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ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Investigation on the Commission's own motion into present and alternative methods of financing nuclear facility decommissioning costs.	OII 86 (Filed January 21, 1981)

(See Appendix A for appearances.)

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INTERIM OPINION

I. Summary of Decision

Today's decision completes the first phase of the Commission's investigation into methods of financing the costs of decommissioning nuclear generating facilities. This investigation began with Order Instituting Investigation (OII) 86, issued January 21, 1981. OII 86 named as respondents the regulated California electric utilities which operate or are constructing nuclear facilities: Pacific Gas and Electric Company (PG&E), Southern California Edison Company (Edison), and San Diego Gas & Electric Company (SDG&E).

Today's decision outlines a new procedure by which the utilities will collect and account for the forecast eventual costs of nuclear decommissioning. In assessing the various alternatives for financing recovery of decommissioning costs, the Commission weighed four criteria:

(1) Assurance - The assurance which the method provides that funds collected will be available at the time and in the amount required.

(2) Cost - The cost that the method imposes on ratepayers.

(3) Flexibility - The method's ability to adjust to changes in the costs, technical requirements, and timing of decommissioning, inflation and cost escalation, interim use of accumulated funds, and changes in tax laws.

(4) Equity - The method's equitable treatment of ratepayers. Any funding method should collect funds only from those who benefit from the reactor, strive to levelize ratepayer contribution during the years of plant operation, and stop collection at the end of the plant's operating life.

"Assurance" is the single most important criterion for evaluating alternative financing mechanisms. We must achieve a high level of assurance that decommissioning can be accomplished promptly and efficiently, so as to minimize any potential risk to public health and safety.

"Cost" is the second most important criterion. We compared the funded mechanisms to determine which would provide an acceptable level of assurance at the lowest cost to ratepayers. Based on evidence on the record, sinking fund mechanisms which require annual payments would be less expensive than prepayment.

"Equity" proved to be a relatively easy criterion to satisfy, because it is relatively easy to structure payment schedules in ways which treat ratepayers equitably over time. Only expensing cannot meet this requirement, because it requires assignment of all decommissioning costs to ratepayers in years after a nuclear power plant has ceased to generate benefits.

"Flexibility" was also a relatively easy criterion to meet. Prepayment options proved to be the least flexible, because they would set aside the largest initial fund balance.

In the Commission's view, the mechanism which best satisfies the four criteria is an externally funded sinking fund. Under this mechanism, annual payments will be deposited into a fund which is segregated from other utility assets. Annual contributions will be set so that the principal plus accumulated earnings should cover the cost of decommissioning at the time decommissioning is expected to occur.

Today's decision requires external management of each decommissioning fund by a third-party trustee. Professional fund managers should be able to secure the highest earnings from investment of decommissioning funds for a given level of risk.

PG&E, Edison, and SDG&E are directed to implement procedures to fund decommissioning costs by use of an externally funded reserve as soon as practicable. They are ordered to file proposed accounting and procedural details within 60 days of the effective date of this decision, along with supporting information.

OII 86 remains open. A prehearing conference will be held August 4, 1983 to identify issues and schedule further hearings.

II. Introduction

A. Procedural History

On January 21, 1981 the Commission issued OII 86 to consider current and alternative methods for financing nuclear decommissioning costs to be incurred by California regulated public

utilities. The Commission instituted OII 86 in order to ensure that adequate funds will be available for decommissioning nuclear generating facilities, and to ensure that the costs of decommissioning will be distributed equitably over time among the customers who benefit from operation of the nuclear power plants. The Commission defined four criteria by which alternative financing mechanisms were to be evaluated: assurance, flexibility; equity; and cost.

Currently, the estimated costs of decommissioning are collected over the life of the facility as a negative salvage component of depreciation.1/ The accumulated reserve allows the companies to use the revenues during plant operation, thereby reducing the need for additional external financing. The accumulated reserve is subtracted from rate base, reducing revenue requirements over the life of the plant. This method accumulates a "depreciation reserve" on the utility's books, but it does not actually require the utility to set money aside. This method assumes that decommissioning costs can be paid from internal company funds at the time of decommissioning.

1/ See Section III-D.4, below, for a more detailed discussion. This accounting treatment was reaffirmed for the San Onofre Nuclear Generating Station (SONGS) Unit No. 1 in Edison's test year 1979 rate case Decision (D.)89711, dated Dec. 12, 1978, in Application (A.)57602, and in SDG&E's test year 1979 rate case D.90405, dated June 5, 1979, in A.58067, et al. Similar treatment is in place for PG&E's Humboldt Bay Nuclear Station, but accrual has been in abeyance since 1980.

In OII 86, the Commission concluded that there is a need to consider financing alternatives to the current "depreciation reserve" method. The OII ordered consideration of at least the following alternatives:

(1) Prepayment - cash or other liquid assets set aside or deposited in an investment account prior to reactor start-up covering either total estimated decommissioning expense, or invested such that principal plus accumulated interest cover estimated cost at the estimated time of decommissioning.

(2) Sinking Fund - fund reserve accumulated over the estimated life of the plant through annual set aside such that fund plus accumulated interest cover estimated cost at estimated time of decommissioning.

(3) Depreciation Reserve - reserve accumulated over the estimated life of the plant on company accounting records although no specific funds are set aside for decommissioning.

(4) Surety Bond - bond purchased from surety company to guarantee that monies equivalent to face value of bond and estimated decommissioning cost will be paid in event the utility, financing through some other method, defaults.

(5) Premature Decommissioning Insurance - insurance or bond to cover decreasing difference between funds accumulated by some other funding method and the estimated costs or decommissioning at any point in time.

PG&E, Edison, and SDG&E were made respondents to OII 86 and were directed to submit written evaluations of current and alternative methods for financing nuclear decommissioning costs to the Commission by May 21, 1981. The California Energy Commission (CEC) was invited to participate in the proceeding and encouraged to prepare a similar evaluation.

A prehearing conference was held on March 13, 1981. During the conference, parties interested in the proceeding were identified and the issues were further refined. The presiding administrative law judge (ALJ) issued a ruling dated April 14, 1981, further clarifying the issues to be addressed in the proceeding. In addition to those specifically delineated in OII 86, the following issues were included:

(1) The estimated range within which decommissioning costs of commercial reactors can reasonably be expected to vary;

(2) The estimated range within which reactors can reasonably be expected to remain commercially useful;

(3) The expensing method of financing;

(4) The salvage value of fuel existing at the time of decommissioning;

(5) The uncertainty of cost estimates and the impact upon funding mechanisms;

(6) The potential for abandonment of facility by an insolvent or solvent utility; and

(7) The decommissioning experience to date.

In addition to requiring the utilities to report the cost to ratepayers of the various methods to finance decommissioning, the ALJ's ruling directed the respondents to analyze the sensitivity of the financing methods to the following factors: discount rates; cost inflation; earnings rate of fund or depreciation account; possible tax deferral of principal and/or interest; and shortened plant lifetime or drastic increase in decommissioning costs related to premature shutdown.

Twelve days of hearings were held between October 26, 1981 and September 8, 1982. The matter was submitted, pending receipt of concurrent briefs on October 22, 1982. Briefs were filed by PG&E, Edison, SDG&E, CEC, the California Association of Utility Shareholders; and the Commission staff. Roughly 50 letters of concern were received from ratepayers during this phase of the proceeding.

B. Positions of Parties

A wide range of positions were taken on the issues by parties to this phase of OII 86. The main reason for this broad range is the great uncertainty entailed in planning for the eventual decommissioning of commercial nuclear electric power plants. Individual positions, and the decisions reached today in this opinion, are based on reasoned judgments made in light of these uncertainties.

1. Commission Staff

Three witnesses appeared on behalf of the Commission staff: Kevin Coughlan, of the Engineering Analysis Group of the Commission's Revenue Requirements Division; Ronald Knecht, of the Special Economics Projects Section of the Revenue Requirements Division; and Robert S. Wood, of the Office of State Programs of the United States Nuclear Regulatory Commission (NRC).

a. Witness Coughlan

Coughlan argued that the current depreciation reserve method should be maintained, but that the tax treatment should be changed to normalized (or "partial cost recovery", as described elsewhere in this decision), rather than flow-through (or "full cost recovery") accounting. He found that all the proposed decommissioning methods provided adequate assurance of fund availability, because the low absolute costs of decommissioning make the expenses easily manageable. After rejecting the expensing method (See Section III-D.1, below) as inequitable, Coughlan argued that the depreciation reserve is the least expensive of the remaining alternatives.

b. Witness Knecht

Knecht analyzed the financing alternatives by establishing an ordinal ranking under each of the four criteria, then merging these rankings on an equally weighted basis to prepare a

final list of preferences. Using this methodology, Knecht found three alternatives to be acceptable, and ranked them: (1) external prepayment fund; (2) external sinking fund; and (3) internal prepayment fund.

Knecht argued that the utilities should base their cost calculations on estimates of the ultimate cost of decommissioning, rather than on the estimated present cost of decommissioning. The decommissioning reserve mechanism now in place, in contrast, calculates each contribution based on the latest estimate of present costs (see Section III-D.4, below for a more detailed description). For mechanisms which involve annual payments to a reserve, Knecht's approach would lead to larger payments in early years and smaller payments in later years. Knecht argued that his approach would be more equitable.

Knecht also argued that no unfunded alternative would provide adequate assurance of fund availability, because of the uncertain financial future of the electric utility industry. He believed that any of the alternative mechanisms could be designed to provide equitable treatment of ratepayers over time. Knecht saw cost as a relatively minor issue, because all the absolute cost differences would be relatively small in comparison both to the costs of performing decommissioning and ratepayers' overall bills.

c. Witness Wood

Although Wood is an NRC employee, he testified in this proceeding on behalf of the Commission staff. His testimony summarizes the fundings of an NRC study, which he has reported in Assuring the Availability of Funds for Decommissioning Nuclear Facilities (Draft Report, October 1980, NUREG-0584 Rev. 2). (Referred to below as the NRC Decommissioning Report)

Wood testified that the NRC staff finds assurance to be the overriding criterion, for a variety of reasons. The NRC, and state ratemaking commissions, are responsible for protecting the public health and safety. The long planning horizon and uncertain future of the electric utility dictate caution. Finally, the NRC staff believes that provisions must be made for the possibility of premature decommissioning.

Emphasizing assurance, Wood recommended that either a prepayment method or a sinking fund method plus premature decommissioning insurance or surety bond be adopted. He believed that insurance would prove less expensive, if it were to become available. This belief was based primarily on the likely tax treatment; insurance would be a deductible expense, while accruals to a decommissioning fund might be treated as taxable income.

2. Respondent Utilities

The utilities' positions were substantially the same. Edison, PG&E, and SDG&E all argued that the existing unfunded depreciation reserve mechanism should be continued. They found benefits to utilities and ratepayers from unrestricted interim use of funds collected for decommissioning. They argued that use of these funds reduces the need for costly external financing.

The utilities also argued that premature decommissioning would not pose significant additional financial difficulties, because of existing or potential insurance mechanisms. They urged continued review of the possibility of premature decommissioning insurance.

3. California Energy Commission

The CEC emphasized the overriding need for adequate assurance. The CEC recommended the adoption of an externally funded sinking fund, in conjunction with a requirement that operating utilities purchase insurance to cover premature and "excess" (i.e., greater than forecast) decommissioning costs. The CEC recognized that neither type of insurance is presently available, but concurred in statements by witness Wood and Edison witness Hughes that if the CPUC ordered California utilities to purchase such insurance, the industry would provide it. The CEC

argued that its proposed scheme would provide maximum assurance while preserving the CEC's equity goal that all decommissioning expenses be collected during the operating life of the plant.

4. Redwood Alliance

The Redwood Alliance supported a hierarchy of the four evaluative criteria, with assurance being the most important, followed by equity, flexibility, and finally cost. The Redwood Alliance recommended that an external fund be established, and that a portion of the fund be invested in alternative energy and conservation projects. Premature decommissioning insurance would be required.

The Redwood Alliance proposed an allocation of the decommissioning costs of plants which shut down before the end of their nominal operating lives, and for which no premature decommissioning insurance had been obtained. Ratepayers would bear the proportion represented by the ratio of actual and nominal operating life of the plant; shareholders would pay the rest. As an example, Redwood Alliance proposed that ratepayers pay only 13/30 of the cost of decommissioning PG&E's Humboldt Bay Nuclear Plant.

III. Discussion

A. Criteria for Evaluating Alternatives

The Commission applied the following criteria when selecting the most appropriate method of financing nuclear facility decommissioning costs. The relative weight given to each criterion corresponds to the order in which they are listed.

1. Assurance

"Assurance" is simply the degree of certainity that the operating utility will have sufficient funds available to pay the costs of decommissioning a nuclear power plant when the plant's operating life ends. OII 86 can be compared with shopping for an insurance policy. The Commission must consider uncertainties in projections of the plant's operating life, the cost to decommission, and the financial status of the utility or any segregated decommissioning fund at the time plant life ends.

In comparing alternative funding proposals, the Commission has looked beyond the most likely scenario, which is that plants operate for at least their nominal life (typically 30 years), and that the operating utility is financially healthy at the time decommissioning is necessary. We also considered the possibility that plant lives may be shorter than planned, that decommissioning costs may be higher than anticipated, or that the operating utility may be suffering financial hardships when decommissioning becomes necessary.

Unfortunately, the limited history of nuclear power precludes any firm assignment of probabilities to different possible futures. There is therefore no definitive way to quantify the assurance to be provided by different financing mechanisms. Our comparisons must be relative.

By looking at analyses submitted by parties to this phase of OII 86, the Commission can make some comparisons of fund sufficiency under different circumstances. All mechanisms are calculated by their proponents to cover the nominal cost of decomissioning at the time it is projected to occur. By looking at projected fund balances during the nominal operating life of the plant, it is possible to compare the funds each mechanism would provide if shortened plant life let to "premature decommissioning." The relative assurance provided by internally and externally funded mechanisms can be evaluated by comparing the likelihoods of financial hardship of utilities and trust funds.

2. Cost

"Cost" represents the cost which operation of the financing mechanism adds to the total cost of decommissioning. Evidence in OII 86 indicates that none of the alternative financing mechanisms would add as much as one percent to ratepayers' total electric utility bills. Accordingly, we do not treat cost as an overriding concern.

Still, the Commission's goal is to maintain the lowest reasonable rates. We will therefore consider below the costs of alternative mechanisms, to determine the cost to ratepayers for varying levels of assurance, equity and flexibility. As is discussed below, there was considerable disagreement among witnesses concerning the absolute and relative costs of alternative mechanisms.

In comparing alternative mechanisms, we note that the timing of collections and expenditures varies. We must therefore establish some standard basis for comparing activities over time. In other proceedings, we have assessed the "present value" of alternatives, as a basis for our selection among competing activities.

Considerable time was spent in this phase of OII 86 in arguments over appropriate "discount rates" which the Commission would choose to convert future dollar values into present value. In particular, staff witness Knecht and Edison witness Adams conducted a debate over discount rates which fills Exhibits 4, 6, and 18 through 30.

We are not prepared to formalize a discount rate methodology in this opinion. Instead, we have considered all of the analyses presented in judging the range of relative and absolute costs which financing mechanisms may impose on ratepayers.

3. Flexibility

"Flexibility" represents the ability to adjust the method in response to changes relevant to decommissioning. These include the projected technical requirements and timing of decommissioning, inflation and cost escalation, and tax treatment. They also include the ability to make the best interim use of funds collected to finance eventual decommissioning expenses.

In view of the many uncertainties described below in Sections III-B and III-C, we deem it very important that the adopted financing mechanism be adaptable. We will reevaluate the annual assessment for decommissioning in each operating utility's general rate case. At that time, operating experience and any changes in cost-related factors would be reviewed when setting the assessment for the next two years.

4. Equity

This criterion evaluates the distribution of the benefits and burdens of a nuclear plant from its first operation to the end of decommissioning. A perfectly equitable mechanism would charge ratepayers at any time in relation to the benefits they were then receiving, the costs they impose on the system, and any insurance premium (implicit or explicit) to protect them from risks of plant operation. This goal recognizes that the population of "ratepayers" may change considerably over 40 years. Ratepayers in 1985 should not subsidize those in 2025, nor vice versa.

b. Assumptions, Projections, and Uncontrollable Factors

"Flexibility" is one of the primary criteria in this proceeding because the mechanism defined today must be responsive to technical, economic, legal, and political conditions over at least the next 30 years. Before analyzing the various alternatives for financing decommissioning costs, we will address certain issues which influence our choice. Should our assumptions about these factors change, future adjustments may be necessary in the annual contribution for decommissioning, and perhaps in the financing mechanism itself.

1. Absence of a Federal Decommissioning Policy

The federal Nuclear Regulatory Commission has the power to designate one or more approved methods and procedures for decommissioning nuclear power plants. Unfortunately for our planning process, no such designation has been made and none appears imminent. Estimated costs of the three most discussed methods vary over a broad range.

a. Immediate Dismantlement and Decontamination

The first decommissioning option is immediate dismantlement and decontamination. After the plant is shut down, the facility would be disassembled and the pieces shipped to appropriate reuse and radioactive waste disposal facilities. This option would require the complete decontamination of the nuclear

facility site so that residual levels of radioactivity would be sufficiently low for the NRC to release the facility for unrestricted use. This is the only decommissioning option that leads to the prompt release of the site for unrestricted use.

There are several arguments both for and against immediate dismantlement. The advantages of immediate dismantlement and decontamination include the rapid release of the site for another power plant or other uses. The uncertainty regarding the actual decommissioning expense would be reduced, since these costs would be incurred immediately rather than postponed. Also, prompt decommissioning ensures removal of a potential hazard. The disadvantages include higher occupational exposure to radioactivity during the dismantlement process and the potentially higher present-value cost of immediate over deferred dismantlement. For example, dismantlement of the 22 megawatt (MW) Elk River Reactor in Minnesota took three years (ending in 1974) and cost $6.15 million.

Although there is no formal federal policy, witness Wood stated that the NRC staff favors decommissioning by dismantlement and removal. Commission staff witness Coughlan assumed that this alternative ultimately would be selected, and presented in Exhibit 11 a summary of utility estimates of decommissioning costs. These estimates range from $48.7 million to $128.5 million, for fifteen commercial reactors of 436 MW or more.

b. Safe Storage

Under this option, the nuclear facility would be closed down, placed in storage, and maintained with some continuing care to keep the safety risk during storage within acceptable bounds. At some time in the future the facility would be dismantled and decontaminated. The storage period may last up to about 100 years. Beyond 100 years the integrity of the concrete structure would begin to be in doubt and most of the remaining radioactive materials would be very long-lived.

There are three types of safe storage: custodial safe storage, passive safe storage and hardened safe storage. They differ in the extent of continuing care necessary for the facility after preparations for safe storage are completed.

Custodial safe storage, or layaway, requires minimal initial decontamination. The active protection system (the ventilation and air filtration system) is maintained in operation during the continuing care period. Radiation monitoring is continuous to provide for the safety of on-site personnel. Security personnel at the site guard against unauthorized entry. At the end of the continuing care period, the nuclear facility is dismantled and fully decontaminated.

Passive safe storage, also called mothballing, relies on a more thorough immediate decontamination effort to permit shutdown of the active protection system. Off-site security personnel such

as those of a private security agency would monitor the alarm systems at the plant. Passive safe storage requires periodic inspection and repairs to maintain the structure in a stable condition.

Hardened safe storage is also known as temporary entombment. It requires the construction of physical barriers around areas with high radioactivity. The use of concrete and other materials to seal off access to the facility is intended to eliminate the potential for accidental intrusion and to make a deliberate break-in difficult.

Passive safe storage has been the most commonly used safe storage choice. Power reactors that have been decommissioned using passive safe storage are the Carolina-Virginia Tube Reactor, South Carolina; Pathfinder, South Dakota; Peach Bottom 1, Pennsylvania; and Vallecitos Boiling Water Reactor, California. Custodial safe storage is reported to have been used at the Hanford Production Reactors at Richland, Washington.

The chief advantage of safe storage is that during the continuing care period the radioactive isotopes with short half-lives will largely cease to be a problem. On the other hand, further delays in the actual dismantlement and decontamination add to the uncertainties in the ultimate costs of decommissioning.

Additional expenses are also created by the costs of site maintenance and surveillance, and by delaying the time when the site becomes available for alternative uses.

c. Entombment

This option entails encasing some or all of the facility in a strong long-lived material such as concrete, until radioactivity decays to an acceptable level. The short half-life of the entombed materials and the limited lifetime of concrete structures suggest that 100 years might be a reasonable upper limit for the period of entombment.

There are three government-owned entombed reactors, all former nuclear power demonstration plants: Hallam, Nebraska; the Piqua Nuclear Power Facility, Ohio; and the Boiling Water Nuclear Superheater Power Station in Ricon, Puerto Rico. The entombment preparations for the Hallam and Piqua reactors took approximately three years to complete. The entrances of all three reactors have been welded shut and all now have concrete covers to secure the radioactive equipment.

2. Reactor Operating Life

Because no large commercial reactor has yet reached the end of its normal operating life, there is no historical basis for estimating the commercial life of nuclear power plants. Their design lives are typically 40 years, but witnesses in this proceed-

ing noted that actual lives could be much shorter or longer than this nominal figure.

Uncertainty of this magnitude compounds the difficulty in estimating the annual contribution to the adopted financing mechanism. First, the size of any annual payment would obviously vary with the number of years available to collect the target sum. Second, any net interest or earnings on the balance in the decommissioning account would make a larger contribution if more years were to elapse before decommissioning.

For the purpose of this discussion, we will assume commercial operating lives of 30 years. In the second phase of OII 86, the actual service life assumed for each plant for depreciation purposes will be used.

3. Inflation and Cost Escalation

Estimates of decommissioning costs have been expressed in current dollars, even though the expenses will occur 30 to 40 years in the future. At this time we cannot establish the inflation or the escalation rates for costs associated with decommissioning, such as labor, construction, and waste disposal. Respondent utilities should submit more detailed estimates in the filings ordered by today's decision. Since we intend to review these cost estimates in rate cases, there will be ample opportunity to adjust any forecast costs.

Most witnesses performed "sensitivity analyses" of their assumptions about these factors. In general, all witnesses concluded that their relative ranking of alternatives remained the same throughout the full "reasonable" range of variation. We accept their conclusions that the inflation and escalation assumptions will affect the size of annual contributions to decommissioning accounts, but not the choice of a financing alternative.

C. Income Tax Effects

Current Internal Revenue Service (IRS) policy treats decommissioning expenses as normal business expenses which are deducted from a utility's income in the year the expenses are incurred. If funds are collected in advance, they are taxed as income in the year collected.

This difference in timing would raise expenses during plant operation, and then produce a "windfall" tax write-off at the time of decommissioning. Tax considerations complicate the Commission's effort to spread equitably over time the costs of creating a funded decommissioning reserve.

We therefore will direct the utilities to make all reasonable efforts to secure tax-exempt status for their funds. While the issue is pending, we will direct the utilities to design their funds in anticipation that tax-exempt treatment will ultimately be obtained.

If it eventually becomes clear that tax-exempt status is unavailable, we would direct the utilities to collect decommissioning funds on a "full cost recovery" basis, as opposed to "partial cost recovery." These alternative treatments are explained below.

1. Prospects for a Tax-Exempt Decommissioning Fund

Witness Wood reports that the IRS has indicated that it may be possible to structure a fund such that funds collected to finance decommissioning would not be recognized as taxable income. He describes four IRS conditions in his testimony and cross-examination, which refer to the NRC Decommissioning Report he authored. The fundamental requirement is that the utility "spend" the money in the same year it is accrued by committing it irretrievably to use for decommissioning.

As a first condition, the IRS would require that funds collected from ratepayers for decommissioning be immediately segregated from the utility's assets and deposited in a blind trust. This requirement would ensure that the utility would not have even short-term use of the funds.

Second, the blind trust funds could not be invested in assets of the operating utility. Third, the fund would be administered by parties not normally involved in the operations of the utility. Fourth, if the fund ultimately proved to be larger than the amount needed for decommissioning, any surplus would be returned to ratepayers, not to the utility.

Wood testified that these guidelines were developed through informal discussions with IRS staff members. However, he stated that he has become "less sanguine" about the possibility that a utility could actually structure a fund which would satisfy the IRS (Tr. 778). He cited requests by several non-California utilities for IRS letter rulings on proposed trust funds; all were withdrawn after preliminary IRS indications that the proposed mechanisms would not qualify for nonrecognition.

Wood had no formal documentation from the IRS or the applicant utilities concerning the requests. He emphasized that no formal ruling has ever been made on the issue. Accordingly, we have no assurance that tax-exempt or non-recognized status is possible without federal legislation.2/ Legislation to this effect (HR 3498) was introduced in the last session of Congress, but was not enacted.3/

2/ The lack of IRS rulings on proposed tax-exempt trust also complicates the conservation programs of California utilities. As of November 1982, Edison had received no response from the IRS to the utility's attempt to establish a tax-exempt "ratepayer trust" to finance its Greater Eastern Desert Area Zero Interest Program for financing residential weatherization activities. In D.82-11-086 (Nov. 17, 1982 in A.61066 and A.61067), the Commission found itself constrained to reject Edison's proposal to establish a ratepayer trust for the utility's system-wide Residential Conservation Financing Program.

3/ HR 3498 (Gibbons) would have made payments to nuclear power plant decommissioning or spent fuel processing financing mechanism tax-deductible expenses in the year collected. No hearings were held concerning HR 3498, and the bill never left the House Ways and Means Committee. No successor bill has yet been introduced in the 98th Congress.

The practical effect of an arrangement meeting the IRS guidelines, according to Wood, would be to place the utility in the role of collecting funds for another entity, the blind trust. Under these circumstances, the tax status of the trust should determine whether or not the income to the trust would be taxable.

Another route to tax-exempt status for decommissioning funds might therefore be to establish a state-administered trust, which should be exempt from federal taxation. Witness Wood referred to this possibility under direct and cross-examination, but the suggestion was not developed beyond the most general level.

We will direct the utilities to design their decommissioning financing mechanisms in anticipation that tax-exempt treatment ultimately will be secured. In filing their proposed mechanisms, however, we will direct the utilities to provide their best analyses of the likelihood of such treatment. These analyses should include assessment of utility or Commission actions which would increase the likelihood of such treatment;

these should include possible efforts to secure federal or state legislation.4/

2. Alternative Treatments of a Taxable Decommissioning Fund

As described in the preceding section, we prefer to create decommissioning funds which would not be subject to the potential inequities caused by timing of income tax effects. However, we may be unable to avoid these tax effects, and must therefore consider alternative treatments of a taxable decommissioning fund.

At present federal corporate income tax rates (46%), or composite federal and state rates of approximately 50%, roughly two dollars must be collected for every dollar actually set aside for decommissioning. At the time of decommissioning, the actual expenses will be deducted from income; at present rates, therefore, tax deductions would cover nearly half the decommissioning expenses at that time. On this basis, we have considered two general

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4/ In 1979, the California legislature enacted SB 1183 (Garamendi), in response to the Three Mile Island accident. The bill required the State Office of Emergency Services to make site-specific investigations of consequences of possible nuclear power plant accidents, and to revise its Nuclear Power Plant Emergency Response Plan. This activity was to be financed by operating utilities through payments to a newly-created Nuclear Planning Assessment Special Account. The PUC was directed to devise the assessment method, and to allow regulated utilities to recover their share in rates. See Cal. Gov't. Code Section 8610.5. The experience with SB 1183 may provide useful guidance to this investigation.

methods of treating income tax, which can be applied to all financing methods in which money is collected during a plant's operating life.

The "full cost recovery" method is designed to ensure that the full estimated cost of decommissioning would be available at the time of decommissioning, without assuming any tax benefits in the years the costs are incurred. This method is analogous to the "flow through" treatment of other utility taxes and tax credits. This method would collect from ratepayers during plant life roughly two dollars for every one dollar to be spent eventually on decommissioning. If the contributions have been calculated correctly, the tax deduction for decommissioning expenses would be available for refund to ratepayers at that time.

The "partial cost recovery basis" describes a method where the provision for decommissioning is accrued but no allowance is made at the time for taxation of this income. If the income earmarked for decommissioning is taxable, this method will provide only about half of the amount ultimately necessary to decommission. The balance is assumed to be available from tax deductions on the decommissioning expenses in the years they occur. This method, which is analogous to "normalization" of taxes and tax credits, matches ratepayer contributions to ratepayer benefits more equitably. However, it may provide less assurance that the total funds for decommissioning will be available when needed.

Proponents of full cost recovery accept its inequitable impacts in exchange for what they perceive to be higher levels of assurance. They argue that the Commission cannot assume, for purposes of assuring adequate funding for decommissioning, that a utility will have taxable income in the decommissioning years. If not, they argue, there would be no tax-based cash flow with which to pay for decommissioning.

In the event that tax-exempt status cannot be secured for funds collected for decommissioning, we intend to adopt the full cost recovery basis for financing decommissioning. This basis would impose greater costs on ratepayers during the period of power plant operation, but other factors outweigh the small increase in total rates required to finance full cost recovery.

The primary consideration justifying the higher interim costs is the uncertainty inherent in projecting the eventual cost and timing of decommissioning. Since these risks are highest in the initial years of plant operation, we find it fair to impose higher relative burdens on ratepayers in those years. This basis will be considered anew if the Commission if forced to reconsider the taxability of decommissioning funds.

D. Evaluation of Financing Alternatives

We evaluated six general types of funding mechanisms in this phase of the proceeding, as well as a limited number of variations within some of the types. The order instituting this investigation specifically ordered consideration of five: prepayment; sinking fund; depreciation reserve; surety bond; and premature decommissioning insurance. We also evaluated the option of making no specific financial preparations for decommissioning, and instead treating decommissioning costs as normal expenses in the years in which they are incurred.

1. Expensing

Under this option, no advance provision would be made for decommissioning. The costs associated with decommissioning would be considered normal utility operating expenses and collected from ratepayers in the year incurred. Adequate funding would be guaranteed only by timely regulatory approval of decommissioning expenses and by ratepayers' ability to absorb the additional costs.

All witnesses rejected the expensing alternative as risky and inequitable. We join in that condemnation. By its operation, ratepayers at the time of decomissioning would unfairly bear the total costs. Those customers who benefited from 30 years of nuclear power plant operation would bear no costs.

2. Surety Bond

This "alternative" would actually be a supplement to the principal financing alternatives. The operating utility would purchase a bond from a surety company, which would agree to pay the face value of the bond if some designated contingency arose. Contract contingencies might include premature decommissioning, decommissioning costs exceeding the funds available for decommissioning, or utility default.

No surety company now underwrites decommissioning costs, so the alternative does not presently exist. In general, the value of the additional assurance provided by a surety bond would vary across alternatives, and over time for each alternative. For instance, the degree of supplemental assurance to a sinking fund approach would be greatest in the early years of plant operation, when the balance would be low compared with estimated costs of decommissioning. In later years, the rising balance would leave less of a potential gap. For a prepayment alternative, in contrast, the potential funding gap presumably would be low in all years of operation.

No estimate appears on the record of what surety bonds for decommissioning would cost, if they were to become available. Accordingly, we cannot make any comparison of the potential costs and benefits of this supplemental assurance.

We will direct the respondent utilities and staff to continue to investigate the potential for surety bonds, including evaluations of their benefits and costs. Updated information should be presented in each biennial review of each utility's funding mechanism.

3. Premature Decommissioning Insurance

Premature decommissioning insurance would also operate as an assurance-increasing supplement to a principal financing method. Like surety bonds, however, this alternative is not presently available. Unlike surety bonds, however, some evidence was presented which addressed the potential benefits and costs of premature decommissioning insurance. The insurance should cover two situations: where decommissioning takes place before the end of expected plant life and the accumulated decommissioning fund is, therefore, insufficient; or where a shortfall results because actual costs of decommissioning exceed estimated costs.

There was very little discussion on the record of the potential cost of premature decommissioning insurance. Edison presented one estimate, that:

> "an annual premium of $250,000 should be adequate to provide the necessary assurance for up to $100 million in premature decommissioning costs. This estimate...is based upon a review of existing brokers, and underwriting estimates provided by the insurance industry." (Exhibit 4, p. IV-3)

We note that this would amount to a premium of 0.25% per year, to cover a potentially very large exposure to risk. According to Edison's calculations, this insurance would add roughly one-tenth to the cost of a sinking fund mechanism.

PG&E, in Exhibit 3, speculated that the annual premium for premature decommissioning assurance would be roughly 1% of estimated decommissioning costs. This estimate was based on a reading of the NRC Decommissioning Report referred to above, and on "various insurance studies currently underway." (Exhibit 3, at I-16).

We wish to clarify that premature decommissioning insurance should not be confused with property insurance related to an accident. Premature decommissioning insurance should provide funds for decommissioning at any time during reactor operation. The expected costs of decommissioning should not include the unexpected costs of an accident which are properly covered by property insurance.

We encourage the respondents to pursue vigorously premature decommissioning insurance within their own industry and with the insurance carriers. We note that the NRC is examining this alternative. Updated evaluations of the potential availability, benefits, and costs of premature decommissioning insurance should be presented in each biennial review.

4. Internally Managed Unfunded Reserve

a. Depreciation Reserve

The straight-line remaining life method now in use is an example of an internally unfunded reserve. An account is established on the utility's books to cover the estimated present costs of decommissioning. Each year the ratepayers make a payment to the account. First, the estimate of decommissioning cost is updated. Second, the balance already in the account is subtracted, to arrive at the estimate of funds which must still be paid into the account. That outstanding balance is divided by the number of estimated remaining years of plant operation, to arrive at the year's payment.

At present, California utilities collect decommissioning funds on a full cost recovery basis, which requires roughly twice the annual payment as would partial cost recovery. No specific fund of money is set aside to pay for the cost of decommissioning. Until the funds are needed, they are available for general corporate use by the utility.

As compensation to the ratepayers, the utility rate base is reduced in each period by the amount of the accumulated reserve, thus lowering the revenue requirements of the utility. The ratepayers therefore save the costs of capital associated with a rate base amount equivalent to the annual contribution, plus the accumulated contribution from prior years. When bills for

decommissioning come due, the utility will raise the money through normal financing.

An unfunded depreciation reserve method was recently adopted for Edison's accrual of funds for the ultimate disposal cost of spent nuclear fuel. In D.82-12-055 (in A.61138, Edison's test year 1983 general rate case), the Commission ordered Edison to collect funds on a "net of tax" (partial cost) basis, using a straight-line remaining life methodology and the estimated present cost of disposal.5/

The straight-line remaining life method of decommissioning appears to be less expensive than other alternatives. It is the method currently in effect and is preferred by staff witness Coughlan and the respondents. The prime feature which distinguishes this method from the alternatives reviewed is the benefit alleged from the internal use of generated funds.

Respondents and Coughlan claim that several factors make the straight-line remaining life method of financing future nuclear decommissioning costs particularly attractive. First, respondents claim that any required financing for decommissioning costs will not seriously affect the utility. The increase in rate base as the

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5/ Seven days after this Commission issued D.82-12-055, the Congress passed the Nuclear Waste Policy Act of 1982, Public Law No. 97-425 (HR 3809), establishing a new federal scheme for disposal of hign level radioactive waste and spent fuel. The Commission's newly-adopted financing mechanism will be revised to allow utilities to recover payments made under waste disposal contracts to be signed with the Department of Energy.

reserve (and its accompanying rate base offset) is drawn down will increase cash flows which will offset, at least in part, the expenses of decommissioning. The result would be a negligible effect on interest coverage ratios.

Second, the increased cash flow from the ratepayers' payments to the reserve improves internal cash generation. This, in turn, supports the utility's bond rating and so ultimately lowers prospective issue costs. Any financing in decommissioning years would not create a greater burden on the utility than the sum of the annual financings which will have been avoided by use of revenues paid into the reserve during the years of plant operations.

Third, respondents argue that decommissioning costs would not place a significant burden on the utility's ability to obtain external funds since they represent such a small amount relative to total capital expenditures. For example, in 1981, Edison raised over $1 billion in the external capital markets. Accepting NRC projections that decommissioning of a large commercial reactor would cost $50 million in today's dollars and further considering that funds for decommissioning would be raised over a period of several years, the annual requirements would have a minute impact associated with the external financing. The result would be a negligible effect on interest coverage ratios.

The CEC, staff witnesses Knecht and Wood, and the Redwood Alliance question the degree of assurance provided by the straight-line remaining life method. They emphasize that the financial health of a utility facing decommissioning 30 or 40 years in the future cannot be guaranteed so that the assurance question cannot be disposed of simply by assuming that the utility will be financially healthy or that decommissioning expenses will place an insignificant burden on a utility's ability to raise capital. They argue that external funds provide greater assurance since investments can be diversified, rather than depending on the financial well-being of one company. The only jeopardy a well-managed external fund would face is a complete collapse of the economy, a situation no funding mechanism could mitigate.

Knecht also contends that the straight-line remaining life method, as presently structured, offends equitable sensitivities. The inequity arises from rate impacts during decommissioning, which is expected to take place over the decade after the plant is retired from service. During this time the rate base deduction would be reduced annually, as decommissioning occurs. The full rate base deduction will not disappear until decommissioning is complete. The result is that during the ten years of decommissioning, future ratepayers will benefit from the remaining rate base deduction through a lower revenue requirement. The effect is to

give future ratepayers the unearned benefit of the rate base deductions.

b. Internal Sinking Fund

An alternative internally-funded mechanism is the so-called "internal sinking fund." This mechanism would not actually create a "fund" in the sense meant in the remainder of this decision. Rather, accruals for decommissioning would be assigned to a special account on the utility's books. The internal sinking fund differs from the straight-line remaining life mechanism in the way the utility compensates ratepayers for its use of the decommissioning funds in the years prior to decommissioning.

As developed by PG&E in Exhibit 3, the internal sinking fund accrues its balance from two sources. First, the ratepayers pay an annual amount based on the projected costs of decommissioning (PG&E uses the estimated present cost of decommissioning). Second, the utility adds to the account an interest payment, calculated at the utility's overall rate of return. Because the utility's contribution accrues to the account, the ratepayers' earn what amounts to compound interest; this contrasts with the "simple interest" provided by the depreciation reserve method.

PG&E calculates that the internal sinking fund would cost roughly 75% as much as the straight-line remaining life depreciation reserve, and roughly 60% as much as an external sinking fund.

A portion of the price advantage is gained because of the compounding of the utility's rate-of-return based interest payments, compared with the simple interest provided by the depreciation reserve's rate base offsets.

In PG&E's testimony, the price advantage of internal over external sinking funds also derives from the return assumed for the two alternatives. The internal fund would earn at the utility's rate of return, assumed to be 15%. The external fund is assumed to earn a tax-free 10% return. In Exhibit 3A, PG&E estimated that the external fund would be less expensive than the internal fund if the former earned a 14.5% return.

As developed by PG&E, the internal sinking fund contains many of the equity problems inherent in the depreciation reserve. First, the present cost based recovery would shift the bulk of nominal dollar payments to later years. This skewing accounts for much of the cost advantage PG&E ascribes to the internal sinking fund.

Second, PG&E's calculated method depends on significant utility interest payments during the years of decommissioning. If the fund were taxable, there would be a large negative revenue requirement in the decommissioning years. This benefits ratepayers in the years following plant life.

These faults could be addressed by using ultimate cost based recovery, and by normalizing the tax treatment. However, much of the present cost price advantage would then be lost.

5. Prepayment

"Prepayment" means the setting aside of a principal sum when a power plant begins operation, calculated so that the principal plus accumulated interest should cover the costs of decommissioning at the end of the plant's nominal operating life. There are a variety of methods by which the prepayment sum could be collected and accounted for.

Prepayment ensures the highest level of funds available for decommissioning during the nominal operating life of a plant, and so would provide the greatest assurance that adequate funds would be available in the event of premature decommissioning. Most other alternatives entail annual collection of relatively small sums, so that the fund balance initially would be small. Fund levels would be adequate only after the full nominal life of a plant. However, use of a surety bond or premature decommissioning insurance would solve this problem, if these mechanisms become available.

We analyzed two methods of prepayment. Under the first option, the utility would "prepay" the estimated cost of decommissioning into a segregated fund. The utility or an outside trustee

would then manage the investment of the funds until the cash is actually needed. The total costs paid by customers would include the costs of capital associated with the lump sum prepayment, such as interest on debt or return on equity.

Recovery of the prepayment could occur in two ways. First, the utility could treat the amount plus cost of capital, as an operating expense in the year borrowed. Ratepayers would meet this revenue requirement in the year of prepayment. Expensed prepayment therefore has one of the costliest present values of any of the alternatives we considered. All ratepayer expenditures are made in the first year of plant operation, and there is no time-based "discounting" of these expenses. Edison, for instance, calculated that expensed prepayment could cost roughly four times as much (present value) as a sinking fund. The method also is least equitable in that initial prepayment is made by ratepayers who are receiving only a fraction of the benefit from the facility; ratepayers in future years would pay nothing.

Alternatively, the utility could "capitalize" the prepayment sum. The investment plus a return would be recovered on a straight-line depreciation basis with return on the unamortized amount, just as if the fund were invested in utility plant. While this alternative is one of the more expensive under consideration, it would distribute decommissioning costs equitably among ratepayers receiving benefits from the plant's use.

Staff witness Knecht favored the capitalized prepayment alternatives. Although the total nominal cost of the prepayment mechanism increases to the extent of ratepayer payments of the utility's cost of capital, the present value cost falls under Knecht's assumptions of high discount rates. Knecht estimated that a capitalized prepayment mechanism would cost roughly 1.2 times as much as a taxable sinking fund, and 2.4 times as much as a tax-exempt sinking fund. He argued that the greater assurance and equity outweighed the higher costs, and so recommended the capitalized prepayment mechanism.

The second method of prepayment analyzed would have the ratepayers pay a one-time surcharge with a future value equal to the estimated decommissioning cost. The initial amount would then come directly from rates, without requiring the utility to secure external financing. This alternative would produce the same inequities as the expensed prepayment.

Staff witness Knecht and the Redwood Alliance favor an external prepayment mechanism. They argue that extra assurance is worth the cost.

6. External Sinking Fund Reserve

The external sinking fund reserve alternative contemplates establishment of a separate fund dedicated to use for decommissioning expenses. The fund would not initially be capitalized, but would accumulate a reserve over the life of the

nuclear unit. The series of annual contributions (annuity) by ratepayers would be computed so that the sum of principal plus accumulated earnings would equal the cost of decommissioning at the end of the nominal life of the plant. The annual contribution would change along with the estimated cost to decommission. As a result, payments from customers for a particular nuclear facility would be expected to vary.

Unlike the internally-funded alternative, the external sinking fund balance would be invested in a segregated fund. These funds would not be made available for general corporate purposes, as is the case with the depreciation reserve approach now in use. The utility thus would lose the opportunity to use decommissioning funds to offset normal financing requirements. Instead, the utility would have to use common stock and preferred stock, debt, or internally generated funds. These have a capital cost of service to be recovered from the customer.

Witnesses calculated a range of costs for the sinking fund alternatives, varying with assumptions about discount rates, earnings and tax-treatments. If the cost of the existing depreciation reserve mechanism is assigned the value "1", then witnesses calculated the cost of an external sinking fund to be 0.22

(Knecht), 0.76 (PG&E, for a "modified" sinking fund), 1.64 (SDG&E), 2.04 (Coughlan), and 2.91 (Edison, for a "modified sinking fund).6/

IV. The Adopted Mechanism

The first phase of this proceeding has allowed the Commission to compare a wide range of alternative decommissioning financing mechanisms. Our goal has been to select the alternative which best meets the four criteria we announced at the outset of OII 86: assurance; cost; flexibility; and equity. We will therefore discuss first our considerations under these four criteria.

A. The Four Criteria

1. Assurance

The Commission stated at the outset of OII 86 that assurance would be our most important criterion when selecting a decommissioning finance mechanism. However, this does not mean that we will single-mindedly select the alternative which provides the greatest assurance. The other three criteria will temper our selection.

At the outset, we note that the assurance promised by the various alternatives can be sorted into three levels. One of the decisions facing the Commission is a selection among these levels.

6/ Ratios calculated by Coughlan in Exhibit 11, Table 3-A, except for Knecht ratio, calculated from Exhibit 18, Schedule 7. Note that Knecht bases the cost of the depreciation reserve on his proposed "ultimate cost basis" for calculating payments to the depreciation reserve.

The highest level of assurance is provided if the total nominal cost of decommissioning is available at all times during the plant's operating life, independent of any assumptions about the viability of the utility at the time of decommissioning. This level can be reached in two ways. First, prepayment of the entire projected costs into an external fund would create a balance nominally sufficient to cover all costs. Second, fully functioning surety bond or premature decommissioning insurance mechanisms would remove concern for the utility's viability (although the viability of the insurer or bondsman then would become a potential concern).

A somewhat lower level of assurance is provided by externally funded sinking funds, operating without supplemental insurance or bonds. If invested in low risk securities, they provide a "safe" fund balance, which grows over time to reach the nominal cost of decommissioning. At the end of the plant's nominal operating life the funds are complete; in all earlier years, the utility and its ratepayers would be called upon to make up any insufficiency between the cost of premature decommissioning and the fund balance. The financial status of the utility therefore remains a factor during nominal plant operating life, which decreases in importance over time as the fund approaches the total cost of decommissioning. Different payment schedules provide different levels of assurance during the years of plant operation, depending on how fast the fund grows.

The lowest level of assurance is provided by the unfunded alternatives. These provide only an accounting balance in the years of plant operation. They rely completely on the ability and willingness of the utility to honor its accounting debt by providing funds, from internal or external sources, at the time a plant is decommissioned.

In the unlikely event that a utility were bankrupt, it would be unlikely to provide decommissioning funds. If the utility were solvent but in financial distress, it would have an incentive to delay decommissioning, or to seek special relief from the Commission. Because unfunded mechanisms require no utility contribution at the time of decommissioning, they remove that incentive.

As a starting point, we note that in recent years utilities' financial capabilities have been strained by large capital construction efforts experiencing costly delays and overruns. In California, much of this construction-based stress derives from construction expenses of four of the nuclear power plants for which we are now designing decommissioning mechanisms. Similar problems could accompany the utilities' efforts to replace these plants at the end of their operating lives. Under such circumstances, even the relatively small burden of decommissioning old plants would be unwelcome.

The operating utilities' financial status could be even more strained if the nuclear plants were to fail to operate for their full lives. Unexpected premature decommissioning, perhaps by NRC order, could remove roughly 5,000 MW_e from California's generating capacity (including Rancho Seco and Palo Verde). This could trigger a costly scramble for replacement power. There would also likely be simultaneous pressure to remove the undepreciated value of the defunct plants from rate base, which would further constrict the utilities' cash flows.

Even a planned premature decommissioning would produce difficulties. This outcome could occur if at some point the utilities decided that the plants had shorter remaining lives than is now estimated. This decision would trigger an accelerated construction program, as the utilities struggled to replace the nuclear plants plus meet any anticipated demand growth. Again, cash flows would be constrained.

Because we can assign no probability to the various futures outlined above, we cannot value precisely the additional assurance provided by funded mechanisms. However, the Commission is willing to consider some premium over the cost of unfunded alternatives.

2. Cost

One of the Commission's goals is to find the most cost-effective decommissioning mechanism. To do so with certainty, we

would have to be able to calculate accurately the cost of each mechanism. This would allow us to buy assurance at the lowest price.

Unfortunately, no such certainty is possible. Cost comparisons presented in the first phase of this proceeding have varied considerably, based on a host of economic, financial, and tax assumptions. In particular, different assumptions about discount rates and the earnings rates of alternative internal and external funds confound attempts to make simple comparisons. Some general conclusions are possible, however.

a. Returns on Fund Balances

A major source of cost differences in the mechanisms posited by various witnesses were differing assumptions concerning rates of return. Compounded over the assumed lifetimes of the mechanisms, even small differences in earnings rates have major effects on the assumed present value cost of the alternatives.

Most witnesses assumed that unfunded mechanisms would earn at the operating utility's overall rate of return. The current "depreciation reserve" mechanism provides annual rate base offsets, and so returns to ratepayers each year an amount based on the utility's rate of return. The "internal sinking fund" would accrue compound interest from the utility at the same rate.

For external funded mechanisms, most witnesses assumed either that the fund would be invested in tax-exempt securities such as municipal bonds or other securities offering low risks and returns. Witnesses therefore calculated lower net earnings than those for unfunded internal mechanisms.

The Commission believes that differences in funding mechanism costs based on differences in assumed rates of return on the mechanisms are misleading if viewed in isolation. External funds, invested in a diversified portfolio of low risk securities, are more certain to actually earn their expected return. The higher nominal return on utility assets is based at least in part on investors' perceptions that there is greater uncertainty in the utility's ability to earn its authorized rate of return.

To say that higher returns on internal funds would make such funds "cheaper" to the ratepayers would ignore the accompanying differential in risks borne by ratepayers. On a risk-adjusted basis, the costs of the two funding alternatives are similar. If this were not the case, the "cheapest" fund of all arguably would be one which was turned over to venture capitalists for speculation in high return investments.

However, the Commission's concern in OII 86 has been to secure the least cost assured return. We find it more appropriate that ratepayer contributions to a nuclear decommissioning fund

involve lower risk of earnings shortfalls, even at the cost of somewhat lower expected rates of return.

A diversified portfolio also avoids any risks unique to the utility, including those associated with investment in and operation of the nuclear plants. The internal fund, simply put, involves the investment of ratepayer funds in a single company, the utility. Generally, investment in a diversified portfolio involves lower costs and risks than investment in a single company. Greater assurance can be obtained without significant added cost merely by utilizing the diversified investment strategy of the external fund.

Finally, the external fund is likely to secure favorable tax treatment. As noted below, we believe that it will be possible to create an external funding mechanism for which both the accrual of principal (from ratepayer payments) and the earnings on fund balance will be tax exempt. This will allow such a fund to earn at rates considerably above those on taxable funding mechanisms, even with a conservative investment policy.

b. Effect of Payment Schedules: Ultimate Versus Present Cost-Based Collections

Witnesses presented a variety of payment schedules by which funds would be collected for the alternative decommissioning schedules. These produced a range of assumed present value costs. As a general principle, of course, the present value of a payment falls if it is postponed further into the future.

The present value cost of prepayment options generally is highest, because more money must be set aside for decommissioning in the first year. Capitalization or amortization of the prepayment sum reduces this impact somewhat.

The internal and external sinking funds were generally premised on one of two means for calculating payment schedules. "Ultimate cost" based recovery estimates the actual ultimate cost of decommissioning, and calculates annual payments of equal nominal amount. "Present cost" based recovery, in contrast, bases each year's collection on the cost to decommission the plant in that year; payments rise over time as the estimated cost of decommissioning rises.

Ultimate cost based recovery therefore has a higher present value cost than does present cost based recovery. Early year payments are higher for the former, and the higher later year payments of the latter are heavily discounted.

Expensing could be cheaper still. However, as noted elsewhere, we reject this alternative as inequitable.

3. Flexibility

All mechanisms can be manipulated so as to allow for revisions in annual payments. We will provide below for review and revision in the biennial general rate cases. This meets our flexibility criterion.

Prepayment is less flexible than other alternatives, however, because it involves the greatest initial commitment of funds. Projected decommissioning costs could fall, or even merely escalate more slowly than initially projected, relative to fund earnings. In that event, the decommissioning fund would become "overcollected".

4. Equity

Our equity goal is to charge ratepayers at any given time in relation to the net benefits they are then receiving. As a first estimate, this involves a comparison of the direct costs and benefits of nuclear electricity.

The costs of nuclear electricity also include an insurance premium, whether paid to an insurer or not, to recognize the risk of premature decommissioning. Because no commercial insurance is yet available, it is difficult to calculate an appropriate internal premium. The ratepayers must, in effect, self-insure.

As described above, only the expensing alternative defies structuring of an equitable mechanism. This alternative would impose all the costs of decommissioning on ratepayers in the years of decommissioning; ratepayers during the operating life of the plant would pay nothing. We reject the expensing alternative on this basis.

B. The Adopted Mechanism

We will adopt an external sinking fund mechanism, with annual ratepayer payments based on the estimated ultimate cost of decommission. We will assume a tax exempt fund.

This choice is based on a balancing of the criteria discussed above. Our concern for assurance leads us to prefer funded alternatives, which provide both greater independence from the financial status of the utility, and the greater automatic availability of funds in the event of premature decommissioning.

Based on our judgment that tax exempt status will be obtained for the external fund, we estimate that the additional cost of an external fund, compared with the so-called "internal sinking fund", will be small. The slightly lower earnings to be expected from investment of the external fund in a portfolio are acceptable representations of their greater security, compared with investment only in the utility itself.

In calculating the size of the annual ratepayer contribution to decommissioning, the utilities should use the ultimate cost of performing decommissioning, not the present cost. This ultimate cost basis will serve to levelize the nominal annuity which the ratepayers will pay; inflation over the next three decades should mean that the real cost to ratepayers of the annual payment will decline over time.

The ultimate cost basis will provide higher fund levels in the early years of plant operation, during a period when the risks and uncertainties associated with operation and decommissioning are greatest. In the absence of surety bonds or premature decommission-

ing insurance, these higher reserve levels will provide more assurance in the event of premature plant decommissioning.

We will require the utilities to acopt external management of their decommissioning reserves, using independent third-party trustees. External management will provide somewhat greater assurance that the fortunes of the utility and the reserve are independent. Professional portfolio managers should also be able to achieve somewhat higher earnings from investment of the reserve funds. Finally, based on the tentative IRS guidelines discussed above, use of an independent trustee increases the likelihood that decommissioning reserves will be treated as tax-exempt or nonrecognized as taxable income.

Respondents and staff will be directed to develop appropriate limitations on the investments available to the fund manager. At a minimum, concern for diversification of risk dictates that decommissioning funds not be invested in the operating utility, since any problems with the nuclear plant would directly affect the value of such investments. For similar reasons, parties also should propose limitations on the total percentage of the funds which can be invested in all energy utilities. We will evaluate these limitations during the next phase of OII 86.

Our adoption of an externally funded and managed reserve for the costs of decommissioning will have an impact upon the respondent utilities' revenue requirement. PG&E will be ordered to file within 60 days of the effective date of this decision, a proposed decommissioning financing mechanism for its Humboldt Bay Nuclear Plant consistent with this decision. This proposal shall include a proposed method for establishing the adopted funding mechanism and for accounting for decommissioning, as well as all necessary information supporting a request for the additional revenue requirement consistent with today's decision. A decommissioning financing mechanism for Humboldt will be adopted in OII 86; the adjustment to rates to finance the reserve will be made in PG&E's pending general rate case, A.82-12-48.

PG&E will be ordered to file a similar proposal for its Diablo Canyon Nuclear Generating Station in A.58911, the proceeding considering its application to add Diablo Canyon to rate base. The reserve and its rate treatment will be established in A.58911.

Edison and SDG&E will be ordered to file within 60 days of the effective date of this order their proposed accounting method, funding mechanism, and requests for revenue requirement consistent with today's decision, to convert their present depreciation reserve treatment of SONGS 1 decommissioning expenses to an externally funded and managed mechanism. Funding mechanisms will be adopted after further hearing in OII 86; the adjustment to rates

to finance the reserves will be made in Edison's 1984 attrition adjustment, and in SDG&E's pending general rate case.

Edison and SDG&E will be directed to propose similar mechanisms in their pending SONGS 2 rate base offset proceedings (A.82-02-40 and A.82-03-63, respectively). At the time of their rate base applications for SONGS 3, they should enclose consistent proposals. Edison and SDG&E should also use their best efforts to involve co-owners City of Anaheim and City of Riverside in their mechanism; at present, the Commission has no authority to impose such requirements on the cities.

We intend that reserves be created to cover the full cost of decommissioning the SONGS units. As the operating utility, Edison will be responsible for assuring this coverage if the cities do not assume their share of the costs. If Edison or SDG&E sell any or all of their existing ownership interests in any SONGS units, they will be responsible for assuring that the purchasers participate fully in the unit's decommissioning financing mechanism.

Finally, to the extent that they are relevant and consistent with this decision, we adopt PG&E's recommendations regarding use of standard nomenclature in addressing costs associated with decommissioning nuclear power plants owned and/or operated by California's public utilities.

Findings of Fact

1. Currently, funds for decommissioning nuclear power plants owned and operated by regulated California public utilities are accumulated on the utilities' books through the straight-line remaining life method.

2. Financing alternatives for funding the costs of decommissioning include prepayment, sinking fund, straight-line remaining life, surety bond, and premature decommissioning insurance.

3. No national policy exists designating the appropriate method and manner for decommissioning nuclear power plants.

4. The NRC staff favors decommissioning by dismantlement and removal; our analysis of the adequacy of alternatives for financing decommissioning costs assumes complete removal during the 10-year period following shutdown of a nuclear power plant.

5. The most important criterion for judging the adequacy of a financing mechanism is the assurance which the method provides that the funds collected will be available and sufficient to cover the costs of decommissioning.

6. Because there are inherent uncertainties in estimating future decommissioning costs, adaptability of a financing mechanism to technical, regulatory and economic changes is critical.

7. The decommissioning financing mechanism should be designed to ensure equitable treatment of ratepayers over time,

considering the benefits, costs, and uncertainties of nuclear power plant operation.

8. The increase in a customer's total monthly bill occasioned by adoption of the most expensive decommissioning financing alternative would be minimal.

9. The "expensing" option is not a reasonable alternative because of its extreme inequity.

10. Premature decommissioning insurance or a surety bond, if available, would provide additional assurance that funds would be available to cover decommissioning costs.

11. Unfunded financing methods, such as existing unfunded straight-line remaining life methods, provide less assurance that funds will be available for decommissioning.

12. Adequate assurance of fund availability is best provided by a funded reserve, segregated from other utility funds and dedicated specifically and solely to payment of nuclear decommissioning costs.

13. All three of the funded methods - external prepayment, external sinking fund, and internally managed, externally funded reserve - provide adequate levels of fund assurance, and also meet our criteria of flexibility and equity.

14. The equity to ratepayers over time of the costs of the decommissioning mechanism will be improved if funds collected for

decommissioning are tax-exempt or non-recognized as taxable income.

15. Informal IRS guidelines indicate that decommissioning financing mechanisms may receive tax-exempt or non-recognized tax treatment if (1) funds collected from ratepayers for decommissioning are segregated immediately from the utility's assets and deposited in a blind trust, (2) the trust funds are not invested in assets of the operating utility, (3) the trust is administered by parties not normally involved in the operations of the operating utility, and (4) provision is made that any eventual surplus would be refunded to the ratepayers, not to the utility.

16. Because no utility has yet received a favorable ruling from the IRS on a proposed decommissioning financing mechanism, it is unclear whether utilities can design a mechanism which would receive tax-exempt or non-recognized treatment from the IRS, under current law.

17. A state-operated decommissioning fund might be treated as tax-exempt.

18. It is reasonable to design decommissioning funds and to begin collections under the assumption that the reserve will be designated as tax-exempt or nonrecognized as taxable income; the adopted mechanism contains adequate flexibility to convert to full cost recovery based collection if the reserves are found to be taxable.

19. If revenues associated with decommissioning financing mechanisms are treated as taxable income, then "full cost recovery" is the most reasonable basis for accounting for such treatment.

20. External trustee management of decommissioning funds will provide reasonable assurance that funds will be invested to earn safe, reasonable returns.

21. It is reasonable to calculate annual payments to the external sinking fund based on the projected ultimate cost of decommissioning, rather than on the estimated present cost.

22. It is reasonable to prohibit investment of decommissioning funds in assets of the operating utility, and to establish other reasonable limitations on investments by the fund, as means of diversifying risk.

23. It is reasonable to require PG&E to establish a decommissioning finance mechanism for the Humboldt Bay Nuclear Plant; it is appropriate to design the mechanism in OII 86, and to establish the accompanying rate adjustment in PG&E's pending general rate proceeding.

24. It is reasonable to require PG&E to propose a decommissioning finance mechanism for the Diablo Canyon Nuclear Generating Station consistent with this decision, in its pending rate base offset proceeding.

25. It is reasonable to require Edison and SDG&E to convert their unfunded straight-line remaining life treatments of

decommissioning costs for San Onofre Nuclear Generating Station No.1 (SONGS 1) to externally funded mechanisms, and to propose such treatments for SONGS 2 and 3, consistent with this decision. It is reasonable to adopt the mechanisms in a further order in OII 86, and to make the necessary rate adjustments in SDG&E's pending rate case, and in Edison's 1984 attrition adjustment.

26. It is reasonable to involve the cities of Anaheim and Riverside, which are part owners of SONGS 2 and 3, in the development and administration of decommissioning financing mechanisms for those power plants. Although this Commission has no existing authority to order such participation, it is reasonable to direct respondents Edison and SDG&E to use their best efforts to secure such participation.

Conclusions of Law

1. The Commission should adopt a method for financing decommissioning costs which provides adequate assurance that sufficient funds will be available for decommissioning at the time they are needed.

2. The Commission should adopt a method for financing decommissioning costs which can readily be adapted to subsequent technical, regulatory, and economic changes.

3. The Commission should adopt a method for financing decommissioning costs which equitably distributes the costs of

nuclear power generation among ratepayers benefiting from such power.

4. The Commission should adopt a method for financing decommissioning costs which best meets the criteria of assurance, flexibility, and equity at the lowest possible cost.

5. The Commission should adopt an externally funded and managed reserve as the best mechanism for respondents to finance decommissioning costs.

6. The Commission should adopt a mechanism which assumes that contributions to decommissioning reserves will be tax-exempt for federal and state tax purposes, in the absence of definitive rulings to the contrary.

7. Annual payments to the reserve should be calculated based on the projected ultimate costs of decommissioning, rather than based on the estimated present cost.

8. Edison and SDG&E should be required to convert their existing straight-line remaining life treatment of decommissioning costs for SONGS 1 to externally funded and managed treatment, consistent with this decision.

9. Edison and SDG&E should be directed to use all reasonable efforts to include in the mechanisms all agencies with any ownership interests in any SONGS unit; Edison, as the operating

10. PG&E and the Commission staff should be required to design a decommissioning finance mechanism for the Humboldt Bay

Nuclear Plant, in the next phase of OII 86; the accompanying rate adjustment should be made in PG&E's pending general rate case.

11. PG&E should be required to propose a financing mechanism consistent with this decision in its pending rate base offset proceeding for its Diablo Canyon Nuclear Generating Station.

INTERIM ORDER

IT IS ORDERED that:

1. Respondents Pacific Gas and Electric Company (PG&E), Southern California Edison Company (Edison), and San Diego Gas & Electric Company (SDG&E) shall, as soon as practicable, develop procedures to fund decommissioning costs for nuclear generating units by use of externally funded and managed reserves.

2. Edison, joined by SDG&E, shall file within 60 days of the effective date of this order a proposed method for establishing an externally funded and managed reserve and a proposed method of accounting for decommissioning costs of San Onofre Nuclear Generating Station (SONGS) Unit No. 1 consistent with this decision. Edison and SDG&E shall develop information which would support requests for additional revenue requirement consistent with tax-exempt treatment of the financing mechanisms; Edison and SDG&E shall include analyses of the likelihood of securing tax-exempt treatments. Further hearing shall be held in OII 86, addressing the design and adoption of approved financing mechanisms. Edison and the Commission staff shall address the revenue impacts of the

adopted mechanism in evaluation of Edison's 1984 attrition adjustment. SDG&E and the Commission staff shall address the revenue impacts of the adopted mechanism in SDG&E's pending general rate case.

3. Edison and SDG&E shall file proposed financing mechanisms for SONGS 2, consistent with this decision, for filing in Edison's and SDG&E's pending rate base offset applications. Similar provisions shall be made for SONGS 3, if and when Edison and SDG&E apply to include that unit's cost in their rate bases.

4. Edison and SDG&E shall use their best efforts to secure the cooperation and participating of the co-owner cities of Anaheim and Riverside in proposed mechanisms for SONGS 2 and 3. The Executive Director shall serve copies of this decision on the City of Anaheim and the City of Riverside.

5. PG&E shall file, in the rate base offset proceeding for Diablo Canyon Nuclear Generating Station, a proposed method for establishing an externally funded reserve and a proposed method of accounting for decommissioning consistent with tax-exempt treatment of the financing mechanism; PG&E shall include its analysis of the likelihood of securing tax-exempt treatment.

6. PG&E shall file within 60 days of the effective date of this order a proposed method for establishing an externally funded and managed reserve and a proposed method of accounting for decommissioning costs of the Humboldt Bay Nuclear Plant consistent

with this decision. PG&E shall develop information which would support a request for additional revenue requirement consistent with tax-exempt treatment of the financing mechanism; PG&E shall include analysis of the likelihood of securing tax-exempt treatment. Further hearing shall be held in OII 86, addressing the design and adoption of an approved financing mechanism. PG&E and the Commission staff shall address the revenue impacts of the adopted mechanism in PG&E's pending general rate case.

7. Further hearings shall be held in OII 86, to address the filings ordered above and to design decommissioning finance mechanisms consistent with this decision. A prehearing conference shall be held in the Commission's Courtroom, State Building, San Francisco, beginning at 10 a.m., Thursday, August 4, 1983 before Administrative Law Judge Alderson. At that time, the ALJ shall schedule days for hearings, and shall determine common issues presented by the filings, which can be heard together.

8. Respondents shall file an original plus twelve copies of each filing ordered in this decision with the Commission's Docket Office, and shall serve copies on all parties in OII 86.

9. To the extent they are relevant and consistent with this decision, PG&E's recommendations regarding standard nomenclature concerning decommissioning nuclear power plants are adopted.

This order becomes effective 30 days from today.

Dated APR 6 1983, at San Francisco, California.

LEONARD M. GRIMES, JR.
President

VICTOR CALVO
PRISCILLA C. GREW
DONALD VIAL
Commissioners

I CERTIFY THAT THIS DECISION WAS APPROVED BY THE ABOVE COMMISSIONERS TODAY.

Joseph E. Bodovitz, Executive Director

APPENDIX A

LIST OF APPEARANCES

Respondents: John R. Bury, David N. Barry, W.E. Marx, R.K. Durant and Carol B. Henningson, Attorneys at Law, for Southern California Edison Company; Jeffrey Lee Guttero, Stephen Edwards, William Reed, and Randall W. Childress, Attorneys at Law, for San Diego Gas & Electric Company; Robert Ohlbach, Richard F. Locke, and Ivor E. Samson, Attorneys at Law, for Pacific Gas and Electric Company.

Interested Parties: Robert Thiele, for Contra Costans for a Nuclear Free Future; Dian Grueneich, and Gary Fay, Attorneys at Law, for California Energy Commission; Roger Beers, for himself; Dan Haifley, for People for a Nuclear Free Future; William L. Knecht, Attorney at Law, for California Association of Utility Shareholders; Jane Bergen, Attorney at Law, for League of Women Voters of California; Ralph C. Cavanagh, Attorney at Law, for Natural Resources Defense Council, Inc.; Michael Paparian, for the Sierra Club; David Martinez, for the Abalone Alliance of the Marina, North Beach and Pacific Heights; Linda Sloven, Attorney at Law, for Toward Utility Rate Normalization; Ronald D. Rattner, for interested PG&E stockholders; Steven Heim, for himself; Bruce Campbell, for Diablo Canyon Task Force of the Alliance for Survival of Los Angeles-Santa Monica; Eric Schroeder, Carl Zichella, and J.A. Savage, for Redwood Alliance; Dwight Cocke, for Californians for Nuclear Safeguards; Arlene Black, for American Association of University Women, California State Division; Rochelle Becker, for Mothers for Peace; Michael H. Cravotto, for himself; Chris Davidson, for himself; Samuel R. Tyson, Stanislaus Safe Energy Committee; Daniel W. Fairfax, for Ernst & Whinney; Tom Hayden, for the Campaign for Economic Democracy; Regina Ryerson, for People Against Nuclear Power; William S. Shaffran, Attorney at Law, for the City of San Diego.

Commission Staff: Richard Rosenberg, Attorney at Law, A.V. Garde, and Ronald L. Knecht.

(END OF APPENDIX A)

ALJ/JFE/ARM/WPSC

A-2
SUPERSEDES PRIOR EARLIER DRAFTS

Decision 83 04 013 APR 6 1983

ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Investigation on the Commission's own motion into present and alternative methods of financing nuclear facility decommissioning costs.	OII 86 (Filed January 21, 1981)

(See Appendix A for appearances.)

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INTERIM OPINION

I. Summary of Decision

Today's decision completes the first phase of the Commission's investigation into methods of financing the costs of decommissioning nuclear generating facilities. This investigation began with Order Instituting Investigation (OII) 86, issued January 21, 1981. OII 86 named as respondents the regulated California electric utilities which operate or are constructing nuclear facilities: Pacific Gas and Electric Company (PG&E), Southern California Edison Company (Edison), and San Diego Gas & Electric Company (SDG&E).

Today's decision outlines a new procedure by which the utilities will collect and account for the forecast eventual costs of nuclear decommissioning. In assessing the various alternatives for financing recovery of decommissioning costs, the Commission weighed four criteria:

(1) Assurance - The assurance which the method provides that funds collected will be available at the time and in the amount required.

(2) Cost - The cost that the method imposes on ratepayers.

(3) Flexibility - The method's ability to adjust to changes in the costs, technical requirements, and timing of decommissioning, inflation and cost escalation, interim use of accumulated funds, and changes in tax laws.

(4) Equity - The method's equitable treatment of ratepayers. Any funding method should collect funds only from those who benefit from the reactor, strive to levelize ratepayer contribution during the years of plant operation, and stop collection at the end of the plant's operating life.

"Assurance" is the single most important criterion for evaluating alternative financing mechanisms. We must achieve a high level of assurance that decommissioning can be accomplished promptly and efficiently, so as to minimize any potential risk to public health and safety.

"Cost" is the second most important criterion. We compared the funded mechanisms to determine which would provide an acceptable level of assurance at the lowest cost to ratepayers. Based on evidence on the record, sinking fund mechanisms which require annual payments would be less expensive than prepayment.

"Equity" proved to be a relatively easy criterion to satisfy, because it is relatively easy to structure payment schedules in ways which treat ratepayers equitably over time. Only expensing cannot meet this requirement, because it requires assignment of all decommissioning costs to ratepayers in years after a nuclear power plant has ceased to generate benefits.

"Flexibility" was also a relatively easy criterion to meet. Prepayment options proved to be the least flexible, because they would set aside the largest initial fund balance.

In the Commission's view, the mechanism which best satisfies the four criteria is an externally funded sinking fund. Under this mechanism, annual payments will be deposited into a fund which is segregated from other utility assets. Annual contributions will be set so that the principal plus accumulated earnings should cover the cost of decommissioning at the time decommissioning is expected to occur.

Today's decision requires external management of each decommissioning fund by a third-party trustee. Professional fund managers should be able to secure the highest earnings from investment of decommissioning funds for a given level of risk.

PG&E, Edison, and SDG&E are directed to implement procedures to fund decommissioning costs by use of an externally funded reserve as soon as practicable. They are ordered to file proposed accounting and procedural details within 60 days of the effective date of this decision, along with supporting information.

OII 86 remains open. A prehearing conference will be held May 2, 1983 to identify issues and schedule further hearings.

II. Introduction

A. Procedural History

On January 21, 1981 the Commission issued OII 86 to consider current and alternative methods for financing nuclear decommissioning costs to be incurred by California regulated public

utilities. The Commission instituted OII 86 in order to ensure that adequate funds will be available for decommissioning nuclear generating facilities, and to ensure that the costs of decommissioning will be distributed equitably over time among the customers who benefit from operation of the nuclear power plants. The Commission defined four criteria by which alternative financing mechanisms were to be evaluated: assurance, flexibility; equity; and cost.

Currently, the estimated costs of decommissioning are collected over the life of the facility as a negative salvage component of depreciation.1/ The accumulated reserve allows the companies to use the revenues during plant operation, thereby reducing the need for additional external financing. The accumulated reserve is subtracted from rate base, reducing revenue requirements over the life of the plant. This method accumulates a "depreciation reserve" on the utility's books, but it does not actually require the utility to set money aside. This method assumes that decommissioning costs can be paid from internal company funds at the time of decommissioning.

1/ See Section III-D.4 below, for a more detailed discussion. This accounting treatment was adopted for the San Onofre Nuclear Generating Station (SONGS) Unit No. 1 in Edison's test year 1979 rate case Decision (D.)89711, dated Dec. 12, 1978, in Application (A.)57602, and in SDG&E's test year 1979 rate case D.90405, dated June 5, 1979, in A.58067, et al. Similar treatment is in place for PG&E's Humboldt Bay Nuclear Station, but accrual has been in abeyance since 1980.

In OII 86, the Commission concluded that there is a need to consider financing alternatives to the current "depreciation reserve" method. The OII ordered consideration of at least the following alternatives:

(1) Prepayment - cash or other liquid assets set aside or deposited in an investment account prior to reactor start-up covering either total estimated decommissioning expense, or invested such that principal plus accumulated interest cover estimated cost at the estimated time of decommissioning.

(2) Sinking Fund - fund reserve accumulated over the estimated life of the plant through annual set aside such that fund plus accumulated interest cover estimated cost at estimated time of decommissioning.

(3) Depreciation Reserve - reserve accumulated over the estimated life of the plant on company accounting records although no specific funds are set aside for decommissioning.

(4) Surety Bond - bond purchased from surety company to guarantee that monies equivalent to face value of bond and estimated decommissioning cost will be paid in event the utility, financing through some other method, defaults.

(5) Premature Decommissioning Insurance - insurance or bond to cover decreasing difference between funds accumulated by some other funding method and the estimated costs of decommissioning at any point in time.

PG&E, Edison, and SDG&E were made respondents to OII 86 and were directed to submit written evaluations of current and alternative methods for financing nuclear decommissioning costs to the Commission by May 21, 1981. The California Energy Commission (CEC) was invited to participate in the proceeding and encouraged to prepare a similar evaluation.

A prehearing conference was held on March 13, 1981. During the conference, parties interested in the proceeding were identified and the issues were further refined. The presiding administrative law judge (ALJ) issued a ruling dated April 14, 1981, further clarifying the issues to be addressed in the proceeding. In addition to those specifically delineated in OII 86, the following issues were included:

(1) The estimated range within which decommissioning costs of commercial reactors can reasonably be expected to vary;

(2) The estimated range within which reactors can reasonably be expected to remain commercially useful;

(3) The expensing method of financing;

(4) The salvage value of fuel existing at the time of decommissioning;

(5) The uncertainty of cost estimates and the impact upon funding mechanisms;

(6) The potential for abandonment of facility by an insolvent or solvent utility; and

(7) The decommissioning experience to date.

In addition to requiring the utilities to report the cost to ratepayers of the various methods to finance decommissioning, the ALJ's ruling directed the respondents to analyze the sensitivity of the financing methods to the following factors: discount rates; cost inflation; earnings rate of fund or depreciation account; possible tax deferral of principal and/or interest; and shortened plant lifetime or drastic increase in decommissioning costs related to premature shutdown.

Twelve days of hearings were held between October 26, 1981 and September 8, 1982. The matter was submitted, pending receipt of concurrent briefs on October 22, 1982. briefs were filed by PG&E, Edison, SDG&E, CEC, the California Association of Utility Shareholders; and the Commission staff. Roughly 50 letters of concern were received from ratepayers during this phase of the proceeding.

B. Positions of Parties

A wide range of positions were taken on the issues by parties to this phase of OII 86. The main reason for this broad range is the great uncertainty entailed in planning for the eventual decommissioning of commercial nuclear electric power plants. Individual positions, and the decisions reached today in this opinion, are based on reasoned judgments made in light of these uncertainties.

1. Commission Staff

Three witnesses appeared on behalf of the Commission staff: Kevin Coughlan, of the Engineering Analysis Group of the Commission's Revenue Requirements Division; Ronald Knecht, of the Special Economics Projects Section of the Revenue Requirements Division; and Robert S. Wood, of the Office of State Programs of the United States Nuclear Regulatory Commission (NRC).

a. Witness Coughlan

Coughlan argued that the current depreciation reserve method should be maintained, but that the tax treatment should be changed to normalized (or "partial cost recovery", as described elsewhere in this decision), rather than flow-through (or "full cost recovery") accounting. He found that all the proposed decommissioning methods provided adequate assurance of fund availability, because the low absolute costs of decommissioning make the expenses easily manageable. After rejecting the expensing method (See Section III-D.1, below) as inequitable, Coughlan argued that the depreciation reserve is the least expensive of the remaining alternatives.

b. Witness Knecht

Knecht analyzed the financing alternatives by establishing an ordinal ranking under each of the four criteria, then merging these rankings on an equally weighted basis to prepare a

final list of preferences. Using this methodology, Knecht found three alternatives to be acceptable, and ranked them: (1) external prepayment fund; (2) external sinking fund; and (3) internal prepayment fund.

Knecht argued that the utilities should base their cost calculations on estimates of the ultimate cost of decommissioning, rather than on the estimated present cost of decommissioning. The decommissioning reserve mechanism now in place, in contrast, calculates each contribution based on the latest estimate of present costs (see Section III-D.4, below for a more detailed description). For mechanisms which involve annual payments to a reserve, Knecht's approach would lead to larger payments in early years and smaller payments in later years. Knecht argued that his approach would be more equitable.

Knecht also argued that no unfunded alternative would provide adequate assurance of fund availability, because of the uncertain financial future of the electric utility industry. He believed that any of the alternative mechanisms could be designed to provide equitable treatment of ratepayers over time. Knecht saw cost as a relatively minor issue, because all the absolute cost differences would be relatively small in comparison both to the costs of performing decommissioning and ratepayers' overall bills.

c. Witness Wood

Although Wood is an NRC employee, he testified in this proceeding on behalf of the Commission staff. His testimony summarizes the fundings of an NRC study, which he has reported in Assuring the Availability of Funds for Decommissioning Nuclear Facilities (Draft Report, October 1980, NUREG-0584 Rev. 2). (Referred to below as the NRC Decommissioning Report)

Wood testified that the NRC staff finds assurance to be the overriding criterion, for a variety of reasons. The NRC, and state ratemaking commissions, are responsible for protecting the public health and safety. The long planning horizon and uncertain future of the electric utility dictate caution. Finally, the NRC staff believes that provisions must be made for the possibility of premature decommissioning.

Emphasizing assurance, Wood recommended that either a prepayment method or a sinking fund method plus premature decommissioning insurance or surety bond be adopted. He believed that insurance would prove less expensive, if it were to become available. This belief was based primarily on the likely tax treatment; insurance would be a deductible expense, while accruals to a decommissioning fund might be treated as taxable income.

2. Respondent Utilities

The utilities' positions were substantially the same. Edison, PG&E, and SDG&E all argued that the existing unfunded depreciation reserve mechanism should be continued. They found benefits to utilities and ratepayers from unrestricted interim use of funds collected for decommissioning. They argued that use of these funds reduces the need for costly external financing.

The utilities also argued that premature decommissioning would not pose significant additional financial difficulties, because of existing or potential insurance mechanisms. They urged continued review of the possibility of premature decommissioning insurance.

3. California Energy Commission

The CEC emphasized the overriding need for adequate assurance. The CEC recommended the adoption of an externally funded sinking fund, in conjunction with a requirement that operating utilities purchase insurance to cover premature and "excess" (i.e., greater than forecast) decommissioning costs. The CEC recognized that neither type of insurance is presently available, but concurred in statements by witness Wood and Edison witness Hughes that if the CPUC ordered California utilities to purchase such insurance, the industry would provide it. The CEC

argued that its proposed scheme would provide maximum assurance while preserving the CEC's equity goal that all decommissioning expenses be collected during the operating life of the plant.

4. Redwood Alliance

The Redwood Alliance supported a hierarchy of the four evaluative criteria, with assurance being the most important, followed by equity, flexibility, and finally cost. The Redwood Alliance recommended that an external fund be established, and that a portion of the fund be invested in alternative energy and conservation projects. Premature decommissioning insurance would be required.

The Redwood Alliance proposed an allocation of the decommissioning costs of plants which shut down before the end of their nominal operating lives, and for which no premature decommissioning insurance had been obtained. Ratepayers would bear the proportion represented by the ratio of actual and nominal operating life of the plant; shareholders would pay the rest. As an example, Redwood Alliance proposed that ratepayers pay only 13/30 of the cost of decommissioning PG&E's Humboldt Bay Nuclear Plant.

III. Discussion

A. Criteria for Evaluating Alternatives

The Commission applied the following criteria when selecting the most appropriate method of financing nuclear facility decommissioning costs. The relative weight given to each criterion corresponds to the order in which they are listed.

1. Assurance

"Assurance" is simply the degree of certainity that the operating utility will have sufficient funds available to pay the costs of decommissioning a nuclear power plant when the plant's operating life ends. OII 86 can be compared with shopping for an insurance policy. The Commission must consider uncertainties in projections of the plant's operating life, the cost to decommission, and the financial status of the utility or any segregated decommissioning fund at the time plant life ends.

In comparing alternative funding proposals, the Commission has looked beyond the most likely scenario, which is that plants operate for at least their nominal life (typically 30 years), and that the operating utility is financially healthy at the time decommissioning is necessary. We also considered the possibility that plant lives may be shorter than planned, that decommissioning costs may be higher than anticipated, or that the operating utility may be suffering financial hardships when decommissioning becomes necessary.

Unfortunately, the limited history of nuclear power precludes any firm assignment of probabilities to different possible futures. There is therefore no definitive way to quantify the assurance to be provided by different financing mechanisms. Our comparisons must be relative.

By looking at analyses submitted by parties to this phase of OII 86, the Commission can make some comparisons of fund sufficiency under different circumstances. All mechanisms are calculated by their proponents to cover the nominal cost of decomissioning at the time it is projected to occur. By looking at projected fund balances during the nominal operating life of the plant, it is possible to compare the funds each mechanism would provide if shortened plant life let to "premature decommissioning." The relative assurance provided by internally and externally funded mechanisms can be evaluated by comparing the likelihoods of financial hardship of utilities and trust funds.

2. Cost

"Cost" represents the cost which operation of the financing mechanism adds to the total cost of decommissioning. Evidence in OII 86 indicates that none of the alternative financing mechanisms would add as much as one percent to ratepayers' total electric utility bills. Accordingly, we do not treat cost as an overriding concern.

Still, the Commission's goal is to maintain the lowest reasonable rates. We will therefore consider below the costs of alternative mechanisms, to determine the cost to ratepayers for varying levels of assurance, equity and flexibility. As is discussed below, there was considerable disagreement among witnesses concerning the absolute and relative costs of alternative mechanisms.

In comparing alternative mechanisms, we note that the timing of collections and expenditures varies. We must therefore establish some standard basis for comparing activities over time. In other proceedings, we have assessed the "present value" of alternatives, as a basis for our selection among competing activities.

Considerable time was spent in this phase of OII 86 in arguments over appropriate "discount rates" which the Commission would choose to convert future dollar values into present value. In particular, staff witness Knecht and Edison witness Adams conducted a debate over discount rates which fills Exhibits 4, 6, and 18 through 30.

We are not prepared to formalize a discount rate methodology in this opinion. Instead, we have considered all of the analyses presented in judging the range of relative and absolute costs which financing mechanisms may impose on ratepayers.

3. Flexibility

"Flexibility" represents the ability to adjust the method in response to changes relevant to decommissioning. These include the projected technical requirements and timing of decommissioning, inflation and cost escalation, and tax treatment. They also include the ability to make the best interim use of funds collected to finance eventual decommissioning expenses.

In view of the many uncertainties described below in Sections III-B and III-C, we deem it very important that the adopted financing mechanism be adaptable. We will reevaluate the annual assessment for decommissioning in each operating utility's general rate case. At that time, operating experience and any changes in cost-related factors would be reviewed when setting the assessment for the next two years.

4. Equity

This criterion evaluates the distribution of the benefits and burdens of a nuclear plant from its first operation to the end of decommissioning. A perfectly equitable mechanism would charge ratepayers at any time in relation to the benefits they were then receiving, the costs they impose on the system, and any insurance premium (implicit or explicit) to protect them from risks of plant operation. This goal recognizes that the population of "ratepayers" may change considerably over 40 years. Ratepayers in 1985 should not subsidize those in 2025, nor vice versa.

B. Assumptions, Projections, and Uncontrollable Factors

"Flexibility" is one of the primary criteria in this proceeding because the mechanism defined today must be responsive to technical, economic, legal, and political conditions over at least the next 30 years. Before analyzing the various alternatives for financing decommissioning costs, we will address certain issues which influence our choice. Should our assumptions about these factors change, future adjustments may be necessary in the annual contribution for decommissioning, and perhaps in the financing mechanism itself.

1. Absence of a Federal Decommissioning Policy

The Federal Nuclear Regulatory Commission has the power to designate one or more approved methods and procedures for decommissioning nuclear power plants. Unfortunately for our planning process, no such designation has been made and none appears imminent. Estimated costs of the three most discussed methods vary over a broad range.

a. Immediate Dismantlement and Decontamination

The first decommissioning option is immediate dismantlement and decontamination. After the plant is shut down, the facility would be disassembled and the pieces shipped to appropriate reuse and radioactive waste disposal facilities. This option would require the complete decontamination of the nuclear

facility site so that residual levels of radioactivity would be sufficiently low for the NRC to release the facility for unrestricted use. This is the only decommissioning option that leads to the prompt release of the site for unrestricted use.

There are several arguments both for and against immediate dismantlement. The advantages of immediate dismantlement and decontamination include the rapid release of the site for another power plant or other uses. The uncertainty regarding the actual decommissioning expense would be reduced, since these costs would be incurred immediately rather than postponed. Also, prompt decommissioning ensures removal of a potential hazard. The disadvantages include higher occupational exposure to radioactivity during the dismantlement process and the potentially higher present-value cost of immediate over deferred dismantlement. For example, dismantlement of the 22 megawatt (MW) Elk River Reactor in Minnesota took three years (ending in 1974) and cost $6.15 million.

Although there is no formal federal policy, witness Wood stated that the NRC staff favors decommissioning by dismantlement and removal. Commission staff witness Coughlan assumed that this alternative ultimately would be selected, and presented in Exhibit 11 a summary of utility estimates of decommissioning costs. These estimates range from $48.7 million to $128.5 million, for fifteen commercial reactors of 436 MW or more.

b. Safe Storage

Under this option, the nuclear facility would be closed down, placed in storage, and maintained with some continuing care to keep the safety risk during storage within acceptable bounds. At some time in the future the facility would be dismantled and decontaminated. The storage period may last up to about 100 years. Beyond 100 years the integrity of the concrete structure would begin to be in doubt and most of the remaining radioactive materials would be very long-lived.

There are three types of safe storage: custodial safe storage, passive safe storage and hardened safe storage. They differ in the extent of continuing care necessary for the facility after preparations for safe storage are completed.

Custodial safe storage, or layaway, requires minimal initial decontamination. The active protection system (the ventilation and air filtration system) is maintained in operation during the continuing care period. Radiation monitoring is continuous to provide for the safety of on-site personnel. Security personnel at the site guard against unauthorized entry. At the end of the continuing care period, the nuclear facility is dismantled and fully decontaminated.

Passive safe storage, also called mothballing, relies on a more thorough immediate decontamination effort to permit shutdown of the active protection system. Off-site security personnel such

as those of a private security agency would monitor the alarm systems at the plant. Passive safe storage requires periodic inspection and repairs to maintain the structure in a stable condition.

Hardened safe storage is also known as temporary entombment. It requires the construction of physical barriers around areas with high radioactivity. The use of concrete and other materials to seal off access to the facility is intended to eliminate the potential for accidental intrusion and to make a deliberate break-in difficult.

Passive safe storage has been the most commonly used safe storage choice. Power reactors that have been decommissioned using passive safe storage are the Carolina-Virginia Tube Reactor, South Carolina; Pathfinder, South Dakota; Peach Bottom 1, Pennsylvania; and Vallecitos Boiling Water Reactor, California. Custodial safe storage is reported to have been used at the Hanford Production Reactors at Richland, Washington.

The chief advantage of safe storage is that during the continuing care period the radioactive isotopes with short half-lives will largely cease to be a problem. On the other hand, further delays in the actual dismantlement and decontamination add to the uncertainties in the ultimate costs of decommissioning.

Additional expenses are also created by the costs of site maintenance and surveillance, and by delaying the time when the site becomes available for alternative uses.

c. Entombment

This option entails encasing some or all of the facility in a strong long-lived material such as concrete, until radioactivity decays to an acceptable level. The short half-life of the entombed materials and the limited lifetime of concrete structures suggest that 100 years might be a reasonable upper limit for the period of entombment.

There are three government-owned entombed reactors, all former nuclear power demonstration plants: Hallam, Nebraska; the Piqua Nuclear Power Facility, Ohio; and the Boiling Water Nuclear Superheater Power Station in Rico, Puerto Rico. The entombment preparations for the Hallam and Piqua reactors took approximately three years to complete. The entrances of all three reactors have been welded shut and all now have concrete covers to secure the radioactive equipment.

2. Reactor Operating Life

Because no large commercial reactor has yet reached the end of its normal operating life, there is no historical basis for estimating the commercial life of nuclear power plants. Their design lives are typically 40 years, but witnesses in this proceed-

ing noted that actual lives could be much shorter or longer than this nominal figure.

Uncertainty of this magnitude compounds the difficulty in estimating the annual contribution to the adopted financing mechanism. First, the size of any annual payment would obviously vary with the number of years available to collect the target sum. Second, any net interest or earnings on the balance in the decommissioning account would make a larger contribution if more years were to elapse before decommissioning.

For the purpose of this discussion, we will assume commercial operating lives of 30 years. In the second phase of OII 86, the actual service life assumed for each plant for depreciation purposes will be used.

3. Inflation and Cost Escalation

Estimates of decommissioning costs have been expressed in current dollars, even though the expenses will occur 30 to 40 years in the future. At this time we cannot establish the inflation or the escalation rates for costs associated with decommissioning, such as labor, construction, and waste disposal. Respondent utilities should submit more detailed estimates in the filings ordered by today's decision. Since we intend to review these cost estimates in rate cases, there will be ample opportunity to adjust any forecast costs.

Most witnesses performed "sensitivity analyses" of their assumptions about these factors. In general, all witnesses concluded that their relative ranking of alternatives remained the same throughout the full "reasonable" range of variation. We accept their conclusions that the inflation and escalation assumptions will affect the size of annual contributions to decommissioning accounts, but not the choice of a financing alternative assumptions will affect the size of annual contributions to decommissioning accounts, but not the choice of a financing alternative.

C. Income Tax Effects

Current Internal Revenue Service (IRS) policy treats decommissioning expenses as normal business expenses which are deducted from a utility's income in the year the expenses are incurred. If funds are collected in advance, they are taxed as income in the year collected.

This difference in timing would raise expenses during plant operation, and then produce a "windfall" tax write-off at the time of decommissioning. Tax considerations complicate the Commission's effort to spread equitably over time the costs of creating a funded decommissioning reserve.

We therefore will direct the utilities to make all reasonable efforts to secure tax-exempt status for their funds. While the issue is pending, we will direct the utilities to design

their funds in anticipation that tax-exempt treatment will ultimately be obtained.

If it eventually becomes clear that tax-exempt status is unavailable, we would direct the utilities to collect decommissioning funds on a "full cost recovery" basis, as opposed to "partial cost recovery." These alternative treatments are explained below.

1. Prospects for a Tax-Exempt Decommissioning Fund

Witness Wood reports that the IRS has indicated that it may be possible to structure a fund such that funds collected to finance decommissioning would not be recognized as taxable income. He describes four IRS conditions in his testimony and cross-examination, which refer to the NRC Decommissioning Report he authored. The fundamental requirement is that the utility "spend" the money in the same year it is accrued by committing it irretrievably to use for decommissioning.

As a first condition, the IRS would require that funds collected from ratepayers for decommissioning be immediately segregated from the utility's assets and deposited in a blind trust. This requirement would ensure that the utility would not have even short-term use of the funds.

Second, the blind trust funds could not be invested in assets of the operating utility. Third, the fund would be administered by parties not normally involved in the operations of the utility. Fourth, if the fund ultimately proved to be larger

than the amount needed for decommissioning, any surplus would be returned to ratepayers, not to the utility.

Wood testified that these guidelines were developed through informal discussions with IRS staff members. However, he stated that he has become "less sanguine" about the possibility that a utility could actually structure a fund which would satisfy the IRS (Tr. 778). He cited requests by several non-California utilities for IRS letter rulings on proposed trust funds; all were withdrawn after preliminary IRS indications that the proposed mechanisms would not qualify for nonrecognition.

Wood had no formal documentation from the IRS or the applicant utilities concerning the requests. He emphasized that no formal ruling has ever been made on the issue. Accordingly, we have no assurance that tax-exempt or non-recognized status is possible without federal legislation.2/ Legislation to this effect

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2/ The lack of IRS rulings on proposed tax-exempt trust also complicates the conservation programs of California utilities. As of November 1982, Edison had received no response from the IRS to the utility's attempt to establish a tax-exempt "ratepayer trust" to finance its Greater Eastern Desert Area Zero Interest Program for financing residential weatherization activities. In D.82-11-086 (Nov. 17, 1982 in A.61066 and A.61067), the Commission found itself constrained to reject Edison's proposal to establish a ratepayer trust for the utility's system-wide Residential Conservation Financing Program.

(HR 3498) was introduced in the last session of Congress, but was not enacted.3/

The practical effect of an arrangement meeting the IRS guidelines, according to Wood, would be to place the utility in the role of collecting funds for another entity, the blind trust. Under these circumstances, the tax status of the trust should determine whether or not the income to the trust would be taxable.

Another route to tax-exempt status for decommissioning funds might therefore be to establish a state-administered trust, which should be exempt from federal taxation. Witness Wood referred to this possibility under direct and cross-examination, but the suggestion was not developed beyond the most general level.

We will direct the utilities to design their decommissioning financing mechanisms in anticipation that tax-exempt treatment ultimately will be secured. In filing their proposed mechanisms, however, we will direct the utilities to provide their best analyses of the likelihood of such treatment. These analyses should include assessment of utility or Commission

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3/ HR 3498 (Gibbons) would have made payments to nuclear power plant decommissioning or spent fuel processing financing mechanism tax-deductible expenses in the year collected. No hearings were held concerning HR 3498, and the bill never left the House Ways and Means Committee. No successor bill has yet been introduced in the 98th Congress.

actions which would increase the likelihood of such treatment; these should include possible efforts to secure federal or state legislation.4/

2. Alternative Treatments of a Taxable Decommissioning Fund

As described in the preceding section, we prefer to create decommissioning funds which would not be subject to the potential inequities caused by timing of income tax effects. However, we may be unable to avoid these tax effects, and must therefore consider alternative treatments of a taxable decommissioning fund.

At present federal corporate income tax rates (46%), or composite federal and state rates of approximately 50%, roughly two dollars must be collected for every dollar actually set aside for decommissioning. At the time of decommissioning, the actual expenses will be deducted from income; at present rates, therefore,

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4/ In 1979, the California legislature enacted Sb 1183 (Garamendi), in response to the Three Mile Island accident. The bill required the State Office of Emergency Services to make site-specific investigations of consequences of possible nuclear power plant accidents, and to revise its Nuclear Power Plant Emergency Response Plan. This activity was to be financed by operating utilities through payments to a newly-created Nuclear Planning Assessment Special Account. The PUC was directed to devise the assessment method, and to allow regulated utilities to recover their share in rates. See Cal. Gov't. Code Section 8610.5. The experience with SB 1183 may provide useful guidance to this investigation.

tax deductions would cover nearly half the decommissioning expenses at that time. On this basis, we have considered two general methods of treating income tax, which can be applied to all financing methods in which money is collected during a plant's operating life.

The "full cost recovery" method is designed to ensure that the full estimated cost of decommissioning would be available at the time of decommissioning, without assuming any tax benefits in the years the costs are incurred. This method is analogous to the "flow through" treatment of other utility taxes and tax credits. This method would collect from ratepayers during plant life roughly two dollars for every one dollar to be spent eventually on decommissioning. If the contributions have been calculated correctly, the tax deduction for decommissioning expenses would be available for refund to ratepayers at that time.

The "partial cost recovery basis" describes a method where the provision for decommissioning is accrued but no allowance is made at the time for taxation of this income. If the income earmarked for decommissioning is taxable, this method will provide only about half of the amount ultimately necessary to decommission. The balance is assumed to be available from tax deductions on the decommissioning expenses in the years they occur. This method, which is analogous to "normalization" of taxes and tax credits,

matches ratepayer contributions to ratepayer benefits more equitably. However, it may provide less assurance that the total funds for decommissioning will be available when needed.

Proponents of full cost recovery accept its inequitable impacts in exchange for what they perceive to be higher levels of assurance. They argue that the Commission cannot assume, for purposes of assuring adequate funding for decommissioning, that a utility will have taxable income in the decommissioning years. If not, they argue, there would be no tax-based cash flow with which to pay for decommissioning.

In the event that tax-exempt status cannot be secured for funds collected for decommissioning, we intend to adopt the full cost recovery basis for financing decommissioning. This basis would impose greater costs on ratepayers during the period of power plant operation, but other factors outweigh the small increase in total rates required to finance full cost recovery.

The primary consideration justifying the higher interim costs is the uncertainty inherent in projecting the eventual cost and timing of decommissioning. Since these risks are highest in the initial years of plant operation, we find it fair to impose higher relative burdens on ratepayers in those years. This basis will be considered anew if the Commission if forced to reconsider the taxability of decommissioning funds.

D. Evaluation of Financing Alternatives

We evaluated six general types of funding mechanisms in this phase of the proceeding, as well as a limited number of variations within some of the types. The order instituting this investigation specifically ordered consideration of five: prepayment; sinking fund; depreciation reserve; surety bond; and premature decommissioning insurance. We also evaluated the option of making no specific financial preparations for decommissioning, and instead treating decommissioning costs as normal expenses in the years in which they are incurred.

1. Expensing

Under this option, no advance provision would be made for decommissioning. The costs associated with decommissioning would be considered normal utility operating expenses and collected from ratepayers in the year incurred. Adequate funding would be guaranteed only by timely regulatory approval of decommissioning expenses and by ratepayers' ability to absorb the additional costs.

All witnesses rejected the expensing alternative as risky and inequitable. We join in that condemnation. By its operation, ratepayers at the time of decomissioning would unfairly bear the total costs. Those customers who benefited from 30 years of nuclear power plant operation would bear no costs.

2. Surety Bond

This "alternative" would actually be a supplement to the principal financing alternatives. The operating utility would purchase a bond from a surety company, which would agree to pay the face value of the bond if some designated contingency arose. Contract contingencies might include premature decommissioning, decommissioning costs exceeding the funds available for decommissioning, or utility default.

No surety company now underwrites decommissioning costs, so the alternative does not presently exist. In general, the value of the additional assurance provided by a surety bond would vary across alternatives, and over time for each alternative. For instance, the degree of supplemental assurance to a sinking fund approach would be greatest in the early years of plant operation, when the balance would be low compared with estimated costs of decommissioning. In later years, the rising balance would leave less of a potential gap. For a prepayment alternative, in contrast, the potential funding gap presumably would be low in all years of operation.

No estimate appears on the record of what surety bonds for decommissioning would cost, if they were to become available. Accordingly, we cannot make any comparison of the potential costs and benefits of this supplemental assurance.

We will direct the respondent utilities and staff to continue to investigate the potential for surety bonds, including evaluations of their benefits and costs. Updated information should be presented in each biennial review of each utility's funding mechanism.

3. Premature Decommissioning Insurance

Premature decommissioning insurance would also operate as an assurance-increasing supplement to a principal financing method. Like surety bonds, however, this alternative is not presently available. Unlike surety bonds, however, some evidence was presented which addressed the potential benefits and costs of premature decommissioning insurance. The insurance should cover two situations: where decommissioning takes place before the end of expected plant life and the accumulated decommissioning fund is, therefore, insufficient; or where a shortfall results because actual costs of decommissioning exceed estimated costs.

There was very little discussion on the record of the potential cost of premature decommissioning insurance. Edison presented one estimate, that:

> "an annual premium of $250,000 should be adequate to provide the necessary assurance for up to $100 million in premature decommissioning costs. This estimate...is based upon a review of existing brokers, and underwriting estimates provided by the insurance industry." (Exhibit 4, p. IV-3)

We note that this would amount to a premium of 0.25% per year, to cover a potentially very large exposure to risk. According to Edison's calculations, this insurance would add roughly one-tenth to the cost of a sinking fund mechanism.

PG&E, in Exhibit 3, speculated that the annual premium for premature decommissioning assurance would be roughly 1% of estimated decommissioning costs. This estimate was based on a reading of the NRC Decommissioning Report referred to above, and on "various insurance studies currently underway." (Exhibit 3, at I-16).

We wish to clarify that premature decommissioning insurance should not be confused with property insurance related to an accident. Premature decommissioning insurance should provide funds for decommissioning at any time during reactor operation. The expected costs of decommissioning should not include the unexpected costs of an accident which are properly covered by property insurance.

We encourage the respondents to pursue vigorously premature decommissioning insurance within their own industry and with the insurance carriers. We note that the NRC is examining this alternative. Updated evaluations of the potential availability, benefits, and costs of premature decommissioning insurance should be presented in each review of an adopted mechanism.

4. Internally Managed Unfunded Reserve

a. Depreciation Reserve

The straight-line remaining life method now in use is an example of an internally unfunded reserve. An account is established on the utility's books to cover the estimated present costs of decommissioning. Each year the ratepayers make a payment to the account. First, the estimate of decommissioning cost is updated. Second, the balance already in the account is subtracted, to arrive at the estimate of funds which must still be paid into the account. That outstanding balance is divided by the number of estimated remaining years of plant operation, to arrive at the year's payment.

At present, California utilities collect decommissioning funds on a full cost recovery basis, which requires roughly twice the annual payment as would partial cost recovery. No specific fund of money is set aside to pay for the cost of decommissioning. Until the funds are needed, they are available for general corporate use by the utility.

As compensation to the ratepayers, the utility rate base is reduced in each period by the amount of the accumulated reserve, thus lowering the revenue requirements of the utility. The ratepayers therefore save the costs of capital associated with a rate base amount equivalent to the annual contribution. When

bills for decommissioning come due, the utility will raise the money through normal financing.

An unfunded depreciation reserve method was recently adopted for Edison's accrual of funds for the ultimate disposal cost of spent nuclear fuel. In D.82-12-055 (in A.61138, Edison's test year 1983 general rate case), the Commission ordered Edison to collect funds on a "net of tax" (partial cost) basis, using a straight-line remaining life methodology and the estimated present cost of disposal.5/

The straight-line remaining life method of decommissioning cost is less expensive than other alternatives. It is the method currently in effect and is preferred by staff witness Coughlan and the respondents. The prime feature which distinguishes this method from the alternatives reviewed is the benefit alleged from the internal use of generated funds.

Respondents and Coughlan claim that several factors make the straight-line remaining life method of financing future nuclear decommissioning costs particularly attractive. First, respondents claim that any required financing for decommissioning costs will not seriously affect the utility. The increase in rate base as the

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5/ Seven days after this Commission issued D.82-12-055, the Congress passed the Nuclear Waste Policy Act of 1982, Public Law No. 97-425 (HR 3809), establishing a new federal scheme for disposal of high level radioactive waste and spent fuel. The Commission's newly-adopted financing mechanism will be revised to allow utilities to recover payments made under waste disposal contracts to be signed with the Department of Energy.

reserve (and its accompanying rate base offset) is drawn down will increase cash flows which will offset, at least in part, the expenses of decommissioning. The result would be a negligible effect on interest coverage ratios.

Second, the increased cash flow from the ratepayers for the reserve improves internal cash generation. This, in turn, supports the utility's bond rating and so ultimately lowers prospective issue costs. Any additional financing to recover the reserve would not create a greater burden on the utility than would the amount of the earlier foregone financings.

Third, respondents argue that decommissioning costs would not place a significant burden on the utility's ability to obtain external funds since they represent such a small amount relative to total capital expenditures. For example, in 1981, Edison raised over $1 billion in the external capital markets. Accepting NRC projections that decommissioning of a large commercial reactor would cost $50 million in today's dollars and further considering that funds for decommissioning would be raised over a period of several years, the annual requirements would have a minute impact associated with the external financing. The result would be a negligible effect on interest coverage ratios.

The CEC, staff witnesses Knecht and Wood, and the Redwood Alliance question the degree of assurance provided by the straight-line remaining life method. They emphasize that the financial

health of a utility facing decommissioning 30 or 40 years in the future cannot be guaranteed so that the assurance question cannot be disposed of simply by assuming that the utility will be financially healthy or that decommissioning expenses will place an insignificant burden on a utility's ability to raise capital. They argue that external funds provide greater assurance since investments can be diversified, rather than depending on the financial well-being of one company. The only jeopardy a well-managed external fund would face is a complete collapse of the economy, a situation no funding mechanism could mitigate.

Knecht also contends that the straight-line remaining life method, as presently structured, offends equitable sensitivities. The inequity arises from rate impacts during decommissioning, which is expected to take place over the decade after the plant is retired from service. During this time the rate base deduction would be reduced annually, as decommissioning occurs. The full rate base deduction will not disappear until decommissioning is complete. The result is that during the ten years of decommissioning, future ratepayers will benefit from the remaining rate base deduction through a lower revenue requirement. The effect is to give future ratepayers the unearned benefit of the rate base deductions.

b. Internal Sinking Fund

An alternative internally-funded mechanism is the so-called "internal sinking fund." This mechanism would not actually create a "fund" in the sense meant in the remainder of this decision. Rather, accruals for decommissioning would be assigned to a special account on the utility's books. The internal sinking fund differs from the straight-line remaining life mechanism in the way the utility compensates ratepayers for its use of the decommissioning funds in the years prior to decommissioning.

As developed by PG&E in Exhibit 3, the internal sinking fund accrues its balance from two sources. First, the ratepayers pay an annual provision based on the projected costs of decomissioning (PG&E uses the estimated present cost of decommissioning). Second, the utility adds to the account an interest payment, calculated at the utility's overall rate of return. Because the utility's contribution accrues to the account, the ratepayers' earn what amounts to compound interest; this contrasts with the "simple interest" provided by the depreciation reserve method.

PG&E calculates that the internal sinking fund would cost roughly 75% as much as the straight-line remaining life depreciation reserve, and roughly 60% as much as an external sinking fund. A portion of the price advantage is gained because of the compounding of the utility's rate-of-return based interest payments,

compared with the simple interest provided by the depreciation reserve's rate base offsets.

In PG&E's testimony, the price advantage of internal over external sinking funds also derives from the return assumed for the two alternatives. The internal fund would earn at the utility's rate of return, assumed to be 15%. The external fund is assumed to earn a tax-free 10% return. In Exhibit 3A, PG&E estimated that the external fund would be less expensive than the internal fund if the former earned a 14.5% return.

As developed by PG&E, the internal sinking fund contains many of the equity problems inherent in the depreciation reserve. First, the present cost based recovery would shift the bulk of nominal dollar payments to later years. This skewing accounts for much of the cost advantage PG&E ascribes to the internal sinking fund.

Second, PG&E's calculated method depends on significant utility interest payments during the years of decommissioning. If the fund were taxable, there would be a large negative revenue requirement in the decommissioning years. This benefits ratepayers in the years following plant life.

These faults could be addressed by using ultimate cost based recovery, and by normalizing the tax treatment. However, much of the present cost price advantage would then be lost.

5. Prepayment

"Prepayment" means the setting aside of a principal sum when a power plant begins operation, calculated so that the principal plus accumulated interest should cover the costs of decommissioning at the end of the plant's nominal operating life. There are a variety of methods by which the prepayment sum could be collected and accounted for.

Prepayment ensures the highest level of funds available for decommissioning during the nominal operating life of a plant, and so would provide the greatest assurance that adequate funds would be available in the event of premature decommissioning. Most other alternatives entail annual collection of relatively small sums, so that the fund balance initially would be small. Fund levels would be adequate only after the full nominal life of a plant. However, use of a surety bond or premature decommissioning insurance would solve this problem, if these mechanisms become available.

We analyzed two methods of prepayment. Under the first option, the utility would "prepay" the estimated cost of decommissioning into a segregated fund. The utility or an outside trustee would then manage the investment of the funds until the cash is actually needed. The total costs paid by customers would include the costs of capital associated with the lump sum prepayment, such as interest on debt or return on equity.

Recovery of the prepayment could occur in two ways. First, the utility could treat the amount plus cost of capital, as an operating expense in the year borrowed. Ratepayers would meet this revenue requirement in the year of prepayment. Expensed prepayment therefore has one of the costliest present values of any of the alternatives we considered. All ratepayer expenditures are made in the first year of plant operation, and there is no time-based "discounting" of these expenses. Edison, for instance, calculated that expensed prepayment could cost roughly four times as much (present value) as a sinking fund. The method also is least equitable in that initial prepayment is made by ratepayers who are receiving only a fraction of the benefit from the facility; ratepayers in future years would pay nothing.

Alternatively, the utility could "capitalize" the prepayment sum. The investment plus a return would be recovered on a straight-line depreciation basis with return on the unamortized amount, just as if the fund were invested in utility plant. While this alternative is one of the more expensive under consideration, it would distribute decommissioning costs equitably among ratepayers receiving benefits from the plant's use.

Staff witness Knecht favored the capitalized prepayment alternatives. Although the total nominal cost of the prepayment mechanism increases to the extent of ratepayer payments of the utility's cost of capital, the present value cost falls under

Knecht's assumptions of high discount rates. Knecht estimated that a capitalized prepayment mechanism would cost roughly 1.2 times as much as a taxable sinking fund, and 2.4 times as much as a tax-exempt sinking fund. He argued that the greater assurance and equity outweighed the higher costs, and so recommended the capitalized prepayment mechanism.

The second method of prepayment analyzed would have the ratepayers pay a one-time surcharge with a future value equal to the estimated decommissioning cost. The initial amount would then come directly from rates, without requiring the utility to secure external financing. This alternative would produce the same inequities as the expensed prepayment.

Staff witness Knecht and the Redwood Alliance favor an external prepayment mechanism. They argue that extra assurance is worth the cost.

6. External Sinking Fund Reserve

The external sinking fund reserve alternative contemplates establishment of a separate fund dedicated to use for decommissioning expenses. The fund would not initially be capitalized, but would accumulate a reserve over the life of the nuclear unit. The series of annual contributions (annuity) by ratepayers would be computed so that the sum of principal plus accumulated earnings would equal the cost of decommissioning at the end of the nominal life of the plant. The annual provision would

change along with the estimated cost to decommission. As a result, payments to be demanded from customers using the energy from the facility would be expected to vary.

Unlike the internally-funded alternative, the external sinking fund balance would be invested in a segregated fund. These funds would not be made available for general corporate purposes, as is the case with the depreciation reserve approach now in use. The utility thus would lose the opportunity to use decommissioning funds to offset normal financing requirements. Instead, the utility would have to use common stock and preferred stock, debt, or internally generated funds. These have a capital cost of service to be recovered from the customer.

Witnesses calculated a range of costs for the sinking fund alternatives, varying with assumptions about discount rates, earnings and tax-treatments. If the cost of the existing depreciation reserve mechanism is assigned the value "1", then witnesses calculated the cost of an external sinking fund to be 0.22 (Knecht), 0.76 (PG&E, for a "modified" sinking fund), 1.64 (SDG&E), 2.04 (Coughlan), and 2.91 (Edison, for a "modified sinking fund).6/

6/ Ratios calculated by Coughlan in Exhibit 11, Table 3-A, except for Knecht ratio, calculated from Exhibit 18, Schedule 7. Note that Knecht bases the cost of the depreciation reserve on his proposed "ultimate cost basis" for calculating payments to the depreciation reserve. See Table 1 in Section IV of this decision.

IV. The Adopted Mechanism

The first phase of this proceeding has allowed the Commission to compare a wide range of alternative decommissioning financing mechanisms. Our goal has been to select the alternative which best meets the four criteria we announced at the outset of OII 86: assurance; cost; flexibility; and equity. We will therefore discuss first our considerations under these four criteria.

A. The Four Criteria

1. Assurance

The Commission stated at the outset of OII 86 that assurance would be our most important criterion when selecting a decommissioning finance mechanism. However, this does not mean that we will single-mindedly select the alternative which provides the greatest assurance. The other three criteria will temper our selection.

At the outset, note that the assurance promised by the various alternatives can be sorted into three levels. One of the decisions facing the Commission is a selection among these levels.

The highest level of assurance is provided if the total nominal cost of decommissioning is available at all times during the plant's operating life, independent of any assumptions about the viability of the utility at the time of decommissioning. This level can be reached in two ways. First, prepayment of the entire

projected costs into an external fund would create a balance nominally sufficient to cover all costs. Second, fully functioning surety bond or premature decommissioning insurance mechanisms would remove concern for the utility's viability (although this substitutes the viability of the insurer or bondsman).

A somewhat lower level of assurance is provided by externally funded sinking funds, operating without supplemental insurance or bonds. If invested in low risk securities, they provide a "safe" fund balance, which grows over time to reach the nominal cost of decommissioning. At the end of the plant's nominal operating life they are complete; in all earlier years, the utility and its ratepayers would be called upon to make up insufficiency between the cost of premature decommissioning and the fund balance. The financial status of the utility therefore remains a factor during nominal plant operating life, which decreases in importance over time as the fund approaches the total cost of decommissioning. Different payment schedules provide different levels of assurance during the years of plant operation, depending on how fast the fund fills.

The lowest level of assurance is provided by the unfunded alternatives. These provide only an accounting balance in the years of plant operation. They rely completely on the ability and willingness of the utility to honor its accounting debt by

providing funds, from internal or external sources, at the time a plant is decommissioned.

In the unlikely event that a utility were bankrupt, it would be unlikely to provide decommissioning funds. If the utility were solvent but in financial distress, it would have an incentive to delay decommissioning, or to seek special relief from the Commission. Because unfunded mechanisms require no utility contribution at the time of decommissioning, they remove that incentive.

As a starting point, we note that in recent years utilities' financial capabilities have been strained by large capital construction efforts experiencing costly delays and overruns. In California, much of this construction-based stress derives from construction expenses of four of the nuclear power plants for which we are now designing decommissioning mechanisms. Similar problems could accompany the utilities' efforts to replace these plants at the end of their operating lives. Under such circumstances, even the relatively small burden of decommissioning old plants would be unwelcome.

The operating utilities' financial status could be even more strained if the nuclear plants were to fail to operate for their full lives. Unexpected premature decommissioning, perhaps by NRC order, could remove roughly 5,000 MW_e from California's generating capacity (including Rancho Seco and Palo Verde). This

could trigger a costly scramble for replacement power. There would also likely be simultaneous pressure to remove the undepreciated value of the defunct plants from rate base, which would further constrict the utilities' cash flows.

Even a planned premature decommissioning would produce difficulties. This outcome could occur if at some point the utilities decided that the plants had shorter remaining lives than is now estimated. This decision would trigger an accelerated construction program, as the utilities struggled to replace the nuclear plants plus meet any anticipated demand growth. Again, cash flows would be constrained.

Because we can assign no probability to the various futures outlined above, we cannot value precisely the additional assurance provided by funded mechanisms. However, the Commission is willing to consider some premium over the cost of unfunded alternatives.

2. Cost

One of the Commission's goals is to find the most cost-effective decommissioning mechanism. To do so with certainty, we would have to be able to calculate accurately the cost of each mechanism. This would allow us to buy assurance at the lowest price.

Unfortunately, no such certainty is possible. Cost comparisons presented in the first phase of this proceeding have

varied considerably, based on a host of economic, financial, and tax assumptions. In particular, different assumptions about discount rates and the earnings rates of alternative internal and external funds confound attempts to make simple comparisons. Some general conclusions are possible, however.

a. Returns on Fund Balances

A major source of cost differences in the mechanisms posited by various witnesses were differing assumptions concerning rates of return. Compounded over the assumed lifetimes of the mechanisms, even small differences in earnings rates have major effects on the assumed present value cost of the alternatives.

Most witnesses assumed that unfunded mechanisms would earn at the operating utility's overall rate of return. The current "depreciation reserve" mechanism provides annual ratebase offsets, and so returns to ratepayers each year an amount based on the utility's rate of return. The "internal sinking fund" would accrue compound interest from the utility at the same rate.

For external funded mechanisms, most witnesses assumed either that the fund would be invested in tax-exempt securities such as municipal bonds or other securities offering low risks and returns. Witnesses therefore calculated lower net earnings than those for unfunded internal mechanisms.

The Commission believes that differences in funding mechanism costs based on differences in assumed rates of return on the mechanisms are misleading if viewed in isolation. External funds, invested in a diversified portfolio of low risk securities, are more certain to actually earn their expected return. The higher nominal return on utility assets is based at least in part on investors' recognition of the greater uncertainty in their ability to earn their authorized rates of return.

To say that higher returns on internal funds would make such funds "cheaper" to the ratepayers would ignore the accompanying differential in risks borne by ratepayers. On a risk-adjusted basis, the costs of the two funding alternatives are similar. If this were not the case, the "cheapest" fund of all arguably would be that was turned over to venture capitalists for speculation in high return investments.

However, the Commission's concern in OII 86 has been to secure the least cost assured return. We find it more appropriate that ratepayer contributions to a nuclear decommissioning fund involve lower risk of earnings shortfalls, even at the cost of somewhat lower expected rates of return.

A diversified portfolio also avoids any risks unique to the utility, including those associated with investment in and operation of the nuclear plants. The internal fund, simply put,

involves the investment of ratepayer funds in a single company, the utility. Generally, investment in a diversified portfolio involves lower costs and risks than investment than a single company. Greater assurance can be obtained without added cost merely by utilizing the diversified investment strategy of the external fund.

Finally, the external fund is likely to secure favorable tax treatment. As noted below, we believe that it will be possible to create an external funding mechanism for which both the accrual of principal (from ratepayer payments) and the earnings on fund balance will be tax exempt. This will allow such a fund to earn at rates considerably above those on taxable funding mechanisms, even with a conservative investment policy.

b. Effect of Payment Schedules: Ultimate Versus Present Cost-Based Collections

Witnesses presented a variety of payment schedules by which funds would be collected for the alternative decommissioning schedules. These produced a range of assumed present value costs. As a general principle, of course, the present value of a payment falls if it is postponed further into the future.

The present value cost of prepayment options generally is highest, because more money must be set aside for decommissioning in the first year. Capitalization or amortization of the prepayment sum reduces this impact somewhat.

The internal and external sinking funds were generally premised on one of two means for calculating payment schedules. "Ultimate cost" based recovery estimates the actual ultimate cost of decommissioning, and calculates annual payments of equal nominal amount. "Present cost" based recovery, in contrast, bases each year's collection on the cost to decommission the plant in that year; pay-rise over time as the estimated cost of decommissioning rises.

Ultimate cost based recovery therefore has a higher present value cost than does present cost based recovery. Early year payments are higher for the former, and the higher later year payments of the latter are heavily discounted.

Expensing could be cheaper still. however, as noted elsewhere, we reject this alternative as inequitable.

3. Flexibility

All mechanisms can be manipulated so as to allow for revisions in annual payments. We will provide below for review and revision in the biennial general rate cases. This meets our flexibility criterion.

Prepayment is less flexible than other alternatives, however, because it involves the greatest initial commitment of funds. Projected decommissioning costs could fall, or even merely escalate more slowly than initially projected, relative to fund earnings. In that event, the decommissioning fund would become "overcollected".

4. Equity

Our equity goal is to charge ratepayers at any given time in relation to the net benefits they are then receiving. As a first estimate, this involves a comparison of the direct costs and benefits of nuclear electricity.

The costs of nuclear electricity also include an insurance premium, whether paid to an insurer or internalized, to recognize the risk of premature decommissioning. Because no commercial insurance is yet available, it is difficult to calculate an appropriate internal premium. The ratepayers must, in effect, self-insure.

As described above, only the expensing alternative defies structuring of an equitable mechanism. This alternative would impose all the costs of decommissioning on ratepayers in the years of decommissioning; ratepayers during the operating life of the plant would pay nothing. We reject the expensing alternative on this basis.

B. The Adopted Mechanism

We will adopt an external sinking fund mechanism, with annual ratepayer payments based on the estimated ultimate cost of decommission. We will assume a tax exempt fund.

This choice is based on a balancing of the criteria discussed above. Our concern for assurance leads us to prefer funded alternatives, which provide both greater independence from the financial status of the utility, and the greater automatic availability of funds in the event of premature decommissioning.

Based on our judgment that tax exempt status will be obtained for the external fund, we estimate that the additional cost of an external fund, compared with the so-called "internal sinking fund", will be small. The slightly lower earnings to be expected from investment in a portfolio are acceptable representations of their greater security, compared with investment only in the utility itself.

In calculating the size of the annual ratepayer contribution to decommissioning, the utilities should use the ultimate cost of performing decommissioning, not the present cost. This ultimate cost basis will serve to levelize the nominal annuity which the ratepayers will pay; inflation over the next three decades should mean that the real cost to ratepayers of the annual payment will decline over time.

It is equitable for ratepayers to pay more for assurance in the early years of plant operation, because the risks and uncertainties associated with operation and decommissioning are greatest in the early years. The ultimate cost basis also will increase the fund balance more rapidly in the early years of plant operation. In the absence of surety bonds or premature decommissioning insurance, these higher reserve levels will provide more assurance in the event of premature plant decommissioning.

We will require the utilities to adopt external management of their decommissioning reserves, using independent third-party trustees. External management will provide somewhat greater assurance that the fortunes of the utility and the reserve are independent.

Professional portfolio managers should also be able to achieve somewhat higher earnings from investment of the reserve funds. Finally, based on the tentative IRS guidelines discussed above, use of an independent trustee increases the likelihood that decommissioning reserves will be treated as tax-exempt or nonrecognized as taxable income.

Respondents and staff will be directed to develop appropriate limitations on the investments available to the fund manager. At a minimum, concern for diversification of risk dictates that decommissioning funds not be invested in the operating utility, since any problems with the nuclear plant would directly affect the value of such investments. For similar reasons, parties also should propose limitations on the total percentage of the funds which can be invested in all energy utilities. We will evaluate these limitations during the next phase of OII 86.

Our adoption of an externally funded and managed reserve for the costs of decommissioning will have an impact upon the respondent utilities' revenue requirement. PG&E will be ordered to file OII 86, within 60 days of the effective date of this decision, a proposed decommissioning financing mechanism for its Humboldt Bay Nuclear Plant consistent with this decision. This proposal shall include a proposed method for establishing the adopted funding mechanism and for accounting for decommissioning, as well as all

necessary information supporting a request for the additional revenue requirement consistent with today's decision. A decommissioning financing mechanism for Humboldt will be adopted in OII 86; the adjustment to rates to finance the reserve will be made in PG&E's pending general rate case, A.82-12-48.

PG&E will be ordered to file a similar proposal for its Diablo Canyon Nuclear Generating Station in A.58911, the proceeding considering its application to add Diablo Canyon to rate base. The reserve and its rate treatment will be established in A.58911.

Edison and SDG&E will be ordered to file within 60 days of the effective date of this order their proposed accounting method, funding mechanism, and requests for revenue requirement consistent with today's decision, to convert their present depreciation reserve treatment of SONGS 1 decommissioning expenses to an externally funded and managed mechanism. Funding mechanisms will be adopted after further hearing in OII 86; the adjustment to rates to finance the reserves will be made in Edison's 1984 attrition adjustment, and in SDG&E's pending general rate case.

Edison and SDG&E will be directed to propose similar mechanisms in their pending SONGS 2 rate base offset proceedings (A.82-02-40 and A.82-03-63, respectively). At the time of their rate base applications for SONGS 3, they should enclose consistent proposals. Edison and SDG&E should also use their best efforts to

involve co-owners City of Anaheim and City of Riverside in their mechanism; at present, the Commission has no authority to impose such requirements on the cities.

We intend that reserves be created to cover the full cost of decommissioning the SONGS units. As the operating utility, Edison will be responsible for assuring this coverage if the cities do not assume their share of the costs. If Edison or SDG&E sell any or all of their existing ownership interests in any SONGS units, they will be responsible for assuring that the purchasers participate fully in the unit's decommissioning financing mechanism.

Finally, to the extent that they are relevant and consistent with this decision, we adopt PG&E's recommendations regarding use of standard nomenclature in addressing costs associated with decommissioning nuclear power plants owned and/or operated by California's public utilities.

Findings of Fact

1. Currently, funds for decommissioning nuclear power plants owned and operated by regulated California public utilities are accumulated on the utilities' books through the straight-line remaining life method.

2. Financing alternatives for funding the costs of decommissioning include prepayment, sinking fund, straight-line remaining life, surety bond, and premature decommissioning insurance.

3. No national policy exists designating the appropriate method and manner for decommissioning nuclear power plants.

4. The NRC staff favors decommissioning by dismantlement and removal; our analysis of the adequacy of alternatives for financing decommissioning costs assumes complete removal during the 10-year period following shutdown of a nuclear power plant.

5. The most important criterion for judging the adequacy of a financing mechanism is the assurance which the method provides that the funds collected will be available and sufficient to cover the costs of decommissioning.

6. Because there are inherent uncertainties in estimating future decommissioning costs, adaptability of a financing mechanism to technical, regulatory and economic changes is critical.

7. The decommissioning financing mechanism should be designed to ensure equitable treatment of ratepayers over time, considering the benefits, costs, and uncertainties of nuclear power plant operation.

8. The increase in a customer's total monthly bill occasioned by adoption of the most expensive decommissioning financing alternative would be minimal.

9. The "expensing" option is not a reasonable alternative because of its extreme inequity.

10. Premature decommissioning insurance or a surety bond, if available, would provide additional assurance that funds would be available to cover decommissioning costs.

11. Unfunded financing methods, such as existing unfunded straight-line remaining life methods, provide less assurance that funds will be available for decommissioning.

12. Adequate assurance of fund availability is best provided by a funded reserve, segregated from other utility funds and dedicated specifically and solely to payment of nuclear decommissioning costs.

13. All three of the funded methods - external prepayment, external sinking fund, and internally managed, externally funded reserve - provide adequate levels of fund assurance, and also meet our criteria of flexibility and equity.

14. The equity to ratepayers over time of the costs of the decommissioning mechanism will be improved if funds collected for decommissioning are tax-exempt or non-recognized as taxable income.

15. Informal IRS guidelines indicate that decommissioning financing mechanisms may receive tax-exempt or non-recognized tax treatment if (1) funds collected from ratepayers for decommissioning are segregated immediately from the utility's assets and

deposited in a blind trust, (2) the trust funds are not invested in assets of the operating utility, (3) the trust is administered by parties not normally involved in the operations of the operating utility, and (4) provision is made that any eventual surplus would be refunded to the ratepayers, not to the utility.

16. Because no utility has yet received a favorable ruling from the IRS on a proposed decommissioning financing mechanism, it is unclear whether utilities can design a mechanism which would receive tax-exempt or non-recognized treatment from the IRS, under current law.

17. A state-operated decommissioning fund might be treated as tax-exempt.

18. It is reasonable to design decommissioning funds and to begin collections under the assumption that the reserve will be designated as tax-exempt or nonrecognized as taxable income; the adopted mechanism contains adequate flexibility to convert to full cost recovery based collection if the reserves are found to be taxable.

19. If revenues associated with decommissioning financing mechanisms are treated as taxable income, then "full cost recovery" is the most reasonable basis for accounting for such treatment.

20. External trustee management of decommissioning funds will provide reasonable assurance that funds will be invested to earn safe, reasonable returns.

21. It is reasonable to calculate annual payments to the external sinking fund based on the projected ultimate cost of decommissioning, rather than on the estimated present cost.

22. It is reasonable to prohibit investment of decommissioning funds in assets of the operating utility, and to establish other reasonable limitations on investments by the fund, as means of diversifying risk.

23. It is reasonable to require PG&E to establish a decommissioning finance mechanism for the Humboldt Bay Nuclear Plant; it is appropriate to design the mechanism in OII 86, and to establish the accompanying rate adjustment in PG&E's pending general rate proceeding.

24. It is reasonable to require PG&E to propose a decommissioning finance mechanism for the Diablo Canyon Nuclear Generating Station consistent with this decision, in its pending rate base offset proceeding.

25. It is reasonable to require Edison and SDG&E to convert their unfunded straight-line remaining life treatments of decommissioning costs for San Onofre Nuclear Generating Station No.1 (SONGS 1) to externally funded mechanisms, and to propose such treatments for SONGS 2 and 3, consistent with this decision. It is reasonable to adopt the mechanisms in a further order in OII 86, and to make the necessary rate adjustments in SDG&E's pending rate case, and in Edison's 1984 attrition adjustment.

26. It is reasonable to involve the cities of Anaheim and Riverside, which are part owners of SONGS 2 and 3, in the development and administration of decommissioning financing mechanisms for those power plants. Although this Commission has no existing authority to order such participation, it is reasonable to direct respondents Edison and SDG&E to use their best efforts to secure such participation.

Conclusions of Law

1. The Commission should adopt a method for financing decommissioning costs which provides adequate assurance that sufficient funds will be available for decommissioning at the time they are needed.

2. The Commission should adopt a method for financing decommissioning costs which can readily be adapted to subsequent technical, regulatory, and economic changes.

3. The Commission should adopt a method for financing decommissioning costs which equitably distributes the costs of nuclear power generation among ratepayers benefiting from such power.

4. The Commission should adopt a method for financing decommissioning costs which best meets the criteria of assurance, flexibility, and equity at the lowest possible cost.

5. The Commission should adopt an externally funded and managed reserve as the best mechanism for respondents to finance decommissioning costs.

6. The Commission should adopt a mechanism which assumes that contributions to decommissioning reserves will be tax-exempt for federal and state tax purposes, in the absence of definitive rulings to the contrary.

7. Annual payments to the reserve should be calculated based on the projected ultimate costs of decommissioning, rather than based on the estimated present cost.

8. Edison and SDG&E should be required to convert their existing straight-line remaining life treatment of decommissioning costs for SONGS 1 to externally funded and managed treatment, consistent with this decision.

9. Edison and SDG&E should be directed to use all reasonable efforts to include in the mechanisms all agencies with any ownership interests in any SONGS unit; Edison, as the operating

10. PG&E and the Commission staff should be required to design a decommissioning finance mechanism for the Humboldt Bay Nuclear Plant, in the next phase of OII 86; the accompanying rate adjustment should be made in PG&E's pending general rate case.

11. PG&E should be required to propose a financing mechanism consistent with this decision in its pending rate base offset proceeding for its Diablo Canyon Nuclear Generating Station.

INTERIM ORDER

IT IS ORDERED that:

1. Respondents Pacific Gas and Electric Company (PG&E), Southern California Edison Company (Edison), and San Diego Gas & Electric Company (SDG&E) shall, as soon as practicable, develop procedures to fund decommissioning costs for nuclear generating units by use of externally funded and managed reserves.

2. Edison, joined by SDG&E, shall file within 60 days of the effective date of this order a proposed method for establishing an externally funded and managed reserve and a proposed method of accounting for decommissioning costs of San Onofre Nuclear Generating Station (SONGS) Unit No. 1 consistent with this decision. Edison and SDG&E shall develop information which would support requests for additional revenue requirement consistent with tax-exempt treatment of the financing mechanisms; Edison and SDG&E shall include analyses of the likelihood of securing tax-exempt treatments. Further hearing shall be held in OII 86, addressing the design and adoption of approved financing mechanisms. Edison and the Commission staff shall address the revenue impacts of the adopted mechanism in evaluation of Edison's 1984 attrition adjustment. SDG&E and the Commission staff shall address the revenue impacts of the adopted mechanism in SDG&E's pending general rate case.

3. Edison and SDG&E shall file proposed financing mechanisms for SONGS 2, consistent with this decision, for filing in Edison's and SDG&E's pending rate base offset applications. Similar provisions shall be made for SONGS 3, if and when Edison and SDG&E apply to include that unit's cost in their rate bases.

4. Edison and SDG&E shall use their best efforts to secure the cooperation and participating of the co-owner cities of Anaheim and Riverside in proposed mechanisms for SONGS 2 and 3. The Executive Director shall serve copies of this decision on the City of Anaheim and the City of Riverside.

5. PG&E shall file, in the rate base offset proceeding for Diablo Canyon Nuclear Generating Station, a proposed method for establishing an externally funded reserve and a proposed method of accounting for decommissioning consistent with tax-exempt treatment of the financing mechanism; PG&E shall include its analysis of the likelihood of securing tax-exempt treatment.

6. PG&E shall file within 60 days of the effective date of this order a proposed method for establishing an externally funded and managed reserve and a proposed method of accounting for decommissioning costs of the Humboldt Bay Nuclear Plant consistent with this decision. PG&E shall develop information which would support a request for additional revenue requirement consistent with tax-exempt treatment of the financing mechanism; PG&E shall include analysis of the likelihood of securing tax-exempt treat-

ment. Further hearing shall be held in OII 86, addressing the design and adoption of an approved financing mechanism. PG&E and the Commission staff shall address the revenue impacts of the adopted mechanism in PG&E's pending general rate case.

7. Further hearings shall be held in OII 86, to address the filings ordered above and to design decommissioning finance mechanisms consistent with this decision. A prehearing conference shall be held in the Commission's Courtroom, State Building, San Francisco, beginning at 10 a.m., Thursday, August 4, 1983 before Administrative Law Judge Carlos. At that time, the ALJ shall schedule days for hearings, and shall determine common issues presented by the filings, which can be heard together.

8. Respondents shall file an original plus twelve copies of each filing ordered in this decision with the Commission's Docket Office, and shall serve copies on all parties in OII 86.

9. To the extent they are relevant and consistent with this decision, PG&E's recommendations regarding standard nomenclature concerning decommissioning nuclear power plants are adopted.

This order becomes effective 30 days from today.

Dated APR 6 1983, at San Francisco, California.

LEONARD M. GRIMES, JR.
President

VICTOR CALVO
PRISCILLA C. GREW
DONALD VIAL
Commissioners

APPENDIX A

LIST OF APPEARANCES

Respondents: John R. Bury, David N. Barry, W.E. Marx, R.K. Durant and Carol B. Henningson, Attorneys at Law, for Southern California Edison Company; Jeffrey Lee Guttero, Stephen Edwards, William Reed, and Randall W. Childress, Attorneys at Law, for San Diego Gas & Electric Company; Robert Ohlbach, Richard F. Locke, and Ivor E. Samson, Attorneys at Law, for Pacific Gas and Electric Company.

Interested Parties: Robert Thiele, for Contra Costans for a Nuclear Free Future; Dian Grueneich, and Gary Fay, Attorneys at Law, for California Energy Commission; Roger Beers, for himself; Dan Haifley, for People for a Nuclear Free Future; William L. Knecht, Attorney at Law, for California Association of Utility Shareholders; Jane Bergen, Attorney at Law, for League of Women Voters of California; Ralph C. Cavanagh, Attorney at Law, for Natural Resources Defense Council, Inc.; Michael Paparian, for the Sierra Club; David Martinez, for the Abalone Alliance of the Marina, North Beach and Pacific Heights; Linda Sloven, Attorney at Law, for Toward Utility Rate Normalization; Ronald D. Rattner, for interested PG&E stockholders; Steven Heim, for himself; Bruce Campbell, for Diablo Canyon Task Force of the Alliance for Survival of Los Angeles-Santa Monica; Eric Schroeder, Carl Zichella, and J.A. Savage, for Redwood Alliance; Dwight Cocke, for Californians for Nuclear Safeguards; Arlene Black, for American Association of University Women, California State Division; Rochelle Becker, for Mothers for Peace; Michael H. Cravotto, for himself; Chris Davidson, for himself; Samuel R. Tyson, Stanislaus Safe Energy Committee; Daniel W. Fairrax, for Ernst & Whinney; Tom Hayden, for the Campaign for Economic Democracy; Regina Ryerson, for People Against Nuclear Power; William S. Shaffran, Attorney at Law, for the City of San Diego.

Commission Staff: Richard Rosenberg, Attorney at Law, A.V. Garde, and Ronald L. Knecht.

(END OF APPENDIX A)