Kilgore, unpublished letter, 20 June 1944; 22 June 1944; L. Chalkley, statement of comments phoned to C. T. Larson of Kilgore's staff, 9 June 1944.

12. Though Kilgore's bill had been much improved, it was still faulty, Bush thought. In an undated note to Chalkley, Bush commented on Kilgore's proposed revision of S702 in a Senate Subcommittee Print dated 10 November 1944:

"Except for the pat[ent] section this is not bad—on the other hand I don't believe such a setup will do much good, & it certainly will do strange things.

"I ought to accumulate some criticisms—for use when called to testify."

13. V. Bush to J. A. Furer, unpublished letter, 12 December 1944.
14. _____, memorandum to files, 19 December 1944; _____ to R. E. Wilson, unpublished letter, 1 January 1945.
15. _____ to I. Bowman, unpublished letter, 10 January 1945.
16. _____ to C. L. Wilson, memorandum, 15 January 1945.
17. _____ to I. Bowman, unpublished letter, 29 January 1945; 19 February 1945; _____ to C. P. Coe, unpublished letter, 26 December 1944; _____ to D. G. Haynes, unpublished letter, 21 February 1945.
18. C. L. Wilson to W. R. Maclaurin, unpublished letter, 5 April 1945; 14 April 1945; H. A. Wallace to V. Bush, unpublished letter, 24 April 1945; V. Bush to B. Brown, unpublished letter, 26 April 1945; _____ to B. Dewey, unpublished letter, 26 April 1945.
19. H. M. Kilgore to V. Bush, unpublished letter, 5 February 1945; 15 February 1945; V. Bush to H. M. Kilgore, unpublished letter, 10 February 1945; _____ to I. Bowman, unpublished letter, 10 February 1945; 17 February 1945; L. Chalkley to V. Bush, memorandum, 24 February 1945; I. Bowman to V. Bush, unpublished letter, 28 February 1945; V. Bush to S. E. Thompson, unpublished letter, 24 March 1945.
20. F. B. Jewett to V. Bush, unpublished letter, 20 March 1945; V. Bush to F. B. Jewett, unpublished letter, 22 March 1945.
21. R. A. Millikan to V. Bush, copy, unpublished letter, 2 April 1945.
22. V. Bush to R. A. Millikan, unpublished letter, 5 April 1945.
23. I. Bowman to V. Bush, unpublished letter, 11 April 1945.
24. Notes on Meeting of the Chairmen and Secretaries of the Four Committees . . . 8 March 1945.
25. H. W. Smith to C. L. Wilson, unpublished letter, 11 March 1945.
26. C. L. Wilson to H. W. Smith, unpublished letter, 14 March 1945, and attached note.
27. W. W. Palmer to V. Bush, unpublished letter, 25 April 1945.
28. L. K. Frank to C. L. Wilson, not dated (about 10 May 1945), note attached to typed comments on draft report of Palmer committee dated 25 April 1945.
29. V. Bush to F. B. Jewett, unpublished letter, 7 June 1945.
30. C. L. Wilson to W. W. Palmer, unpublished letter, 15 June 1945.
31. H. W. Smith to C. L. Wilson, unpublished letter, 21 June 1945.
32. Correspondence in OSRD Records, especially C. L. Wilson to R. Wood, unpublished letter, 21 May 1945; interview of D. K. Price by J.M.E., 18 April 1975.
33. C. L. Wilson, Notes in Connection with Bush Report to President, 22 May 1945.
34. V. Bush, penciled notes on draft report, 23 May 1945.
35. V. Bush to W. W. Palmer *et al.*, unpublished letter, 31 May 1945.
36. H. W. Smith to V. Bush, unpublished letter, 5 June 1945; W. R. Maclaurin to V. Bush, unpublished letter, 4 June 1945; H. Shapley to V. Bush, unpublished letter, 4 June 1945.
37. "Master Copy" attached to V. Bush's mimeographed letter of 31 May 1945 to W. W. Palmer *et al.*
38. V. Bush to F. B. Jewett, unpublished letter, 2 June 1945; F. B. Jewett to V. Bush, unpublished letter, 5 June 1945.
39. Carbon copy (with intermixed mimeographed sheets), dated June 1945, of the overall report; the carbons are pages retyped to incorporate the changes resulting from comments elicited from committee members and others after the 31 May mailing. This copy contains marginal comments and changes in Bush's hand; thus he obviously approved the change.
40. Bush or his assistants may have sounded out some committee members on this change—perhaps by telephone since I have found no evidence on this matter in the OSRD files. But since there were bound to be violent objections, he may have decided on his own to return to the earlier wording.
41. V. Bush, memorandum of conference with the President, 14 June 1945.
42. On the arrangements for printing and releasing the report, see O. M. Ruebhausen's memorandum to files, 16 June 1945; C. L. Wilson to B. U. Webster, unpublished letter, 14 July 1945; and V. Bush to C. Norcross, unpublished letter, 14 July 1945.
43. D. K. Price to A. Miles, memorandum, 20 July 1945, in Bureau of the Budget Records, Record Group 51, Series 39-32, National Archives.

44. I thank L. Chalkley, R. F. Maddox, D. K. Price, O. M. Ruebhausen, and C. L. Wilson, who read an earlier version of this paper and gave me helpful comments. Unless otherwise indicated, all unpublished documents cited above are in the OSRD Records, Record Group 227, National Archives.

NEWS AND COMMENT

The Nuclear Debate: Clashes in Congress and California

Federal and state governments may be headed toward a collision over a key aspect in the development of nuclear power. Antinuclear groups in California are pressing for a law that would ban nuclear power plants unless Congress removes the present legal limitations on the damages payable in the event of a nuclear accident. But Congress, far from repealing the limitation (mandated by the Price-Anderson nuclear insurance law), recently voted to extend it. The skirmish on Capitol Hill over the Price-Anderson law is analyzed in the first of the following articles; the events that have made the California proposition possible are discussed in the second.

I. Pronuclear Forces Trounce Antis in Insurance Liability Fight

Proponents of nuclear power won a major victory over nuclear critics at the close of the 1975 congressional session.

Both the House and the Senate passed legislation extending the Price-Anderson nuclear insurance law that limits the nuclear industry's liability in the event of a catastrophic accident. Both houses voted down proposed amendments that would have allowed injured parties to sue for damages above the specified liability limits.

The struggle over liability limits had been the most hotly contested political battle involving nuclear power in the recent session. It was widely viewed as a pivotal fight that might affect the future growth rate of the nuclear industry. Its outcome is sure to be interpreted as a measure of the relative strengths of the pro- and antinuclear lobbies.

The forces in favor of retaining a limit on liability included, among others, the Ford Administration, the congressional Joint Committee on Atomic Energy, the nuclear industry, the electric utility industry, the private insurance industry, and the AFL-CIO. Those pushing for an end to the limit included, among others, various environmental groups, Ralph Nader's Congress Watch, Common Cause, the National Taxpayers Union, the United Mine Workers, the United Auto Workers, the oil fuel dealers, the California Bar Association, and the American Trial Lawyers Association.

The Price-Anderson Act was originally enacted in 1957 with two purposes: to protect the infant nuclear industry from potentially bankrupting damage claims in the event of a catastrophic accident (and thus encourage more companies to enter the new industry) and to provide monetary reimbursement to injured parties in the event of a nuclear catastrophe.

As originally passed, the act limited the liability of the industry for any one accident to $560 million. It required nuclear utilities to obtain the maximum coverage available from private insurance companies (currently $125 million), and provided that the federal government would indemnify the utilities for the remaining liability (currently $435 million) in return for a token premium payment. The manufacturers of nuclear equipment—as distinct from the utilities that purchase the equipment—were made exempt from liability.

The coverage was of the "no fault" variety—injured parties could get reimbursed by establishing that they were injured in a nuclear accident without having to establish who was at fault in the accident. However, they could only recover a maximum total of $560 million—even if the total damage far exceeded that figure. Anything

more would depend on whether Congress felt inclined to appropriate special diaster funds, but Congress has not always done much to help the victims of previous, nonnuclear disasters.

The act, which was extended once in the mid-1960's, was due to expire again in 1977—a circumstance which set the stage for the battle over whether there should be any extension and, if so, what form that extension should take.

At times the debate became highly emotional. In the Senate, for example, Senator John O. Pastore (D–R.I.), chairman of the Joint Committee on Atomic Energy, saw the issue in apocalyptic terms. "The minute that we cannot get Price-Anderson, it is the end of the nuclear industry in this country," he said. "It is the end." Elaborating on this theme, he explained that no insurance company would underwrite an unlimited liability, and that no utility would get a reactor if insurance were unavailable. "So if one cannot buy insurance, we do not build a reactor. If we do not build the reactor, we do not achieve energy independence. We begin to put sections of the country in the dark. . . . So we put the lights out. And what happens then? If we put the lights out, we will put a lot of people out of work."

And, lest he be accused of callous disregard for public safety, he added: "Do not let anyone tell me on the floor of the Senate that they love their children and grandchildren more than I do, that they are out to protect them more than I am, whether it is Ralph Nader or anyone else. . . . If anyone thinks for one minute I would stand on this floor and jeopardize the lives and safety of my grandchildren, he has another think coming."

The key votes in each house came on amendments that would have allowed victims to bring suit against the nuclear industry—both utilities and manufacturers—if the money otherwise provided by Price-Anderson proved inadequate to fully cover claims. The proponents of these amendments argued that the nuclear industry is now mature enough to stand on its own feet—it should no longer receive an insurance "subsidy" that gives it an unfair cost advantage over other forms of energy. They also argued that the manufacturers and utilities would exercise greater quality control if they were fully liable for their actions, thus improving the safety of nuclear systems. And they suggested that it is unconstitutional to deprive the public of the right to sue for full damages.

In opposition, the nuclear advocates argued that the likelihood of a nuclear accident was extremely remote but that the mere possibility of having to pay damage claims from a catastrophic accident would lead many manufacturers—particularly the small makers of valves and other components—to abandon the nuclear field. (That point was disputed by environmentalists who noted that the small manufacturers have not abandoned other industries where damage claims of bankrupting dimensions are also theoretically possible.) The nuclear advocates also argued that removal of the liability limit would increase the costs of the nuclear industry and ultimately the charges imposed on the consumers of electricity.

The antinuclear forces made their best showing in the House, where an amendment to do away with the liability limit lost by 217 to 176 on 8 December. A similar amendment was voted down in the Senate on 16 December by a more resounding 62 to 34.

As finally adopted, the legislation extends the Price-Anderson insurance system for another 10 years with modifications aimed at phasing out the government's role as insurer and allowing the liability limit to rise gradually above $560 million. This will be done by requiring utilities, at the time of a catastrophic accident, to pay a retrospective premium of between $2 million and $5 million per nuclear plant to cover damages exceeding the amount of private insurance available. As the number of nuclear plants grows, these retrospective premiums would reduce—and perhaps ultimately replace entirely—the government's share of the $560 million liability. Once the government's role had ended, the retrospective premiums of new nuclear plants would be used to increase the liability limit. Thus the limit of liability would be determined by the number of nuclear plants in operation. Some nuclear advocates predict that the limit could rise to more than $1 billion within a decade or so. However, environmentalists, noting the recent woes of the nuclear industry, are skeptical that the limit will rise that fast; they also suggest that even $1 billion would not be enough to keep pace with inflation.

Hovering in the background of the debate over Price-Anderson was the *Reactor Safety Study* recently directed by Norman C. Rasmussen, professor of nuclear engineering at the Massachusetts Institute of Technology, under contract with the Nuclear Regulatory Commission. That study concluded that a worst case accident could cause $14 billion in property damage plus some 3300 early fatalities, but the chances of such an accident happening were rated minuscule. Rasmussen told the Joint Committee that the odds of any given reactor causing damage that would exceed the $560 million Price-Anderson limit is about 2 in 1 million per reactor per year. The nuclear critics suggested that if nuclear power is really so safe, it shouldn't need special protection against full liability for an accident. But the nuclear advocates countered that, while the odds of a catastrophe are remote, no one can guarantee it won't happen, so the need for special protection persists.—PHILIP M. BOFFEY

II. Nuclear Power and People's Power: Law-Making by Initiative

Los Angeles. On 6 June last year, Californians will commit a psephological act of more than routine interest. Along with deciding which would-be legislators shall prevail in the primary elections, voters will do some direct legislating themselves through the mechanism known as the initiative process. One issue the voter will settle as he works down his ballot sheet is the future of nuclear power in California. A proposition that has qualified for the ballot sets such strict terms for the construction of nuclear power plants that the industry is calling it tantamount to a moratorium.

California has three nuclear power plants in operation and 28 more are planned over the next 20 years, by which time the state would depend for a third of its power on nuclear energy. The nuclear safeguards initiative, if accepted, would certainly delay this schedule and could put a total ban on nuclear energy, because even existing plants must be phased out if its conditions cannot be met. Supply of energy could become radically more difficult both in California and in the other states which may follow California's example and in which similar initiatives are already being mounted. A vote to accept the proposition, some say, would represent a stance by the electorate against big technology, and against the ever greater consumption of material goods and energy which characterizes certain aspects of the American life-style.

Be this as it may, many voters have not yet heard of the initiative, let alone pondered its cosmic implications. According

to a survey taken last month by pollster Mervin D. Field, only 45 percent of the electors are aware of the issue, although that is a fairly high degree of awareness at so early a stage. Field reports that 19 percent favor the proposition, 18 percent are against it, and 8 percent have not made up their minds.

The utilities and nuclear industry have reason for apprehension in the forthcoming debate because they have been cunningly disarmed of their most potent weapon. Initiative campaigns in California have traditionally been checkbook wars in which millions of dollars are laid out in advertising and similar means of persuasion. The advantage, some believe, has too often lain with the side with more money, generally that of the corporate interests. But now there are new ground rules.

An initiative accepted by the voters in 1974, the Political Reform Act, clamps rigorous limits on expenditures. Each side may spend only $10,000 in the period up to 28 days before an election. Thereafter, expenditures must be kept to within $500,000 of what the other side intends to spend, up to a maximum of $1.138 million (the figure represents 8 cents per person of voting age in California).

The nuclear safeguards initiative will be the first to be fought under the new rules, provided that they are not overturned in court. The Committee for Jobs and Energy, which is organizing the opposition to the initiative, last month filed suit with the California Supreme Court against the new spending limit. It is, the suit contends, an unreasonable constraint on the committee's right to disseminate political ideas, and hence it "violates the freedom of speech guaranteed by the First Amendment."

The campaign in favor of the initiative is being conducted by Californians for Nuclear Safeguards, a coalition of environmental and activist groups put together by Richard B. Spohn. Spohn, now a member of Governor Jerry Brown's staff, used to head Ralph Nader's California Citizens' Action Group, and it was he who drafted the nuclear safeguards initiative. But citizens' use of the initiative process is a recent phenomenon, for which the credit or debit is due to an organization known as People's Lobby.

The initiative process was written into California law in 1911 by the reformist governor Hiram Johnson who sought to end a long period of political corruption. But its principal users were those who could afford the hundred thousand dollar cost of gathering the necessary number of signatures required to qualify an initiative for the ballot. Professional firms used to

Edwin A. Koupal

circulate petitions, charging up to 50 cents per signature collected, which tended to make direct legislation a pastime for large interest groups. The first grass roots petition to make the ballot was the Environment Initiative of the June 1972 presidential primary election. It was qualified by People's Lobby, at a cost of $10,000, by using volunteer signature collectors from college campuses.

The Environment Initiative, which included a specific moratorium on nuclear power plants, was rejected. People's Lobby was more successful with a second initiative it helped qualify for the 1972 general election, the Coastal Zone Conservation Act. An even greater triumph was the Political Reform Act of 1974, an initiative mounted by People's Lobby and other groups and supported by gubernatorial candidate Jerry Brown. The act received more votes than Brown won to become governor, a circumstance that has made People's Lobby a force of some consequence in California politics.

People's Lobby is run by Ed and Joyce Koupal out of a cluttered house near downtown Los Angeles that serves as both an office and a printing works. "Final Responsibility Rests with the People Therefore Never is Final Authority Delegated" proclaims a prominent slogan on the house's front wall. Before founding People's Lobby in 1969, Koupal was a used car salesman, and before that he served as a drum major in the Air Force, sold pots and pans door to door, and earned his living as a musician. He didn't register to vote until he was 40. It was Reagan who got him into politics, Koupal explains, by the cuts he made in spending for education and mental hospitals.

People's Lobby's first effort was to do something about smog. Later, Koupal's interest in nuclear issues was aroused by nuclear critic John W. Gofman of the University of California, Berkeley. Because of the rejection of the 1972 environment initiative with its nuclear moratorium, proponents of the nuclear safeguard initiative are careful to avoid any suggestion that they wish to close the industry down. "We are not going to shut the industry off," says Koupal. "I personally support the technology. I don't think nuclear power should have come into existence in the first place, but since it has, I have no inherent objection as long as it can be developed safely. But I am turned off by the bureaucratic bungling which has brought this technology into existence on a very weak limb. We are tired of making America the great test tube in the sky."

The nuclear safeguards initiative, Koupal believes, does not require the industry to do anything weird or rare. "We are not asking the public to vote for or against the technology—we have already done that. We are asking the voters to declare through the ballot boxes for the appropriate framework to be established to allow a framework for discussion."

Koupal fights a hard campaign, slapping lawsuits on his opponents and publishing with gusto their internal documents which somehow find their way into his hands. "I am 48 years old and I don't have 900 years to fool around with phony concepts that I am not going to fight like they do," he says abrasively. Koupal is equally aggressive toward the state legislature, which he describes flatly as "dead." He has refused appointments in the state government, he says. "There is hardly a senator that likes us, but they will deal with us, and they are dead scared of us, and that is the way we like it."

Koupal is confident of victory with the nuclear safeguards proposition. "We think we have a rather easy campaign in California this time," he says. "The voters are more than usually aware of the issue, People's Lobby has high visibility because of the success of the Political Reform Act, and the initiative's opponents," Koupal remarks ungallantly, "have got fools running their campaign—it is headed by losers who have never run an issue campaign."

People's Lobby gives advice to Californians for Nuclear Safeguards and helped the coalition qualify the nuclear initiative on its second attempt. Koupal is not directly involved with initiative campaign in California, however, his energies being taken up with a coalition of states known as the Western Bloc, whose goal is to qualify nuclear safeguards initiatives of their own. The Western Bloc was formed a year ago at the first Critical Mass conference convened by Ralph Nader, and now includes 19 member states (*Science*, 5

December 1975, p. 964). So far Western Bloc members in Oregon have gathered enough signatures to qualify their initiative, but Massachusetts has failed. Only 22 states of the union possess the initiative mechanism. The ultimate goal of People's Lobby is to have a national initiative process adopted into the constitution by a constitutional amendment.

These ambitions will certainly be influenced by the fate of Californian nuclear safeguards initiative. The initiative is a fairly involved legal document but its basic requirements are as follows:

1) The federally imposed limitations on insurance liability for nuclear accidents must be removed within a year.

2) The effectiveness of all safety systems, including the emergency core cooling system, must be demonstrated by the testing in actual operation of substantially similar physical systems.

3) Radioactive wastes must be stored with no reasonable likelihood of escape.

4) Conditions 2) and 3) above must be demonstrated to the satisfaction of the state legislature, as expressed by a two-thirds vote in each house.

Opponents of the proposition are labeling it the "nuclear shutdown initiative" chiefly because Congress, they say, is not about to remove the insurance liability limits and second, the two-thirds rule is almost impossible to obtain. "Why, you can't get a Mother's Day resolution passed by a two-thirds vote in the legislature," former governor Edmund G. Brown told the Los Angeles *Times* recently. (Brown senior is a co-chairman of Citizens for Jobs and Energy; his son, the present governor, has not yet declared his position on the nuclear safeguards initiative).

Citizens for Jobs and Energy is supported by the state's major utilities and makers of nuclear hardware such as the Bechtel Corporation and Westinghouse. On the other side, Californians for Nuclear Safeguards is a coalition of environmental groups such as the Sierra Club and Friends of the Earth, together with Project Survival, a vigorous new group composed largely of activist middle-class housewives whose chief ideologue is guru-in-the-making E. F. Schumacher. Schumacher, economist author of the neo-Gandhian tract *Small Is Beautiful*, is a zealous opponent of nuclear power; his leading fan in California is Governor Jerry Brown.

Should the initiative be accepted in June, the industry's first move might well be to challenge its constitutionality in the courts, on the grounds that it usurps the right of the federal government to be the regulator of nuclear power. Yet judges might hesitate to nullify a law that has the specific support of several million voters. Whatever the final outcome, the initiative should prove an interesting experiment in direct democracy.—NICHOLAS WADE

Trident in Trouble: New Missile May Resemble Poseidon, After All

The $16.5 billion Trident submarine missile system has been having some problems lately, which may mean that it turns out to be similar to the existing Poseidon system instead of the revolutionary advance its advocates originally promised.

Some experts close to the project say that the Trident I missile, which is the first element of the system, may not attain its originally planned range of 4500 to 4800 nautical miles (n.m.), but may go only 4000 n.m. Other experts are doubtful that it will go more than 3600 n.m. The range of the Poseidon missile, now aboard U.S. strategic submarines, is from 2200 to 2800 n.m.

A second issue is what payload Trident I will carry at these ranges. There are reports that Trident I's maximum "throw weight" may be less than Poseidon's.

These problems with Trident I make the plans for Trident II—a missile that would go 6000 n.m.—even more questionable to the extent they look to the same technology.

The Navy, which is developing the Trident system, has declined to comment on these problems since virtually the entire subject is classified. Officials have, however, expressed confidence that Trident I will meet range and payload goals when it becomes operational in 1979. Nonetheless, from reports in the aviation press and talk in industry and scientific circles, there are signs that Trident I could be in trouble.

The Trident system was described to Congress in 1972, by John R. Foster, Jr., Director of Defense Research and Engineering, as involving "no diminution in capability" whatever from the existing Poseidon system. And Navy specifications for the missile, as recently as early 1974, stated that it should carry "essentially the same payload as Poseidon but go twice the range."

Both the Trident I missile and its follow-on, the Trident II, are the justification for building a controversial new class of submarines, also called Trident. The first of these is already under construction, and the defense budget which Congress has just approved includes funds for work on an additional nine. The Navy plans to put a total of 160 Trident I's aboard ten of the Poseidon submarines and a total of 240 Trident I's aboard the ten new Trident submarines. Foes of the new submarine, in congressional debates over the project, have argued without success that all the Navy really needs to do is to backfit Trident I aboard the existing fleet of Poseidon submarines.

The Navy wants a new generation of long-range strategic missiles to increase the operating area of the submarines and, hence, lessen their chances of detection. Their present area is of approximately 3 million n.m.^{2}, embracing the Arctic, North Atlantic, and North Pacific oceans. If they carried missiles with a range of 4000 n.m. the submarines would have an operating area of no less than 15 million n.m.^{2} (see map); they could even train their missiles on the Soviet Union while sitting off the U.S. coastline.

The Soviet Union is widely reported to be unable to detect, let alone destroy, the 31 U.S. strategic submarines that are now on station at any given time in a single first strike. The submarines would be able to strike back at the Soviet Union with devastating force. For this reason, the submarine-based long-range missile—in its present and future forms—is considered the country's most stable deterrent against nuclear war.

But developments of the last year are raising anew some questions as to whether the new missile will be only a modest improvement over Poseidon. First, there have been problems with the new high-energy propellant, and there is some disagreement among experts as to whether these can be adequately solved. The Navy's prime con-