

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	
PACIFIC GAS AND ELECTRIC COMPANY)	DOCKET Nos. 50-275 O.L.
(Diablo Canyon Nuclear Power)	50-323 O.L.
Plant, Unit Nos. 1 and 2))	

AFFIDAVIT OF DALE G. BRIDENBAUGH

DALE G. BRIDENBAUGH, being first duly sworn, state under oath as follows:

1. In 1981 I, Dale G. Bridenbaugh, coauthored an affidavit with Richard B. Hubbard regarding the risks surrounding operation of Diablo Canyon, Units 1 and 2 at low power. This affidavit, entitled Affidavit of Dale G. Bridenbaugh and Richard B. Hubbard, was dated August 11, 1981, and was submitted to the Nuclear Regulatory Commission. A copy is attached.

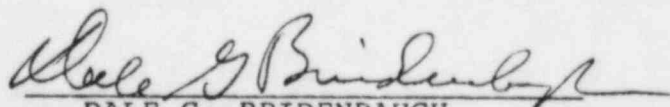
2. Paragraphs 11 and 12 of the 8/11/81 affidavit address the potential hazards resulting from a release of built up fission products as a result of an accident during 5% power operation. It also discusses the radioactive contamination and irradiation of plant systems and components that would occur as a result of the 5% power operation.

3. It is my understanding that PG&E is now seeking approval for a full power license for Diablo Canyon Unit 1. The granting of such full power approval is potentially

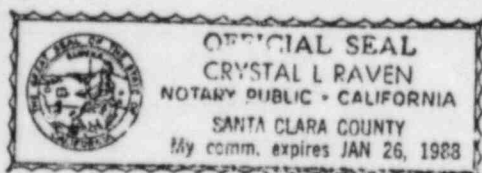
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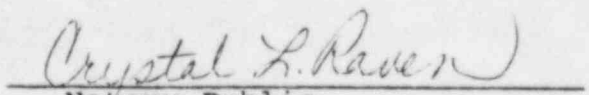
hazardous and needs to be carefully considered. The risks outlined in the above paragraphs of the 8/11/81 affidavit are still present and would be increased by a significant factor by operation at full power. It is therefore of even greater importance that the plant has been adequately designed and constructed and that PG&E is properly qualified to operate it than was the case for low power operation. Accordingly, the risks described in paragraphs 11 and 12 of the 8/11/81 affidavit continue to be of concern.

I have read the foregoing and swear that it is true and accurate to the best of my knowledge.


DALE G. BRIDENBAUGH

Subscribed and sworn to before me on this 24th day of July, 1984.




Notary Public
Commission expires: 1/26/88

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of

PACIFIC GAS AND ELECTRIC COMPANY

(Diablo Canyon Nuclear Power
Plant, Unit Nos. 1 and 2)

Docket Nos. 50-275 O.L.
50-323 O.L.

AFFIDAVIT OF DALE G. BRIDENBAUGH
AND RICHARD B. HUBBARD

DALE G. BRIDENBAUGH and RICHARD B. HUBBARD, being first
duly sworn, state under oath as follows:

1. In preparing this affidavit, affiant Richard B. Hubbard reviewed PG&E's proposed special low power test program as set forth in the low power license application and as further described in PG&E's safety analysis report provided to the NRC Staff on February 6, 1981. He also attended, as a consultant to Governor Brown's counsel, all sessions of the recent low power test proceedings which were held in San Luis Obispo from May 19 to May 22, 1981. Thus, he is familiar with the duration of the low power tests as postulated by PG&E and Staff witnesses. Further, he has reviewed the actual schedule for fuel loading, initial criticality and zero power testing, and low power testing of large PWR's which have occurred in the

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post-TMI period, particularly North Anna-2, Salem-2, and Sequoyah-1. In addition, on July 10, 1981, Hubbard accompanied Commissioner Gilinsky on his tour of the Diablo Canyon facility. A recent statement of Hubbard's professional qualifications and experience is set forth in Exhibit 16 of "Opposition of Governor Edmund G. Brown, Jr. to the NRC Staff and Pacific Gas and Electric Company Motions for Reconsideration and Summary Disposition," dated April 24, 1981.

2. Affiant Dale G. Bridenbaugh is a Professional Nuclear Engineer, technical consultant, co-founder and president of MHB Technical Associates, technical consultants on energy and environment, with offices at 1723 Hamilton Avenue, Suite K, San Jose, California. He has participated as an expert witness in licensing proceedings before the U.S. Nuclear Regulatory Commission (NRC); has served as a consultant to the NRC; has testified at the request of the Advisory Committee on Reactor Safeguards; has appeared before various committees of the U.S. Congress and testified in various state licensing and regulatory proceedings. Additional details of Bridenbaugh's experience and qualifications are set forth in Attachment A, which is attached hereto.

3. The purpose of this affidavit is twofold: First, to estimate the elapsed time which is likely to be required after issuance of a low power operating license to load fuel and to

complete the special low power tests at or below 5% of Rated Thermal Power as Pacific Gas and Electric Company has proposed for Diablo Canyon Unit 1; second, to identify the technical difficulties and increased costs associated with modifying the structures, systems, and components of the plant should further modifications be required after fuel has been loaded and operation commenced. The results of our review are summarized in the following paragraphs.

4. During Commissioner Gilinsky's tour of the Diablo Canyon facility, both NRC and PG&E personnel emphasized PG&E's readiness to load fuel. The necessary fuel is presently onsite in a building immediately adjacent to the Containment Building. Further, due to the duration of the licensing process, PG&E has had sufficient time to conduct, and in some cases reconduct, its pre-operational tests as set forth in Section 14.1 of the Final Safety Analysis Report. Thus, we conclude that Diablo Canyon Unit 1 equipment is in an advanced state of readiness to load fuel, and that virtually all preliminary testing (see FSAR Table 14.1-1) possible prior to fuel loading has been completed.^{*/} Further, we conclude that PG&E should be able to promptly load fuel once such authorization is received from the NRC.

5. We estimate that the fuel loading task should be completed in less than one week elapsed time. For example, at

^{*/} A recent Nucleonics Week article indicates that all steps prior to fuel load will be completed by approximately August 12, 1981 (p. 4, Nucleonics Week, July 23, 1981). In general, all pre-operational testing will be completed before fuel loading (FSAR, p. 14.1-8).

Salem-2, a Westinghouse-designed PWR similar in design and rating to Diablo Canyon, fuel loading began on May 23, 1980 and was completed on May 27, 1980. More specifically, a PG&E spokesman recently estimated that preparation and fuel loading of Diablo Canyon Unit 1 could be completed in about one month after issuance of a low power license (see July 18, 1981 article from the San Francisco Chronicle, which is attached hereto as Attachment B). Therefore, we conclude that it is reasonable to expect that fuel loading of Diablo Canyon could be completed in one to two weeks and certainly no more than 30 days after the issuance of a low power test license.^{*/}

6. The next phase of startup and testing includes initial criticality and low power testing. FSAR Table 14.1-2 summarizes the normal tests which will be performed. In addition, the scope and duration of the special low power tests were described in detail during the recent low power proceedings in San Luis Obispo. The Board, in the partial Initial Decision dated July 17, 1981, noted at page 24, paragraph 61, that PG&E has proposed a series of eight special low power tests. The proposed tests would probably last for no more than one month and in actuality, as cited by the Board, would perhaps take only about eighteen days (Tr. 10,726-10,728). Other references to the "relatively few days" encompassed by the proposed low power test

^{*/} It has been reported that PG&E expects fuel loading to take no longer than two weeks (p. 4, Nucleonics Week, July 23, 1981).

program are set forth in the recent decision by the Board at page 25 (paragraph 65), page 32 (paragraph 82), and page 33 (paragraph 83). Therefore, we believe that it is reasonable to expect that, absent major problems, initial criticality and low power testing can be conducted in an elapsed time of less than 30 days. Thus, assuming a 30-day period to complete fuel loading (which we believe to be very conservative), the entire fuel load and testing program can easily be completed in no more than 60 days.

7. The reasonableness of a 60-day cycle from license issuance to completion of the special low power tests was further confirmed during Commissioner Gilinsky's tour of the Diablo Canyon facility. In response to a question, the Diablo Canyon Plant Manager, Robert C. Thornberry, stated in Hubbard's presence that PG&E's current schedules forecast that fuel loading, zero power testing, and the special low power test program will be completed approximately 58 days after receipt of a low power license. Mr. Thornberry added that the schedule might need to be increased if major unanticipated problems were encountered during the test program.

8. In order to be conservative, we believe it may be appropriate to add 15 to 30 days to the fuel loading and low power testing schedule to allow time for resolution of any routine unanticipated events. In reaching the preceding conclusions,

we have assumed a routine startup during which no major accident, such as a seismically induced LOCA, occurs. Thus, we are not stating any conclusion on either the risk potential during low power testing or the probability of accidents occurring during such testing. Our sole purpose is to express the view that absent unforeseen events, the PG&E startup and low power testing program should require no more than 30 days to complete after fuel is loaded.

9. The post-TMI experience and the current schedules for startup testing lend further support to the preceding conclusions. The first plant granted an operating license in the post-TMI period was Sequoyah-1, which received a low power license on February 29, 1980. Fuel loading commenced on March 2, 1980 and was completed on March 8, 1980. Two major problems thereafter seriously delayed the initial criticality of Sequoyah-1. First, in response to I&E Bull. 79-14, TVA required approximately 60 days to inspect and rework pipe hangers and supports. Second, in parallel with the hanger reinspection, TVA conducted a base line inspection of the turbine blades. The turbine reinspection required 4-5 weeks of elapsed time. Routine maintenance problems and pre-operational testing resulted in further delays. Initial criticality was achieved on July 5, 1980. Following zero power testing, the special low power testing program began on July 12 and was completed on

July 18, 1980.

10. The second plant to receive a post-TMI license to load fuel and conduct special low power tests was North Anna-2. The authorization to load fuel was issued on April 11, 1980 and the low power testing was completed by July 1, 1980, an elapsed time of less than 80 days. The Salem-2 low power license was issued on April 18, 1980. As set forth in paragraph 5, fuel loading was completed on May 27, 1980. Initial criticality was achieved on August 2, 1980 and the special low power test program was completed on August 29, 1980. The two months delay between fuel loading and initial criticality was largely due to the need to conduct routine pre-operational maintenance testing and surveillance testing (such as valve operability) which could have been accomplished prior to fuel load. As presented in paragraph 4, we believe that these pre-operational tests will be accomplished at Diablo Canyon prior to mid-August, 1981. Thus, we conclude that the actual duration of the Salem-2, North Anna-2, and Sequoyah-1 fuel loading and low power testing programs is not inconsistent with our conclusions for Diablo Canyon as set forth herein.

11. Table I of the testimony of Applicant's witness, Dr. Brunot, in the low power test proceedings sets forth the fission product inventories which will be produced in the core during the proposed Diablo Canyon low power test program. For

example, the inventory of iodine-131, one of the radionuclides which is a significant contributor to the dominant exposure modes for accidents requiring off-site emergency preparedness, is estimated by Dr. Brunot as 4,500,000 curies (approximately 1/20th the full power value as set forth in FSAR Table 11.1-4). In contrast, for the design basis LOCA addressed by the Applicant in the FSAR for full power operation, only 192 curies of iodine-131 were postulated to be released to the environment in the first two hours (FSAR Table 15.5-12). Therefore, because of the relatively rapid buildup (half-life of hours to days) of the radioactive isotopes listed in Table 3 of NUREG-0654^{*/} which dominate prompt health consequences resulting from postulated accidental releases, we conclude that even at 5% power the fission products available for release pose a significant potential hazard.

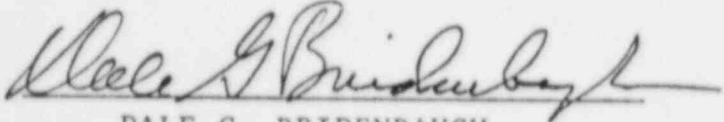
12. Operation at low power will not only cause a buildup of fission products within the reactor core, making it inaccessible for contact repair and/or modification but will also cause a spread of radioactive contaminants throughout the primary portion of the steam supply system. It will also contaminate certain auxiliary systems such as the Chemical and Volume Control System, Equipment and Floor Drainage Systems, and the Liquid Radioactive Waste System. If fuel failures and/or steam generator tube failures or leaks are experienced, a large number

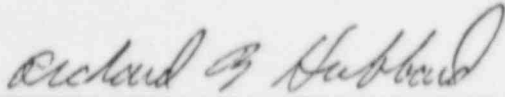
^{*/} NUREG-0654, Rev. 1 (FEMA-REP-1), "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November, 1980.

of other systems, including the turbine, condensate, and other components within the Steam and Power Conversion System could become contaminated. Contamination and irradiation of such equipment greatly increases the care required and the time and cost of future modifications that could be required at the plant. It is, therefore, important that power operation, including low power testing, not be permitted until reviews and evaluations that could lead to required plant modifications have been completed.

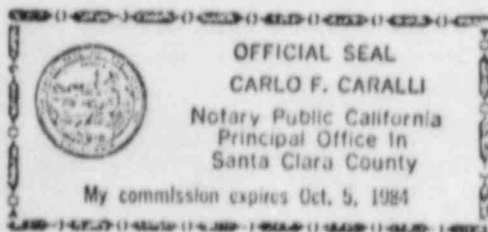
13. Based on the foregoing, we conclude that fuel loading, initial criticality, and low power testing, including the special low power tests, can be accomplished at Diablo Canyon Unit 1 within approximately 60 days, with an outside maximum elapsed time of approximately 90 days, after issuance of the low power operating license. We further conclude that the fuel loading portion of the startup schedule should be completed within less than 30 days following issuance of the low power license. Finally, we conclude that operation at low power will contaminate some of the facility's components and systems. This unnecessary commitment of resources creates technical difficulties and increased costs associated with modifying the reactor, should further modification be required after fuel has been loaded and power operation commenced.

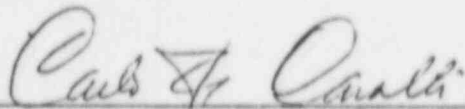
I have read the foregoing and swear that it is true and accurate to the best of my knowledge.


DALE G. BRIDENBAUGH


RICHARD B. HUBBARD

Subscribed and sworn to before me this 11th day of August,
1981.




Notary Public
My commission expires: 10/5/84

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

DOCKETED

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In the Matter of)

PACIFIC GAS AND ELECTRIC COMPANY)

(Diablo Canyon Nuclear Power)
Plant, Units 1 and 2))

Docket Nos. 50-275 O.L.
50-323 O.L.

CERTIFICATE OF SERVICE

I hereby certify that on this 25th day of July, 1984, I have served copies of the foregoing JOINT INTERVENORS' APPLICATION FOR A STAY, mailing them through the U.S. mails, first class, postage prepaid, to the attached list.

Amanda Varona
AMANDA VARONA

SERVICE LIST

- | | |
|--|--|
| *Nunzio Palladino, Chairman
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 | *James Asselstine, Commissioner
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 |
| *Lando W. Zech, Jr. Commissioner
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 | *Frederick Bernthal, Commissioner
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Commission
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| *Thomas S. Moore, Chairman
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Appeal Board
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Washington, D.C. 20555 | *Dr. W. Reed Johnson
Atomic Safety & Licensing
Appeal Board
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 |
| *Dr. John H. Buck
Atomic Safety & Licensing
Appeal Board
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 | *Docket and Service Branch
Office of the Secretary
U.S. Nuclear Regulatory
Commission
Washington, D.C. 20555 |
| *Lawrence Chandler, Esq.
Office of the Executive Legal Director - BETH 042
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555 | |
| David S. Fleischaker, Esq.
Post Office Box 1178
Oklahoma City, OK 73101 | |
| *Bruce Norton, Esq.
Norton, Burke, Berry & French
2002 E. Osborn
Phoenix, AZ 85064 | |
| *Malcolm H. Furbush, Esq.
Vice President & General Counsel
Philip A. Crane, Esq.
Pacific Gas and Electric Company
77 Beale Street
San Francisco, CA 94106 | |

John Van de Kamp, Attorney General
Andrea Sheridan Ordin, Chief Attorney General
Michael J. Strumwasser,
Special Counsel to the Attorney General
Office of the Attorney General
State of California
3580 Wilshire Boulevard, Suite 800
Los Angeles, CA 90010

Richard B. Hubbard
MHB Technical Associates
1723 Hamilton Avenue
Suite K
San Jose, CA 95125

Virginia and Gordon Bruno
Pecho Ranch
Post Office Box 6289
Los Osos, CA 93402

Sandra and Gordon Silver
1760 Alisal Street
San Luis Obispo, CA 93401

Carl Neiburger
Telegram Tribune
Post Office Box 112
San Luis Obispo, CA 93402

Tom Devine
Government Accountability Project
1901 Que Street, N.W.
Washington, D.C. 20009

Eric Havian, Esq.
Heller, Ehrman, White & McAuliffe
44 Montgomery Street., 31st Floor
San Francisco, CA 94104

* Via Express Mail