7/27/77

July 27, 1977

Elizabeth S. Bowers, Esq., Chairman
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. Glenn O. Bright
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. William E. Martin
Senior Ecologist
Battelle Memorial Institute
Columbus, Ohio 43201

In the Matter of
Pacific Gas and Electric Company
(Diablo Canyon Nuclear Power Plant, Units Nos. 1 and 2)
Docket Nos. 50-275 O.L. and 50-323 O.L.

Members of the Board:

Enclosed for insertion in the record in this case is a copy of "NRC Staff Evaluation of the Impact of Revised Table S-3 Values on the Diablo Canyon Cost-Benefit Balance". While this revised data must be considered in the cost-benefit balance for licensing actions after March 14, 1977, the effective date of adoption of Final Interim Rule S-3 (See, Statement of Consideration, 42 Fed. Reg. 13803, March 14, 1977; Supplemental General Statement of Policy, 41 Fed. Reg. 49898, November 11, 1976), the impact on the overall cost-benefit balance is negligible. The Staff would propose to have this matter inserted in the record, and considered by the Licensing Baard. Should the Board or any party so request, the Staff will furnish a witness who can be subject to such limited cross-examination as is authorized by 10 C.F.R. §51.20(e), during a future hearing session.

Sincerely,

Richard J. Goddard
Counsel for NRC Staff

Enclosure

cc (w/ encl.):
See Page 2

OFFICE	OELD	OELD				
SURNAME	RGoddard/dbr	JTourtellotte				
DATE	7/27/77	7/27/77				

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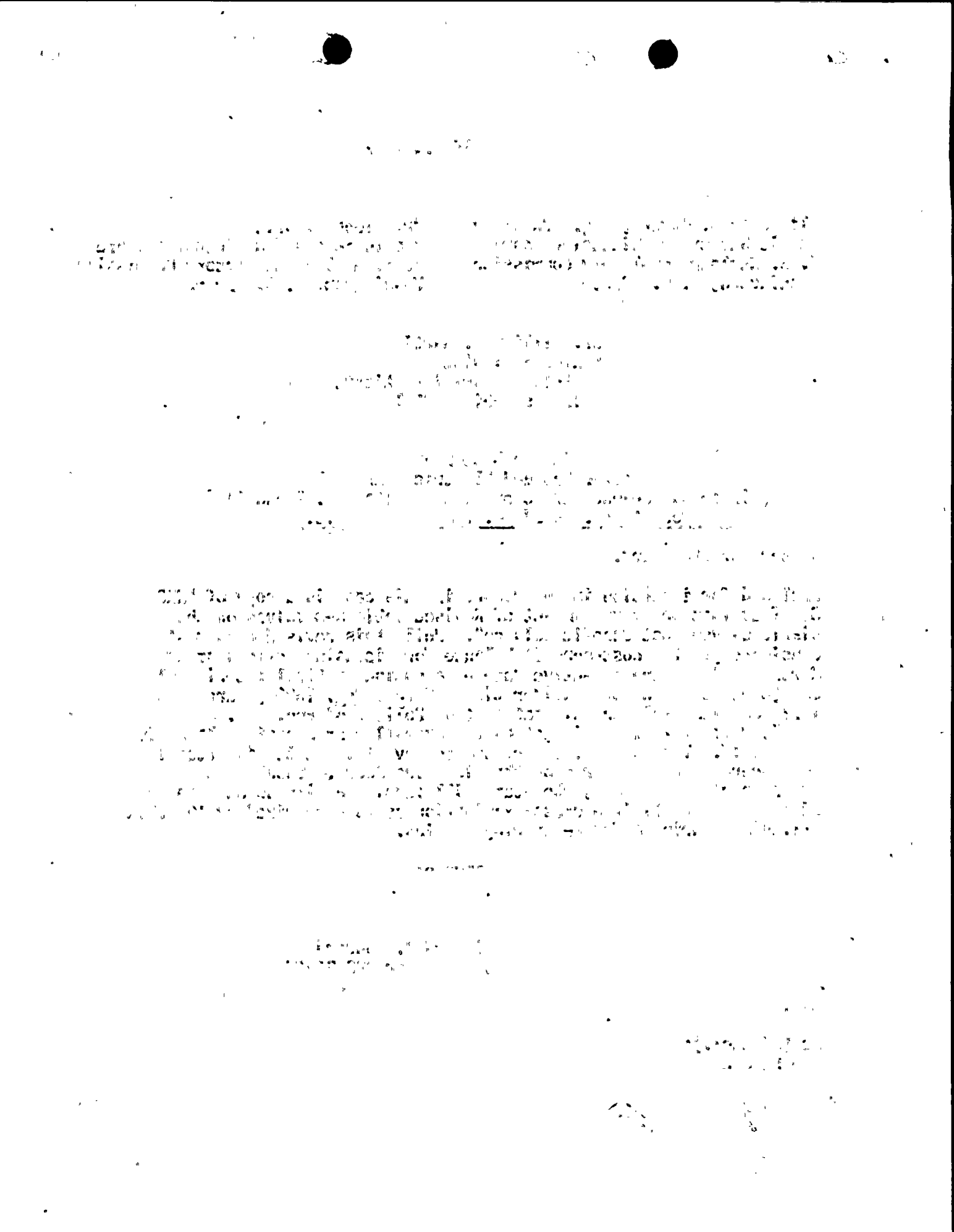

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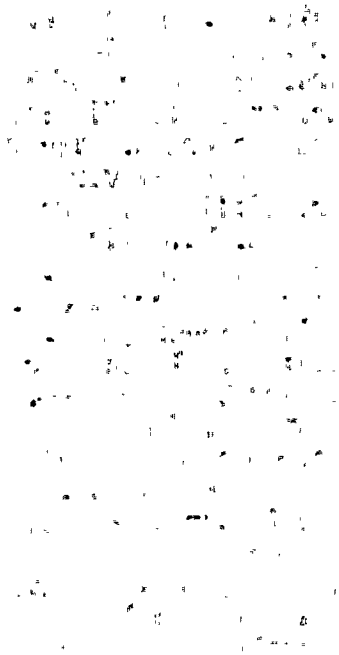

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PACIFIC GAS AND ELECTRIC COMPANY	)	Docket Nos. 50-275-OL
	)	50-323-OL
	)	
(Diablo Canyon Nuclear Power Plant, Units 1 and 2)	)	

NRC STAFF EVALUATION OF THE IMPACT OF REVISED TABLE S-3 VALUES ON THE DIABLO CANYON COST-BENEFIT BALANCE

On March 14, 1977, the Nuclear Regulatory Commission issued an interim rule regarding the environmental considerations of the uranium fuel cycle (42 FR 13803). It is effective through September 13, 1978, and revises Table S-3 of the Commission's regulations 10 CFR Part 51. Final rulemaking proceedings will be conducted to provide for additional public comment. Specific details with respect to time, place and format of such proceedings shall be presented in a subsequent FEDERAL REGISTER notice.

The interim rule reflects new and updated information relative to reprocessing of spent fuel and radioactive waste management as discussed in NUREG-0116, Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle (Supplement 1 to WASH-1248) and NUREG-0216 (Supplement 2 to WASH-1248) which presents public comments on NUREG-0116 and the NRC staff responses thereto. The rule also considers other environmental factors of the uranium fuel cycle including mining and milling,

isotopic enrichment, fuel fabrication, and the management of low and high level radioactive wastes. These factors are described in the Atomic Energy Commission report WASH-1248, Environmental Survey of the Uranium Fuel Cycle.

Specific categories of natural resource use are included in Table S-3 of the interim rule. This revised table, entitled "Summary of environmental considerations for uranium fuel cycle", is reproduced in this assessment. The resource use categories relate to land use, water consumption and thermal effluents, electrical energy use, fossil fuel combustion, chemical and radioactive effluents, burial of transuranic and other high and low level wastes, and radiation doses from transportation of radioactive materials and various occupational exposures. The contributions in Table S-3 for reprocessing, waste management, and transportation of wastes are maximized for either of the two fuel cycles (uranium only and no recycle), that is, the cycle which resulted in the greater impact was used.

In accordance with the interim rule, the staff's assessment of the environmental impacts of the fuel cycle as it relates to the operation of the Diablo Canyon Nuclear Power Plant is based upon the values given in the attached table. Further, the staff has considered the revised values in its determination of the effects on the cost-benefit balance as presented in the FES for the Diablo Canyon Nuclear Power Plant. For the sake of consistency, the analysis of fuel cycle impacts other than that due to land use has been cast in terms of a model 1000 MWe LWR. Our conclusions regarding the effects of these impacts would not be altered if the analysis was based on the electrical power capacity of 1150 MWe for each

of the Diablo Canyon Nuclear Power Plant units - a value sufficiently close to 1000 MWe as to not perturb the validity of the analysis.

The total amount of land requirements for the fuel cycle supporting a model 1000 MWe LWR is approximately 100 acres (94 acres temporarily committed and 7.1 acres permanently committed). Over the 30-year operating life of the plant this amounts to about 2100 acres,[1/] which is approximately 25% of the total land commitment for the Diablo Canyon facility itself.

A further point of perspective is that the temporarily disturbed land associated with the fuel cycle supporting the model 1000 MWe LWR or the 1150 MWe Diablo Canyon units is comparable to the temporarily disturbed land associated with the fuel cycle supporting a small coal-fired power plant of about 110 MWe. Considering common classes of land use in the United States, the fuel cycle land requirement related to the operation of the Diablo Canyon Nuclear Power Plant does not constitute a significant impact.

The annual total water usage and thermal effluents associated with fuel cycle operations to support a 1000 MWe LWR are given in the revised Table S-3. Since the Diablo Canyon plant utilizes once-through cooling, it can be

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[1/] The temporarily committed land at the reprocessing plant is not prorated over 30 years, since the complete temporary impact accrues regardless of whether the plant services one reactor for one year or 57 reactors for 30 years (See footnote "2" to the enclosed Table S-3).

compared to the model 1000 MWe plant with once-through cooling referenced in the table. Thus, the amount of water discharged to the air, water bodies and the ground related to the fuel cycle represents about 8% of the principal consumptive water use, i.e., discharge to water bodies, for the Diablo Canyon plant. The quantity of heat discharged in fuel cycle operations is less than 8% of the thermal output from two 1000 MWe LWR's. The staff finds these quantities of indirect water consumption and thermal loadings to be acceptable relative to the use of water and thermal discharges at the power plant.

Electrical energy and process heat are required during various phases of the fuel cycle process. The electrical energy is usually produced by the combustion of fossil fuel at conventional power plants. As indicated in Table S-3, electrical energy associated with the fuel cycle represents less than 5% of the annual electrical power production of a typical 1000 MWe nuclear plant. Process heat is primarily generated by the combustion of natural gas. As noted in Table S-3, this gas consumption if used to generate electricity would be less than 0.3% of the electrical output from a 1000 MWe plant. The staff finds, therefore, that both the direct and indirect consumption of electrical energy for fuel cycle operations are small and acceptable relative to the net power production of the two-unit Diablo Canyon plant.

The quantities of chemical gaseous and particulate effluents associated with fuel cycle processes are also given in Table S-3. The principal

species are SO_x, NO_x and particulates. Based upon data in a CEQ report,[2/] the staff finds that these emissions constitute an extremely small additional atmospheric loading in comparison to the same emissions from the stationary fuel combustion and transportation sectors in the U.S., i.e., approximately 0.02% of the annual (1974 base) national releases for each of these species. The staff believes such small increases in releases of these pollutants are relatively insignificant and therefore acceptable.

Liquid chemical effluents produced in fuel cycle processes are related to fuel enrichment, fabrication and reprocessing operations and may be released to receiving waters. These effluents are usually present in dilute concentrations such that only small amounts of dilution water are required to reach levels of concentration that are within established standards. Table S-3 specifies the flow of dilution water required for specific constituents. Additionally, all liquid discharges into the navigable waters of the United States from plants associated with the fuel cycle operations will be subject to requirements and limitations set forth in an NPDES permit issued by an appropriate State or Federal regulatory agency.

Tailings solutions and solids are generated during the milling process. These solutions and solids are not released in signficant quantities to create an impact upon the environment.

[2/] "The Seventh Annual Report of the Council on Environmental Quality," September 1976, Figures 11-27 and 11-28, pp. 238-239.

Radioactive effluents released to the environment estimated to result from reprocessing and waste management activities and other phases of the fuel cycle process are set forth in Table S-3. It is estimated that the overall gaseous dose commitment to the U.S. population from the total fuel cycle for a 1000 MWe reference reactor would be approximately 370 man-rem per year. This dose is less than 0.002% of the average natural background dose of approximately 20,000,000 man-rem to the U.S. population. Based on Table S-3 values, the additional dose commitment to the U.S. population from radioactive liquid effluents due to all fuel cycle operations would be approximately 100 man-rem per year for a 1000 MWe reference reactor. Thus, the overall estimated annual involuntary dose commitment to the U.S. population from radioactive gaseous and liquid releases due to these portions of the fuel cycle for a 1000 MWe LWR is approximately 470 man-rem. The occupational dose attributable to the reprocessing and waste management portions of the fuel cycle is 22.6 man-rem per reference reactor year. This represents approximately 5% of the occupational dose associated with operation and maintenance of each of the Diablo Canyon reactors.

The quantities of buried radioactive waste material (low-level, high-level and transuranics) are specified in Table S-3. For low level wastes, which are buried at land burial facilities, the Commission notes in the table that there will be no signficant effluent to the environment. For high-level and transuranic wastes, the Commission notes that these are to be buried at a Federal Repository and, in accordance with Table S-3 of 10 CFR 51.20,

no release to the environment is associated with such disposal. NUREG-0116, which provides background and context for the new values established by the Commission, indicates that these buried wastes, which are placed in the geosphere, are not released to the biosphere and no radiological environmental impact is anticipated from them.

Also set forth in Table S-3 is the transportation dose to workers and the public. This dose is small and is not considered significant in comparison to the natural background dose.

The use of a fuel cycle entailing no recycle (neither plutonium or uranium) would not affect the discussion above since as described in footnote 1 of Table S-3, the Commission has considered such a cycle in developing the values given in Table S-3 with respect to reprocessing, waste management, and transportation of wastes.[3/]

The staff has evaluated the environmental impacts associated with the uranium fuel cycle as discussed in NUREG-0116 and NUREG-0216 and as shown in Table S-3. On the basis of the above assessment, the staff has found these impacts to be sufficiently small so that, when they are superimposed

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[3/] As noted in Table S-3, the entry for Radon-222 excludes the contribution from mining. Footnote 5 to the table indicates a maximum release of about 4800 curies of Radon-222 when contributions from mining are considered. This in turn, would increase the estimated dose commitment for the total fuel cycle by some 600 man-rem per reference reactor year, maximized for the no recycle case. Although this is larger than the dose commitment due to other elements of the fuel cycle, it is still small compared to the natural background exposure level of some 20,000,000 man-rem per year.

upon the other environmental impacts assessed with respect to operation of the Diablo Canyon Plant, they would not alter the cost-benefit balance against issuance of the operating licenses.

Table S-3 *Summary of environmental considerations for uranium fuel cycle*[1]
[Normalized to model LWR annual fuel requirement (WASH-1248) or reference reactor year (NUREG-0116)]

Natural resource Use	Total	Maximum effect per annual fuel requirement or reference reactor year of model 1,000 MWe LWR
Land (acres):		
Temporarily committed[2]	94	
Undisturbed area	73	
Disturbed area	22	Equivalent to 110 MWe coal-fired powerplant.
Permanently committed	7.1	Equivalent to 35 MWe coal-fired powerplant.
Overburden moved (millions of MT)	2.8	
Water (millions of gallons):		
Discharged to air	159	≈2 pct of model 1,000 MWe LWR with cooling tower.
Discharged to water bodies	11,090	
Discharged to ground	124	
Total	11,373	<4 pct of model 1,000 MWe LWR with once-through cooling
Fossil fuel:		
Electrical energy (thousands of megawatt hours)	321	<5 pct of model 1,000 MWe LWR output
Equivalent coal (thousands of MT)	117	Equivalent to the consumption of a 45 MWe coal fired powerplant.
Natural gas (millions of scf)	124	<0.3 pct of model 1,000 MWe energy output
Effluents—chemical (MT):		
Gases (excluding entrainment):[3]		
SO_x	4,400	Equivalent to emissions from 45 MWe coal-fired plant for a year.
NO[4]	1,190	
Hydrocarbons	14	
CO	29.6	
Particulates	1,154	
Other gases:		
F^-	0.67	Principally from UF_6 production, enrichment, and reprocessing. Concentration within range of state standards—below level that has effects on human health.
HCl	0.014	
Liquids:		
$SO_4^=$	9.9	From enrichment, fuel fabrication, and reprocessing steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. The constituents that require dilution and the flow of dilution water are: NH_3—600 ft³/s. NO_3—20 ft³/s. Fluoride—70 ft³/s.
NO_3^-	25.8	
Fluoride	12.9	
CA^{++}	5.4	
Cl^-	8.5	
NA^+	12.1	
NH_3	10.0	
Fe	0.4	
Tailings solutions (thousands of MT)	240	From mills only—no significant effluents to environment.
Solids	91,000	Principally from mills—no significant effluents to environment.
Effluents—radiological (curies):		
Gases (excluding entrainment):[5]		
Rn-222	74.5	Principally from milling operations and excludes contributions from mining.
Ra-226	0.02	
Th-230	0.02	
Uranium	0.034	
Tritium (thousands)	18.1	
C-14	24	
Kr-85 (thousands)	400	
Ru-106	0.14	Principally from fuel reprocessing plants.
I-129	1.3	
I-131	0.83	
Fission products and transuranics	0.203	
Liquids:[6]		
Uranium and daughters	2.1	Principally from milling—included in tailings liquor and returned to ground—no effluents; therefore, no effect on environment.
Ra-226	.0034	From UF_6 production.
Th-230	.0015	
Th-234	.01	From fuel fabrication plants—concentration 10 pct of 10 CFR 20 for total processing 26 annual fuel requirements for model LWR.
Fission and activation products	5.9×10^{-6}	
Solids (buried on site):		
Other than high level (shallow)	11,300	9,100 Ci comes from low-level reactor wastes and 1,500 Ci comes from reactor decontamination and decommissioning—buried at land burial facilities. 600 Ci comes from mills—included in tailings returned to ground ~60 Ci comes from conversion and spent fuel storage. No significant effluent to the environment.
TRU and HLW (deep)	1.1×10^7	Buried at Federal repository
Effluents—thermal (billions of British thermal units)	3,462	<4 pct of model 1,000 MWe LWR.
Transportation (person-rem): Exposure of workers and general public.	25	
Occupational exposure (person-rem)	22.6	From reprocessing and waste management.

[1] Data supporting this table are given in the "Environmental Survey of the Uranium Fuel Cycle," WASH-1248, April 1974; the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0116 (Supp. 1 to WASH-1248), and the "Discussion of Comments Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0216 (Supp. 2 to WASH-1248). The contributions from reprocessing, waste management and transportation of wastes are maximized for either of the 2 fuel cycles (uranium only and no recycle). The contribution from transportation excludes transportation of cold fuel to a reactor and of irradiated fuel and radioactive wastes from a reactor which are considered in table S-4 of sec. 51.20(g). The contributions from the other steps of the fuel cycle are given in columns A-E of table S-3A of WASH-1248.

[2] The contributions to temporarily committed land from reprocessing are not presented over 30 years, since the complete temporary impact accrues regardless of whether the plant services 1 reactor for 1 yr or 57 reactors for 30 yr.

[3] Estimated effluents based upon combustion of equivalent coal for power generation.

[4] 1.2 pct from natural gas use and process.

[5] Gaseous effluents from waste management contribute about 9 person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year for the uranium only recycle option. This contribution for the no recycle option is 170 person-rem. For comparison, all radiological gaseous effluents from fuel cycle operations contribute about 370 person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. This dose is <0.002 pct of the average natural background radiation dose to this population. Fuel reprocessing contributes about 330 person-rem (total body) of the total of 370 person-rem to offsite U.S. population. Person-rem is an expression for the summation of whole body doses to individuals in a group. Thus, if each member of a population group of 1,000 people were to receive a dose of 0.001 rem (1 millirem), or if 2 people were to receive a dose of 0.5 rem (500 millirem) each, the total person-rem dose in each case would be 1 person-rem. The dose to the offsite U.S. population due to average natural background radiation is about 2×10^7 person-rem per year. The Commission's final environmental statement on use of mixed-oxide fuel in LWR's (NUREG-0002) indicates a maximum release of about 4800 Ci of Rn-222 when contributions from mining are included. NUREG-0002 also indicates that mining contributes about 500 person-rem (total body) and that milling contributes about 100 person-rem (total body) at a total of about 610 person-rem (total body) to offsite U.S. population per annual fuel requirement.

[6] Liquid radiological effluents from reprocessing and waste management activities in the fuel cycle contribute 1.4×10^{-4} person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. For comparison all radiological liquid effluents from fuel cycle operations contribute about 100 person-rem (total body) to offsite U.S. population per annual fuel requirement or reference reactor year. This dose is <0.005 pct of the average natural background radiation dose to this population.

July 21, 1977

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Business & Professional People
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Chicago, Illinois 60602

Brent Rushforth, Esq.
Center for Law in the Public
Interest
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Los Angeles, California 90067

In the Matter of
Pacific Gas and Electric Company
(Diablo Canyon Nuclear Power Plant, Units Nos. 1 and 2)
Docket Nos. 50-275 O.L. and 50-323 O.L.

Gentlemen:

Enclosed for your use is a loan copy of the transcript of the May 12, 1977 Prehearing Conference.

Sincerely,

L. Dow Davis
Counsel for NRC Staff

Enclosure

OFFICE ➢						
SURNAME ➢	7/21/77					
DATE ➢						

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
SUITE 202, WALNUT CREEK PLAZA
1990 N. CALIFORNIA BOULEVARD
WALNUT CREEK, CALIFORNIA 94596

July 21, 1977

50-275 323

Mr. E. D. Cook
3264 Triangle Park Road
Mariposa, CA 95338

Dear Mr. Cook:

Thank you for your recent letter and for sharing your views with us regarding the necessity of licensing the Diablo Canyon Nuclear Power Station for operation.

We would like to assure you that the NRC staff and the independent Advisory Committee on Reactor Safeguards are working as expeditiously as possible to resolve questions which have been raised about the ability of the facility to withstand earthquakes.

When this question is resolved, the Atomic Safety and Licensing Board will resume the public hearing on Pacific Gas and Electric Company's application to operate the facility. At this time, it is not possible to predict when a final decision will be reached.

We, of course, are aware of the problems the current drought is causing and will cause in the coming months; nevertheless, our primary consideration in this matter--as in all others--must be the public health and safety.

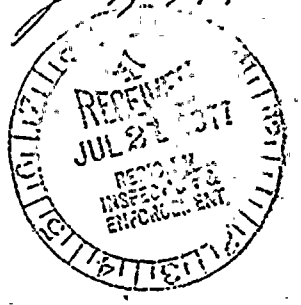
In the meantime, we are taking the liberty of forwarding a copy of your letter for inclusion in the Diablo Canyon file so that all parties to the proceeding will be aware of your views.

Very truly yours,

James G. Hanchett
Public Affairs Officer

cc: w/inc to Docketing and Service Branch

Manteca, Calif.
July 19, 1977



Mr. James L. Hanchett,
Walnut Creek, Ca,

Sir:

By digging into this rotten mess, pertinent to the reason why? the Diablo Canyon Nuclear plant has not as yet produced 1-Kilowatt, it makes me pretty irate.

I have also found you the man, who carried the big stick when it comes to getting that Complex into production.

It is my hope that those of us who dare to stand up and be counted will out number the "Anti" this and the "Anti that" groups.

Unless something is done soon, we will be without electrical energy, so lets not let that happen.

It is my opinion as and observer only, that P. G. & E. have been more than patient.

Please, lets not loose this battle!

Very truly Yours,

E. F. Cook.

REG. FILES

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD PANEL
WASHINGTON, D. C. 20555

7/21/77
July 21, 1977

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State College, Pennsylvania

RE: METROPOLITAN EDISON COMPANY, ET AL.
(Three Mile Island, Unit No. 2)
Docket No. SIN 50-320

Ladies and Gentlemen:

At the session of the evidentiary hearing held on July 5, 1977, the Board indicated that it would issue its written order on Intervenor's motion concerning Contention No. 5 within a few days following the hearing. The motion was denied orally on May 18, 1977 (Tr. p. 1549).

Supervening events have made it impossible for us to issue the written order as quickly as earlier contemplated. The Board now expects to issue its written order setting forth its reason for the denial of the motion early in the month of August 1977.

Very truly yours,

Edward Luton

Edward Luton, Chairman
Atomic Safety and Licensing Board