STATE OF CALIFORNIA—THE RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

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June 26, 1979

Director, Division of Site Safety
and Environmental Analysis
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

Attached is a copy of the California Energy Commission's Comments on the Nuclear Regulatory Commission Staff Draft Environmental Statement (DES) on Palo Verde Nuclear Generating Station, Units 4 & 5. Since the facility is not proposed to be located in California, the comments cover only the need and alternatives sections (Chapters 8 and 9) of the DES. The comments are also limited to the California participants in the proposed project.

The comments are generally based upon recent utility submittals to the California Energy Commission and continuing Commission studies of future electricity demand and alternative available resources. The California Energy Commission staff would be pleased to provide documents or other assistance to the NRC staff in their efforts to complete the final environmental statement.

Sincerely yours,

Mark Urban

MARK J. URBAN
Deputy General Counsel

cc: Applicants & Intervenors

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CALIFORNIA ENERGY COMMISSION COMMENTS
ON THE NUCLEAR REGULATORY COMMISSION
STAFF DRAFT ENVIRONMENTAL STATEMENT ON
PALO VERDE NUCLEAR PROJECT, UNITS 4 & 5

I. NEED.

The discussion of need for Palo Verde Nuclear Generating Station, Units 4 & 5 ("Palo Verde 4 & 5") is generally adequate. Most of the seventeen pages on this subject in the draft environmental statement (DES) sheds little light on whether each of the California participants need the capacity and energy that Palo Verde 4 & 5 would generate in the proposed timeframe. A much more extensive analysis on need is necessary for a properly complete final environmental impact statement.

A. Forecasts.

The most glaring deficiency in the DES assessment of the energy and capacity needs of the participants is the failure to rely upon the California participants' own most recent demand forecasts. These forecasts are significantly lower than the NRC staff estimate contained in the DES. The California participants have lowered their peak demand forecast for 1991 by 1,000 megawatts, compared to estimates made in 1978. They now forecast 1991 peak needs of 29,000 megawatts, which is an annual peak demand growth of 3.3%. The NRC staff estimate, in contrast, is 3.5%.

The DES concluded that the NERA forecast, because it was econometric and end use rather than historical, was most reasonable. Since the Energy Commission required a similar methodology

for the California utilities' forecasts, the utilities' own latest projection obviously should be used more fully in assessing need.

There are several other important problems with the EIS forecast analysis. The NRC staff has projected annual growth rates for peak demand of 3.5% and energy requirements of 3.0% through 1992, but they have failed to describe how those estimates were determined. Such factors as the assumed population growth rate for each service area, the assumed effectiveness of conservation programs now underway, and the assumed relationship between energy demand and economic activity should be discussed. The DES also fails to distinguish projected growth for each of the various participants. The DES' apparent assumption is that all ten utilities will have identical growth rates. This assumption is contrary to the utilities' own forecast and the NERA forecasts. Since the project will be serving ten different service areas, analysis showing its need in each of the service areas is necessary for an adequate environmental statement.

Another apparent deficiency in the forecast analysis is the heavy reliance of the NRC staff on the NERA forecasts. NEPA requires independent governmental review of information provided by an applicant. The NERA forecast financed by applicant utilities and projecting needs even greater than the utilities, cannot serve as the basis of an independent analysis.

B. Reserve Margin.

The DES fails to evaluate independently needed reserve margins as required by NEPA. Instead the NRC staff accepts a

15% reserve margin, apparently because five of the participants at one time agreed, that a 15% reserve margin was prudent practice. One California participant, San Diego Gas & Electric Company ("SDG&E"), however, has been generally using a 10% planning reserve margin. The NRC staff completely fails to explain why 15% reserve margin is needed for Palo Verde 4 & 5.

C. Resource Capability.

Because the DES fails to present each of the participants' resource plans, it is impossible to determine whether the DES is based upon the latest utility plans. The most recent plans include a 1500-2000 megawatt Southern California Edison coal plant, a California Department of Water Resources 1000 megawatt coal plant which may include some Southern California participants, the LADWP plans to upgrade Scattergood to 760 megawatts, and SDG&E's plans for 132 megawatts of Imperial Valley geothermal by 1990.

D. Oil Displacement.

Another DES assumption not supported by analysis is that, even if projected demand does not justify Palo Verde 4 & 5, building the units would be beneficial due to savings of scarce fuel. The evidence presented in the DES does not support this need for Palo Verde 4 & 5. First, there is absolutely no analysis of the ten different utility systems, showing to what extent, if any, operation of Palo Verde 4 & 5 might decrease oil use. Secondly, there is no information on the actual benefits of such reduced oil use. For example, California

oil-fired power plants provide the major market for residual oil, a major by-product in the refining of California heavy crudes. If this oil by-product were not used in a power plant, it would probably remain in refinery storage. Since that storage is limited, failure to burn residual oil in power plants may reduce refinery operation or reduce the use of California heavy crude in place of imported oil. Finally, the DES does not discuss alternative methods of reducing oil use such as production of methanol or gasified coal which might be more cost effective and environmentally acceptable than construction of Palo Verde 4 & 5.

E. Conservation.

The DES discussion of conservation fails to comply with NEPA's requirement that the "no need" alternative be seriously analyzed. The discussion of conservation measures contains no estimate of specific conservation potential for each of the participant's service areas. While the NERA projections include some estimates of conservation savings, no independent NRC analysis of the reasonableness of those projections is provided. With regard to the California participants, the NRC staff should identify the demand reduction resulting from California mandatory building and appliance conservations standards (Pub. Res. Code § 25402; 20 Cal. Admin. Code §§ 1400, et seq.), California's mandatory load management program (Pub. Res. Code § 25403.5), federal, state, and local programs promoting solar energy (e.g., the 55% state solar tax credit and the San Diego County solar ordinance), and other feasible and cost effective conservation

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activities such as commercial and industrial sector audits and insulation of existing buildings.

F. Conclusions.

The DES' need analysis contains a discussion of the consequences of underestimating demand and concludes that "there is a decided advantage in guarding against the risk of building the units later than demand growth and other considerations would justify." There is no analysis that this supposed benefit actually exists for each participant. Furthermore, there is no assessment of whether alternatives such as combustion turbines, which have shorter lead times and are less costly, provide better protection against blackouts caused by underforecasting.

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II. ALTERNATIVES.

Alternatives in a DES should be fairly analyzed and receive more than cursory analysis. Yet, all alternatives, except for coal, are dismissed in a few lines. A number of alternatives deserve closer analysis. For instance, cogeneration, powerpooling, and geothermal have all been identified by the Energy Commission as providing significant potential energy sources for California utilities in the late 1980's. Cogeneration of just one facility, Kaiser Steel in Fontana, could provide over 100 megawatts of capacity to Southern California utilities. In addition, recent utility submissions to the Energy Commission indicate that up to 800 megawatts of Imperial Valley geothermal is possible by 1992.

502 248

Two specific alternatives not even mentioned are repowering of Silvergate for San Diego Gas and Electric and purchases of electricity from Mexico. Repowering of Silvergate, which is technically and economically feasible, could add 298 megawatts to the SDG&E system. The California Energy Commission staff estimates that at least 300 megawatts of electricity is available to California from the Republic of Mexico through 1992. Negotiations between Mexico officials and SDG&E are currently under way.

The analysis of alternatives also fails to discuss the feasibility of using combinations of alternatives (including conservation) in place of Palo Verde 4 & 5. Except for coal, the DES fails to assess the economic and environmental costs and benefits of alternatives. This omission contradicts NRC's own regulations requiring a cost benefit analysis of environmental and other impacts of the proposed facility and alternatives. (10 CFR § 51.23(c).)

The only alternative analyzed in depth is a generic coal-fired plant. Coal is dismissed as a viable alternative primarily because of lack of available coal supplies, and greater relative costs and health impacts compared to nuclear power. These conclusions are based upon a DES analysis that is deficient and biased towards nuclear power.

The DES substantially overstates the problem in obtaining a coal supply for a coal-fired alternative to Palo Verde 4 & 5, and may, at the same time, underestimate the problems with uranium supplies. (See Nuclear Fuel Cycle below.) Federal policy, as stated in the President's original energy plan and set into law as the Powerplant and Industrial Fuel Use Act,

encourages production and use of coal in place of oil and gas. Thus, the federal government has made it a priority to remove any barriers to coal utilization. The DES ignores this policy.

Even assuming uncertainties in obtaining additional coal due to federal leasing and surface mining policies, a good deal of coal is still available since 16 billion tons of coal are already under federal lease, and substantial amounts are under state leases or are privately owned as "fee coal." Much of this is mineable underground and is not significantly affected by the Surface Mining Act. Two major coal gasification projects in New Mexico, sited on Native American land, have recently failed to receive approval from the tribes to build the conversion facilities because of expected emissions. These leases, which involve several hundred million tons of coal (sufficient for Palo Verde 4 & 5) may be put on the market soon. Colorado has extensive strip and deep mineable reserves. Half of all Colorado coal land is privately owned, and a substantial portion should be available even without resumed federal leasing, and even under strict surface mining restrictions. Similarly, there are several hundred million tons of uncommitted coal being offered for sale now in Central Utah, all deep mined. Although coal from outside Arizona would be more expensive for an Arizona coal plant because of transportation costs, it may be that a coal-fired alternative sited outside of Arizona would reduce costs.

The DES also overstates the uncertainties due to federal leasing policies and the Surface Mining Act. For example, the statement in the DES that "leasing of Federal land which contains

coal has been suspended for an indefinite period," is misleading. Leasing has been essentially suspended since 1971. However, the Secretary of the Interior has promised promulgation of a new program in 1979, which will start up by 1980. So far, the Department is on schedule; it issued its final EIS on its preferred leasing program in April, 1979. Currently, the Secretary plans to lease coal in Utah and Colorado as early as 1981-82, under a special start-up procedure. The full leasing program, with further leasing in New Mexico and Arizona, could produce its first leases as early as 1985. Since it takes one or two years to develop a mine once the leases (and other permits) are received, coal from some of these new leases could be available for a plant as early as 1983. Even if the leasing program is delayed for several years, it is likely that coal from new leases would be available for a plant to open in the late 1980's.

The EIS states "the recently enacted Surface Mining Control and Reclamation Act (of 1977) is inhibiting expansion of coal mining by creating more uncertainty about mining regulations . . . ." Although the regulations promulgated under the Act are the subject of intense controversy, there is no indication that they have inhibited mining to any substantial degree. Production for April and May of 1979 is greater than the year before (after the industry has recovered from the 1978 coal strike). Furthermore, the coal industry itself is complaining that coal expansion is presently limited by demand, and that there is currently 100 million tons per year of overcapacity.

The NRC staff economic comparison of nuclear and coal concludes that electricity costs of nuclear plants are 5% to

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302 251

11% cheaper than from coal plants. (DES, p. 9-10.) The three major determinants of electricity costs are capital costs, capacity factors, and fuel costs. The analyses in the DES of the capital costs and capacity factors for nuclear and coal is inadequate in several significant ways.

Power plant capital costs have increased rapidly over the last decade, with nuclear units showing a rate of increase approximately twice that of similarly sized coal units. As a result, the capital costs for nuclear units now coming on line are approximately twice those for coal units. The DES estimates capital costs of $1483/kWe for Palo Verde 4 & 5 and $1226/kWe for the coal alternative. Atttached as Appendix A is a chart comparing DES cost estimates with generic nuclear plant cost estimates of architect-engineer construction firms. As shown in this chart, the DES estimated ratio is inconsistent with other estimated ratios. In addition, the $1483/kWe nuclear projection in the DES is approximately 25 percent below the $1905/kWe estimate obtained when the generic estimates are adjusted to Palo Verde's operation dates. The coal option estimate, $1226/kWe, is only about 12 percent below the figure of $1368 when adjusted for operation dates. Thus, the DES estimates, though apparently low for both coal and nuclear, appear to be significantly less accurate for the nuclear option. It also appears that the capital cost estimate of the DES are outdated and do not adequately reflect the experience of the last few years. A more reasonable capital cost figure to use for a nuclear power plant constructed in the late 1980's is around $2000/kWe and around $1500/kWe for a coal-fired unit.

The DES analysis of the second cost factor, average annual capacity factor, also appears unduly to favor nuclear power. The NRC staff assumes an annual capacity factor of 65% for both nuclear and coal. The average historical capacity factor for commercial nuclear plants has been around 60%. An in-depth study of coal-fired power plants shows an average capacity factor for these plants of around 67%.[1/] Furthermore, large units (1000 megawatts and more) of any particular type tend to perform more poorly than mid-size units (500-800 megawatts) of that type. A typical nuclear unit such as Palo Verde 4 & 5 planned for operation in the 1980's, is substantially larger than the typical coal- or oil-fired plant being planned. Considering solely the performance of existing nuclear units, the predicted performance of Palo Verde 4 & 5, based on its size, vintage, manufacturer, and architect-engineer construction firm, would be less than 60 percent levelized over the life of the plant. Considering solely performance of existing coal units, capacity factors for the coal alternative should be projected in the 60-65 percent range.

This predicted capacity factor is supported by the most recent studies on power plant reliability. Power Plant Performance, authored by Charles Komanoff, is an extensive and well-done study of the historical data on capacity factors. This study analyzed performance of both coal and nuclear plants by size and type, among other variables. It showed that historic trends would produce levelized capacity factors of less than 60

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1. This comparison does not fully reflect a coal plant's greater reliability since some coal units, unlike nuclear plants, have not run at high capacity because their full output has not been required.

percent for a plant such as Palo Verde 4 & 5 and in the low- to mid-60 percent range for coal units such as the generic coal alternative here. Data which have accumulated since that study have tended strongly to reinforce its major conclusions. In 1978, Sargent and Lundy, a leading architect-engineering firm, began to use a flat 60 percent for both coal and nuclear units in its published generic estimates. Its most recent generic estimates continue to use the 60 percent figure. Hence capacity factor assumptions above 60 percent, like the comparative capital cost assumptions used in the DES by NRC staff and applicants, reflects undue optimism about nuclear plant reliability. In sum, a levelized lifetime figure of 60 percent for Palo Verde 4 & 5 and one of 60-65 percent for the coal alternative in the generic comparison is much more reasonable than the DES estimates of 65 percent. Because of the possibility that new emissions control requirements may degrade coal unit reliability, the 60 percent figure may be used for larger units and 65 percent for smaller units.

The comparison of environmental impacts is also unacceptably biased in several respects in favor of the nuclear alternative. Because of advances in technology and environmental regulations, coal plants simply will not have many of the adverse impacts associated with existing coal plants. The most significant adverse effect of the coal fuel cycle probably involve air emissions. However, because of the new sophisticated technology that should be used on a new coal plant, air emissions from new plants should be orders of magnitude lower than from existing plants. For instance, advanced air emission control equipment

302 254

currently being used in the United States, such as baghouses and scrubbers, will operate to remove 99.9 percent of a coal plant's particulate emissions (dust and fly ash) and 95 percent of its sulfur oxide (SO_x) emissions. Scrubbers may also substantially reduce hydrocarbon emissions which are a major precursor to the formation of photochemical smog. Selective catalytic reduction could remove up to 90 percent of oxides of nitrogen (NO_x). A coal plant utilizing these technologies will be cleaner than any comparably sized oil-fired plant now operating in the United States.

Under the current state and federal air quality regulatory scheme, siting of new coal plants should result in a net air quality benefit in areas that are not attainment for ambient air quality standards. EPA rulings provide that no new power plant can be built if its construction and operation would cause or contribute to a new or already existing violation of an ambient air quality standard. Nevertheless, new power plants may be built in areas that have an ambient air quality standard violation by securing emission offsets or "trade-offs". These emission offsets are obtained by reducing the allowable emissions from other existing air pollution sources in the vicinity of the proposed power plant. Offsets must be sufficient to produce a net air quality benefit in the general siting area.

Another federal air quality program, the Prevention of Significant Deterioration (PSD) Program, is designed to assure that superior air quality is maintained in designated areas, such as national parks and monuments, where air quality is currently better than required under federal standards. Under

this program, emissions from all new sources cannot cause ambient concentrations of SO_x and particulate matter in the designated areas to increase by an amount in excess of a deterioration increment which is specified by federal statute. These increments of deterioration are sufficiently small to assure that there will be limited adverse air quality impacts in the designated areas caused by large new sources, such as power plants.

Because the emissions from any new coal plants would be much lower than emissions from existing plants, a large part of the adverse health impacts associated with existing coal plants would probably not occur. Furthermore, federal and state ambient air quality standards establish a maximum safe ambient level for pollutants that have been shown to cause a public health problem. Further analysis is needed in the DES of the health impacts for a coal alternative which accurately accounts for: (a) health impacts from a facility sited in a remote, unpopulated area in California; (b) health impacts from a facility complying with Clean Air Act New Source Review requirements, including attainment of ambient air quality standards by 1992; and (c) health impacts from a facility using scrubbers, electrostatic percipators or baghouses, and selective catalytic reduction to reduce SO_x, TSP, hydrocarbon, and NO_x emissions.

Potential radioactive releases from coal burning do not appear to present significant health or environmental impacts. Combustion of coal should not result in the major uncontrolled release to the environment of radioactive radium, thorium, and

uranium since these substances will largely be controlled by the advanced air emission control equipment. Pacific Gas and Electric Company (PG&E) recently assessed the potential radionuclide releases from its proposed 1600 megawatt Fossil 1 and 2 coal facility. They concluded that resultant potential whole body dose exposure to persons living near such a facility resulting from plant releases (with 99.7 percent particulate control) would amount to less than one percent of that received from average ambient background radiation exposures.

Disposal of wastes from coal plants need not result in significant adverse impacts. Unlike wastes from nuclear power plants, beneficial reuse of the wastes from coal plants is possible. The sludge can be converted into gypsum of sufficient quality to use for wallboard and the fly ash can be used as a concrete additive in roadbeds.

Large scale use of coal has been hypothesized to result in global climatic changes. Most notable of these hypothesized changes would be the raising of temperatures due to a "greenhouse" effect of increased atmospheric carbon dioxide gas of which coal burning is one source. The DES appropriately describes this problem, but no definite conclusions can be made of the impact of operating one new coal plant on the global climate.

Finally, the DES' comparison of the coal alternative to Palo Verde 4 & 5 seriously underestimates many of the social, economic, and environmental costs of Palo Verde 4 & 5. In particular, the DES fails adequately to assess and compare with the coal alternative the project's questionable reliability, accident risks, decreased public acceptance, design and opera-

tion changes, and associated costs due to the Three-Mile Island reactor accident, problems with attracting adequate and acceptable financing for new nuclear power plants, and comparative financial risks to the utilities of Palo Verde Units 4 & 5 with a coal alternative.

III. POWER PLANT PERFORMANCE AND RELIABILITY.

As noted above the DES' estimate of 65 percent capacity factor for Palo Verde 4 & 5 is unreasonably high. The DES' assumption not only unduly favors the economics of Palo Verde 4 & 5 in comparison to coal, it also underestimates problems with Palo Verde 4 & 5's reliability and performance. Building Palo Verde 4 & 5 with its relatively poorer performance would have one of two possible effects. One result would be poor system reliability and increased risk of outages for each of the participants. The other is that utilities would compensate for the increased outage risks by building additional capacity. The DES fails to analyze the extent to which each of the participants would incur increased outage risks with Palo Verde 4 & 5 and resulting economic and environmental impacts. It also fails to discuss the likelihood the participants will build additional capacity to compensate and the resulting economic and other effects of such additions. Additional reliability impacts not analyzed in the DES are those stemming from a delay in operation of Palo Verde 4 & 5 and the effect of a simultaneous outage of all five Palo Verde units. Such a simultaneous outage might result from a future NRC shutdown order such as the order issued in response to the Three-Mile Island accident, which closed down

all Babcock & Wilcox reactors of a similar design.

IV. URANIUM FUEL CYCLE IMPACTS.

A. Fuel Availability.

The DES is unduly optimistic in its analysis of uranium availability for Palo Verde 4 & 5. Utilities in the United States currently plan to build 156,000 megawatts of nuclear power capacity by the year 1985 and around 188,000 megawatts by 1990. The federal Department of Energy (DOE) estimates that as much as 395,000 megawatts may be on-line by the year 2000. Energy Commission and DOE studies show that the nuclear power plants planned by domestic utilities will require cumulatively around 875,000 short tons of uranium through the year 2000. This estimate does not include any fuel requirements after the year 2000.

DOE (and the DES, Table 11.2) has estimated presently known domestic uranium reserves and probable (but as yet undiscovered) resources available at a forward cut-off cost of production of $30/lb. at approximately 1,705,000 short tons of uranium oxide (U_3O_8 or "yellowcake"). This $30/lb. forward cost cut-off is currently used by many sources as an estimate of the amount of uranium which is economically recoverable at current market prices. However, a study sponsored by the National Academy of Sciences has characterized the DOE estimates as upper bound figures, rather than most probable estimates. Dr. Michael Lieberman of the University of California calculated remaining resources of domestic uranium by using a resource estimating methodology which proved more reliable for estimating

oil resources than did the methodology used by DOE for uranium. Lieberman estimated that domestic resources economically recoverable at market prices amount to only 798,000 short tons. Both methodologies recognize that additional uranium may be found and recovered at costs substantially above current market prices.

If the Lieberman estimate is used, currently economic domestic uranium resources will be exhausted by about 1995 under present utility plans for nuclear power development. If the DOE estimate is used, currently domestic uranium resources will be exhausted before 2010. In either case, there would not be sufficient domestic quantities of this resource to fuel nuclear plants coming on line in the 1980's and 1990's throughout their full operating lifetimes. Thus, under either scenario, continued economic operation of nuclear plants would depend on purchasing uranium from foreign sources, greater than expected discoveries of domestic resources, major and as yet unspecified technological breakthroughs in resource recovery, or substantial reversals in recently formulated federal policies on the recycling of nuclear fuel (such as the President's recent decision not to pursue development of a breeder reactor, which produces more fuel than it consumes).

B. Fuel Processing.

Palo Verde 4 & 5 also faces potential fuel supply problems related to uranium mining, milling, and enrichment capacity. With regard to uranium mining and milling, the Nuclear Exchange Corporation, the trading market organization for yellowcake, has estimated that domestic uranium mining and milling produc-

tion will be approximately 24,000 short tons of U_3O_8 in 1985. This production level will be less than the requirements in the mid-1980s of nuclear power plants currently on-line and expected to be on line. Thus, although the amount of domestic uranium in the ground may be sufficient to meet requirements at least in the 1980s, it may not be possible to produce enough of the uranium.

Uranium must be enriched before it can be used in a nuclear reactor. The United States Department of Energy is the sole domestic source of nuclear fuel enrichment. DOE's current enrichment capacity is 17 million separative work units (SWU, the measure of enrichment services). DOE is increasing its capacity and is expected to reach around 27.3 million SWU in 1986. DOE has calculated that the domestic demand for enrichment services in the middle to late 1980s will be 18.4 million SWU. DOE also has contracts to provide 110,000 megawatts of foreign reactors with enrichment services, requiring around 10.1 million SWU. Thus, the total need for more than 28.5 million SWU in the middle to late 1980s exceeds likely capacity.

In light of this problem, DOE has considered increasing the Uranium-235 content to the waste stream from an enrichment plant. However, this procedure would require substantially increased amounts of raw uranium, thus exacerbating the uranium supply problem already discussed. In addition, DOE has decided to construct an enrichment facility using a new technological process around 1990. However, the main component of the process has not yet been commercially demonstrated, and has, in fact, experienced failures in testing. Furthermore, such a facility

could likely be subject to the construction schedule slippages which have characterized other large nuclear projects in the 1970s. It is therefore quite possible that full production capability would not be achieved until after 1990. Thus, it is uncertain whether DOE will be able to supply needed enrichment services in the middle and late 1980s. This would adversely affect any nuclear power plant, whether existing or new, during that time.

If nuclear fuel is unavailable at reasonable cost because of resource scarcity or a lack of mining, milling or enrichment capability, nuclear plants would most likely be forced to operate at low output levels. This would increase the costs of electricity produced by these high capital cost projects, because the plants' fixed costs would be spread over fewer kilowatt-hours of production.

C. Was . Disposal.

The DES seriously underestimates the environmental impacts of wastes generated by the plants and the resulting adverse reliability, safety, and economic implications. The high-level lethal nuclear wastes produced by Palo Verde 4 & 5 must be isolated from the environment and man for hundreds of thousands of years. Currently there is no dem trated method for permanent safe disposal and isolation of the astes. Consequently, Palo Verde 4 & 5's wastes will have to be temporarily stored either in tanks at several central locations through the United States or as used or "spent" fuel accumulating in storage pools at the reactor site. The absence of a waste disposal method for Palo

Verde 4 & 5 means the costs of disposal are essentially unknown. The accumulation of spent fuel potentially will also jeopardize reactor operation, since new fuel cannot be added if there is no more room for the spent fuel. The problems of cost, the relative unknowns of nuclear waste disposal, and resulting impacts on reliability, are inadequately addressed in the DES.

D. Decommissioning.

The DES' cursory discussion of decommissioning Palo Verde 4 & 5 is totally inadequate. Decommissioning involves substantial problems of costs, acceptable waste disposal, maintenance of security, and institutional (i.e., utility) longevity. There exists currently in the state of New York a prime example of the effects of institutional instability in a case involving nuclear waste, the Nuclear Fuel Services' (NFS) West Valley reprocessing plant. The dispute concerns the responsibility for, and management of, the 600,000 gallons of high level wastes left at the plant site when NFS went out of business. This dispute has not been resolved. Nevertheless, the DES totally fails to analyze social and environmental impacts of decommissioning but only states that studies of suc effects have not identified any significant impacts of decommissioning large commercial nuclear power plants. Their primary reference is a study by the Atomic Industrial Forum (AIF). The AIF is the nuclear industry's lobbying arm, hardly the independent analyst required under NEPA.

The DES does estimate decommissioning costs but these estimates appear to be extremely low. SDG&E testified before the Energy Commission in the Sundesert Notice of Intention

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proceeding that decommissioning costs (as estimated nearly two years ago) would range from $25 to $40 million and that a "conservative factor" of 25 percent should be added. No discussion is included as to how the ten utilities will share decommissioning costs, whether each will be liable for the other's costs, how each of the participants plans to ensure its ability to finance the costs, and the impacts of the costs on each of the utilities' financing integrity. The DES is thus seriously deficient in answering who will assume responsibility for the facility during the twenty-first century and how the public can be assured that adequate funds are available for dismantling as late as the twenty-second century.

V. THREE-MILE ISLAND IMPACTS.

The recent nuclear accident at Three-Mile Island (TMI) has had profound effects on the nuclear industry. The DES admits that the NRC did "not take into consideration the experience gained from the accident at the TMI site. . . ." The omission of information on the effects of TMI is a serious deficiency of the DES, since data from TMI accident may well affect the cost, reliability, and safety of Palo Verde 4 & 5. A DES must contain all relevant information on the benefits and risks of a proposal, so as to allow a fair comparison with alternatives. The DES' failure to analyze the impacts of TMI on Palo Verde 4 & 5 is particularly alarming given recent statements of the NRC affirming the relevance of the accident and subsequent analysis to new nuclear facilities. Specifically, the NRC has issued a letter dated June 6, ordering consideration of TMI

accident in an ongoing licensing proceedings. Furthermore, at a recent briefing before the Energy Commission, NRC officials emphasized that TMI would result in at least three additional requirements for any new nuclear power plants: expanded safety measures pursuant to NUREG 0560, better evacuation plans, and increased operator training. The DES should be updated to discuss the effect of these requirements on plant design and operation, capital costs resulting from such changes, and utility financing. Furthermore, because of the new knowledge of increased risks of nuclear accidents, a revised assessment of Palo Verde 4 & 5's reliability and safety, as well as the environmental and economic consequences of revised postulated accidents is needed. Finally, a revised cost-benefit analysis comparing Palo Verde 4 & 5 with alternatives should include the new information resulting from the TMI accident.

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APPENDIX "A"

CAPITAL COSTS FOR PALO VERDE 4 & 5 NUCLEAR UNITS AND COAL-FIRED ALTERNATIVE

Comparison of Draft Environmental Statement Estimates for Cost of Proposed Palo Verde 4 & 5 Nuclear Units with Generic Nuclear Plant Cost Estimates of Architect-Engineer-Constructor Firms

SOURCE, Date*	COST ($/KWE-INSTALLED)	ON-LINE DATE
UE&C, 1969	$24[illegible]/~$165**	Mid 75
UE&C, 1974	$711	Early 83
Ebasco, Mid 1975	$1005	1/85-1/87
Bechtel, Early 1976	$1030	84-85
Sargent & Lundy, Late 1976	$1047	Late 85
Sargent & Lundy, Early 1977	$1232	Late 86
Ebasco, Mid 1977	$1281	87-89
Sargent & Lundy, Mid 1978	$1[illegible]7/$711**	Late 90
Ebasco, Late 1978	$1801	1/90
Sargent & Lundy, Early 1979	$1[illegible]/$7[illegible]**	Late 90
Draft Environmental Statement for Palo Verde 4 & 5	$1483	1990

* Sources are referenced on the last pages of this Exhibit, pages 3 and 4.

** These figures are real costs, not including AFDC, at the time of the estimate.

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02 26

CAPITAL COSTS FOR PALO VERDE 4 & 5 NUCLEAR UNITS AND COAL-FIRED ALTERNATIVE

Comparison of Draft [illegible]ronmental Statement Estimates for Cost of Coal-Fi[illegible]ternative to Palo Verde 4 & 5 with Generic C[illegible]d Plant Cost Estimates of Architec[illegible]-Constructor Firms

SOURCE*, Date	COST ($/KWE-INSTALLED)	ON-LINE DATE
UE&C, 1969	$195/~$135**	Mid 75
UE&C, 19[illegible]	$626	Early 83
Ebasco, [illegible]	$910	[illegible]85-1/87
Bechtel, [illegible]	$850	[illegible]
Sargent [illegible] 197[illegible]	$841	Late 85
Sargent [illegible] [illegible]ly	$942	Late 86
Ebasco, [illegible]	$1054	87-89
Sargent & Lun[illegible], Mid 197[illegible]	$1083/$460**	89-90
Ebasco, Late 1978	$1096	1/87
Sarge[illegible]ndy, Early 197[illegible]	$1046/$589**	89-90
Draf[illegible]mental Sta[illegible]	$1226	1990

* Sources are r[illegible] the last pages of this Exhibit, pages [illegible] and [illegible]

** These figures [illegible] costs, not including AFDC, at the time of the estimate.

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302 268

CAPITAL COSTS FOR PALO VERDE 4 & 5 NUCLEAR UNITS AND COAL-FIRED ALTERNATIVE

Sources for architect-engineer-constructor generic cost estimates

UE&C, 1969 - "Trends in the Cost of Light Water Reactor Power Plants for Utilities", USAEC Report WASH-1150, May 1970.

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302 269

CAPITAL COSTS FOR PALO VERDE 4 & 5
NUCLEAR UNITS AND COAL-FIRED ALTERNATIVE

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502 270