, ready for possible use against Israel. Israel is undoubtedly in possession of their own tactical weapons; Israeli agents have hijacked 200 tons of uranium from a ship in the Mediterranean sea and diverted weapons-grade uranium from a plant in Pennsylvania. Iran began a \$30 billion nuclear power program some two years ago despite the fact that Iran is one of the most oil-rich nations in the world. Because of corruption and economic factors, the Iranian program has been abandoned, but it seems likely that Iran supplied materials to Arab sister-states.

After the first two nuclear detonations at Hiroshima and Nagasaki, the "balloon" has remained dormant for some 35 years. We have never really feared nuclear weapons proliferation before for three reasons. First, we believed that the technology involved is so difficult that only the most sophisticated nations on earth would possess it. Now, almost every first-year graduate student in Physics or Nuclear Engineering possesses the knowledge necessary to design a thermo-nuclear device.

Second, we have always felt that the supply of fissionable materials was in the hands of a few nations. Now we have learned that many nations can obtain these materials from their neighbors or allies. Finally, we believe that all the people of the earth are equally afraid of the death and destruction that a nuclear war, either tactical or strategic, would mean.

Now we hear United States Army generals threaten to use tactical nuclear weapons in Korea if the South should be invaded again. We see many Third World, have-not countries, being run by fanatics and terrorists. According to the Ayatollah Ruhollah Khomeini, "We cannot control these youths. Why should we be afraid? We consider martyrdom a great honor. We will destroy all those who attack, and we will ourselves be killed."

All of the problems associated with the use of the nuclear fission reactor may conceivably be solved. We will learn how to prevent Three Mile Island type accidents as our technology improves. Once we initiate a feasible waste recycling and disposal/

storage system the waste problem will no longer be an important factor. It seems ludicrous to assume, however, that we will be able to avoid nuclear war of one magnitude or another in a world where 50 or 100 nations possess nuclear weapons. War has been with us as long as civilization and it is irresponsible to believe that a nation, faced with its very survival, would not use nuclear weapons against an adversary.

Of course proliferation is still possible without nuclear power reactors, but nuclear power makes the materials and technologies necessary for weapons programs much more readily available. In fact, most of the new members of the nuclear weapons club became members in just that manner: weapons being developed out of "peacetime" power reactors.

Despite the obvious threats to the safety and security of the world, the United States continues to sell nuclear technology to the rest of the world. If we wish to avoid the nuclear conflict that now seems eminent, we must adopt a responsible and rigid policy in the sale of nuclear technologies, handling of all fissionable materials, our own weapons programs and the use of all forms of nuclear power.

# Ocean

(Continued from p.11)

don't understand," according to Lee. The two researchers have continued work on the project without the grant and, Lee said, "we'll finish it, but of course it will take longer than it would have if the grant had continued."

Associate Director of Marine Resources, Robert Holmes, listed some other possible techniques for utilizing the ocean's power. "First, of course, is waves," he said, adding that the wave motion generates usable energy. Some methods that use waves are presently in use, and others are being researched.

The ocean's salinity gradient is of current interest to researchers. At different depths, the salt content of the water varies. "Theoretically, that (salinity) can be extracted," Holmes said. On the same principle, (depth variable), water temperature can be used to generate power. Hot springs, originating from underwater thermoenergy, can be tapped and used directly in the same ways that boiling water is used while eliminating the need to have to boil the water. Steam energy is a clean and relatively inexpensive source.

Similarly, cold water can and has been used as a coolant. On St. Croix in the Virgin Islands, cold ocean water is used to air-condition homes.

Deep water fertilizers are proving to be very useful as an energy source. The rich fertilizer is transferred to a swimming pool-type container where algae can be cultivated and used as fish food, and indirect energy source.

In the Bay of Fundy, Nova Scotia, extensive research with tides has been conducted. At present, one project there is receiving a lot of attention because of its possible applicability in other regions. The method involves finding or making a below sea level cove. With the aid of a waterwheel or similar device, the water movement caused by the oscillating tide can be transformed into usable energy.

Also using an indentation in the shoreline, Lockheed has developed the "damatol." The waves come into the pond created by the depression, sending the standing water into a whirlpool. A paddlewheel placed in the center of the whirlpool generates energy in a fashion similar to that of the windmill.

Another shoreline method incorporates sharp-angled cliffs. In certain places, the waves slam into cliff crevices, sending spouts of intensified water power into the air. A particular turbine can be used to harness this concentrated source.

Finally, Holmes points out that many people are turning to sailing as a form of transportation as well as recreation. In both instances, the sailors are relying on wind rather than petroleum.

It's terrifying and it's beautiful; as the creative process of discovering how to make it work for us progresses, the ocean is steadily becoming viable as an energy source.

\*\*\*\*\*  
 Dalton is an ugly pig  
 \*\*\*\*\*

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