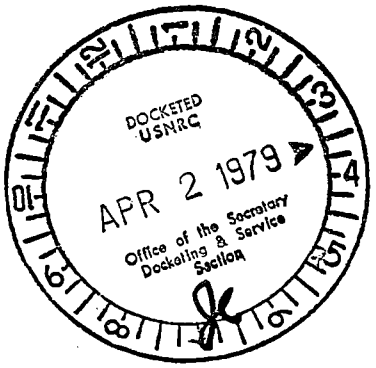

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
PUBLIC SERVICE ELECTRIC & GAS COMPANY, et al.,	)	Docket No. 50-272 (Proposed Issuance of Amendment to Facility Operating License No. DPR-70)
	)	
(Salem Nuclear Generating Station, Unit 1)	)	
	)	

INTERVENORS, COLEMANS', MEMORANDUM IN OPPOSITION TO THE LICENSEE'S MOTION FOR SUMMARY DISPOSITION

INTERVENORS' STATEMENT OF MATERIAL FACTS IN DISPUTE PERTAINING TO CONTENTION TWO.

2. The licensee has given inadequate consideration to the occurrence of accidental criticality due to the increased density or compaction of the spent fuel assemblies. Additional consideration of criticality is required due to the following:

A. deterioration of the neutron absorbtion material provided by the Boral plates located between the spent fuel bundles;

B. deterioration of the rack structure leading to failure of the rack and consequent dislodging of spent fuel bundles.

For its convenience, P.S.E.&G. has choosen to lump together its consideration of the Colemans' Contentions Two or Six. These separate safety issues, however, are too important to be glossed over with such superficial treatment. The Colemans' second contention deals directly with the increased potential of accidential criticality occurring in the spent fuel pool due to deterioration of the neutron absorbtion material provided by the Boral plates which are proposed to be placed significantly closer than in previous long

term usage in the nuclear industry.* Accordingly, the statement on the sixth page of licensee's memorandum in support of its motion, to wit: "unirradicated stainless steel fixtures have been exposed in pools up to 20 years and Zircaloy clad spent fuel has been successfully stored in pool for up to 18 years without evidence of degradation," is a complete non sequitur.

Intervenors in this proceeding are not opposing storage of spent fuel in water cooled basins situated adjacent to a nuclear generating station situated near the Philadelphia metropolitan area. Rather, they are strenuously objecting to the density of such unprecedented long term basin storage at this location with an untried system that entails a known potential for rack deterioration.** In this case, past experience with low density storage provides very little assurance of high density pool safety.

Furthermore, what experience there has been with spent fuel pool storage in conjunction with nuclear power plant operations is not reassuring. As stated in the Minor affidavit attached hereto the Monticello and Connecticut Yankee reactors experienced rack degradation. (Minor, page 3,B). The relevance of these rack integrity deficiencies, while disputed by P.S.E.&G., is clearly an unresolved factual issue material to the Colemans' contention two.

Finally, the very report relied upon the licensee: "Behavior of Spent Nuclear Fuel in Water Pool Storage," BNWL-2256 Battelle Northwest Laboratories, September 1977;*** details the known corrosion problems which have

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*"The present rack design has a nominal center-to-center spacing between fuel storage cavities of 21 inches. The proposed new spent fuel racks would be modular stainless stell structures with individual storage cavities to provide a nominal center-to-center spacing of 10.5 inches." NRC Staff Safety Evaluation, January 15, 1979 Section 1.0, page 1-1, paragraph 2.

**This NRC Safety and Licensing Board can take judicial notice of the fact that heat plus acidic water over time induces corrosion in metals, including stainless steel. The NRC Staff Safety evaluation estimates that:"The maximum incremental heat loads that will be added by increasing the number of spent fuel assemblies in the SFP from 264 to 1170 will be 4.5×10^6 Btu/hr." Report page 2-4, Section 2.2.2, paragraph Two.

***Since P.S.E.&G.'s motion and supporting documents attached thereto only the first four pages of the Battelle Report, page thirty-six of this report is attached hereto as Exhibit A.

already occurred in spent fuel pool storage cells:

> "Aluminum corrosion behavior has been substandard in some borated pools. . . . Considerable aluminum corrosion also occurred in crevices on the cannisters, perhaps due to oxygen concentration cells."

The unfortunate circumstance that the Battelle Report can only speculate on the cause of the corrosion as being the result of oxygen concentration cells merely adds to the unresolved safety issues pertaining to long term basin storage. Intervenors intend to fully examine both the NRC and P.S.E.&G. witnesses concerning these corrosion risks at the Salem hearings in May.

INTERVENORS' STATEMENT OF MATERIAL FACTS
IN DISPUTE PERTAINING TO CONTENTION SIX

6. The licensee has given inadequate consideration to qualification and testing of Boral material in the environment of protracted association with spent nuclear fuel, in order to validate its continued properties for reactivity control and integrity.

The numerous unresolved safety issues pertaining to this contention are best exemplified by the licensee's anomolous argument that the greatest care possible has been taken to protect the Boral from exposure to the spent fuel pool water environment, while proposing under certain circumstances to dose this Boral with contaminated pool water. When a leaking problem arises in the stainless steel shroud, P.S.E.&G. intends to drill vent holes in the top of the storage cell to relieve the gas pressure buildup inside. This intentional breaching of the integrity of the Boral protective shielding demands the utmost scrutiny to determine all the consequences of action which, on its face, appears to severely undermine the very design basis for the safety analysis of the spent fuel pool. Examples of specific factual questions pertaining to the nature of this venting procedure abound: what equipment will be used to drill these vent holes?, what size holes are contemplated?, how long will the cells be used with vent holes? What safeguards will be used to ensure that the holes are drilled no further than required to relieve the gas pressure buildup? In sum, no detail is given on the proposed method of relieving the gas pressure thru venting without doing additional damage to this safety system.

Moreover, the uncertainties of so-called normal storage operations are also fertile areas for factual inquiry by this Board. P.S.E.&G. has stated that its present NRC plant operation license permits continuous use of the spent fuel pool for the life of the plant, approximately 40 years time; also use beyond this period is even contemplated (See Transcript, Prehearing Conference, May 18, 1978;

T62-16 to T63-6. Despite this very real possibility that fuel assemblies will be kept in the Salem pools at least for seventeen years (due solely to economic considerations since viable alternatives now exist), the NRC Staff Safety Report states:

> "Since the possibility of long-term storage of spent fuel exists, the effects of the pool environment on the racks, fuel cladding and pool liner are under continued investigation." NRC Staff Safety Evaluation page 2-14, Section 2.4.1, paragraph Two.

This candid acknowledgement by Staff that the P.S.E.&G. plan involves many facets still being evaluated itself underscores the necessity of examining these issues at a plenary hearing prior to authorizing reracking which may expose the public unknowingly to unreasonable risks.

INTERVENORS' STATEMENT OF MATERIAL FACTS
IN DISPUTE PERTAINING TO COTENTION NINE

9. The Licensee has given inadequate consideration to alternatives to the proposed action. In particular, the Licensee has not adequately evaluated alternatives associated with the Nuclear Regulatory Commission adopting the "no action" alternative for licensee's application, which would implicate the following:

A. expansion of spent fuel storage capacity at reprocessing plants;

B. licensing of independent spent fuel storage installations;

C. storage of spent fuel from Salem No. 1 at the pools of other reactors;

D. ordering the generation of spent fuel to be stopped or restricted (leading to the slow-down or termination of nuclear power production until ultimate disposition can be effectuated).

That material facts exist concerning alternatives to the proposed risky expansion of the Salem One and Two Spent Fuel Pools can not be seriously questioned. Nor has P.S.E.&.G. really attempted to do so. In its Statement of Undisputed Facts, P.S.E.&.G. has included the following points:

34. It is highly unlikely that an Independent Spent Fuel Storage Installation ("ISFSI") could be available to accept fuel by 1983 or 1984. (emphasis added).

36. It is unlikely that the Hope Creek units would be sufficiently complete to enable fuel to be stored prior to the unmodified Salem unit fuel pool being fuel. (emphasis added).

Of course, were this Board to deny Public Service's application to expand its Salem Pools for any one of the safety or environmental concerns addressed herein, we can rest assured that the likelihood of the company expediting the

construction schedule for the Hope Creek pools would undoubtedly be much greater. This is particularly so in light of the cost of shutting down Salem One, estimated by P.S.E.&G. at $300,000.00 per day.

Furthermore, the unsettled posture of "ISFSI" availability is subject to rapid change. Within this past week, the New York Times reported that the United States Department of Energy had reached an agreement in principle with the State of New York regarding the reopening of the West Valley, New York spent fuel storage facility. (N. Y. Times, p. 1, March 21, 1979, Exhibit B). No one can make the categorical statement that an ISFSI will not be available by the time that Salem One and Two will reach pool capacity (no sooner than late 1983 if no unusual down time is experienced at either plant; a highly unlikely eventuality).* To do so is pure speculation, upon which a motion for summary disposition can not be granted. Mississippi Power and Light Company (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-130, 6 AEC 423, 424-425 (1973).

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*The NRC Staff Environmental Impact Appraisal, January 15, 1979, Section 7.3 page 16, paragraph 3 states that the U.S. Department of Energy announced in October of 1977 its plan to provide interim fuel storage facilities by 1983 or 1984. For some unexplained reason, the staff has decided to discount the avowed commitment of a Cabinet level Department of the United States Government. This caliveer treatment of a major national initiative warrants a thorough review at a plenary hearing.

Moreover, P.S.E.&G. has stated without clarification that : "(s)ince Salem Unit 2 is expected to begin operation shortly, [Salem One has been operating for over 1 year now and will need to refuel within a few weeks] and will have an annual discharge of fuel, both unenlarged fuel pools would be full by 1983 even if the capacity of the pools were shared jointly." This identical deadline for both plants makes no allowance for the additional year before Salem Two will need to off-load its first 1/3 of a core. Intervenors plan to fully explore all these factual issues at the hearing scheduled for May 2, 1979.

INTERVENORS' STATEMENT OF MATERIAL FACTS IN DISPUTE PERTAINING TO CONTENTION THIRTEEN

> 13. The licensee has failed to give adequate consideration to the cumulative impacts of expanding spent fuel storage at Salem Nuclear Generating Station Unit 1 in association with the recently filed proposed amendment to the application for an operating license at the sister unit, Salem Unit 2. (See Amendment No. 42, Docket No. 50-311, filed April 12, 1978 which proposes modifications of spent fuel storage which the intervenor believes are similar in scope to the Salem Unit 1 application.). For example, the licensee assumes an increase in releases of Kr-85 by a factor of 4.5--due to the factor of 4.5 increase in spent fuel (licensee's application, at 10). A similar increase, absent exceptional controls, can be expected at Salem No. 2, resulting in a cumulative increase in Kr-85 emissions by a factor of 9--almost a full order of magnitude increase. (If similar spent fuel increases are postulated for the companion units, Hope Creek 1 and 2, now under construction, the cumulative increase could rise by a factor of 18, or almost two full orders of magnitude.)

In addition to the numerous factual issues associated with the need for faultless operation of the Salem One and Salem Two spent fuel pools over a long period of time (See Minor affidavit, pages eight through ten), the Colemans' Contention 13 is wholly misconstrued by P.S.E.&G. in order to avoid the fundamental policy thrust of 10 C.F.R. Part 50, Appendix I, and 10 C.F.R. §20.1. Pursuant to the latter NRC regulation, P.S.E.&G. is required to:

> "...make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas, as low as is reasonably achievable." 10 C.F.R. §20.1.

This rule, then, clearly obligates the licensee to make every reasonable effort to maintain radiation exposures as low as is reasonably achievable in making all decisions on plant operational modes and not merely reliance upon the existing containment mechanisms once it has drastically increased the radaition

load in the spent fuel pool.* Having made a decision to increase the public's exposure to radiation, Public Service is udner an affirmative duty to establish the reasonableness of this action in light of alternatives that would not ential such increased exposure. If not by implementing additional containment measures, the licensee must seek to achieve this standard by adopting alternatives to the proposed action which do not result increased radiation exposure.

Therefore, the factual basis for P.S.E.&G.'s conclusion that increasing the public's exposure to Krypton-85 radiation in the entire Salem region constitutes compliance with 10 C.F.R. Part 50, Appendix I is an issue which can only be resolved at the plenary hearing scheduled in this matter.

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*P.S.E.&G. hereby seeks impermissibly to obtain both a shield and sword from the NRC regulations and rulings pertaining to this proceeding. When intervenors assert that considration be given to the adequacy of the spent fuel pool containment in light of the increased risks posed by high density storage, they are told that this has been foreclosed by the prior grant of an operation license to the plant, which found this structure to be adequate. Nonetheless, when confronted with the obligation to maintain radiation exposure as low as reasonably achievable, the licensee proposes to make no further efforts whatsoever, except to declare the increased exposure to be insignificant.

Intervenors respectfully submit that the Nuclear Regulatory Commission's mandate to maintain radiation as low as reasonably achievable constitutes an directive for affirmative action which can not be ignored in this fashion.

CONCLUSION

For all the foregoing reasons, the licensee's motion for summary disposition should be denied.

Respectfully submitted,

STANLEY C. VAN NESS, PUBLIC ADVOCATE

BY: Keith C. Onsdorff

KEITH A. ONSDORFF, ESQUIRE
Attorney for Intervenors

AGREE ON DISPOSING OF NUCLEAR WASTES

Talks With Energy Secretary Bring a Tentative Pact on Problems of Material in West Valley

By STEVEN R. WEISMAN
Special to The New York Times

WASHINGTON, March 20 — After more than a year of negotiations, the Federal Energy Department has tentatively agreed to accept responsibility — at a possible cost of several hundred million dollars — for eventual disposal outside New York State of huge deposits of highly radioactive nuclear waste at the West Valley, N.Y., storage facility near Buffalo.

At the same time, the Carey administration has agreed to accept additional amounts of nuclear waste, produced by nuclear reactors operating around New York State, for interim storage at West Valley until the Federal Government comes up with a long-awaited plan for eventual disposal.

The preliminary agreement between the Energy Secretary, James R. Schlesinger, and the state government, must be approved by the White House and Congress before it can take effect. But energy officials, who disclosed the accord today, said it constituted an important breakthrough on one of the sorest points of contention between Albany and the Federal Government.

Reprocessing Company Defunct

At issue in the sometimes bitter dispute is the defunct Western New York Nuclear Service Center, a so-called "reprocessing facility" on a 3,300-acre site southeast of Buffalo. It is the only plant of its kind ever operated in the United States under purely commercial auspices.

The plant, owned by the state and leased to Nuclear Fuel Services, a subsidiary of the Getty Oil Company, was a favored project of Gov. Nelson A. Rockefeller in 1963, at a time of high hopes for the future of nuclear power. It was shut down in 1972, an acknowledged symbol of the failure of the nation's energy planners to deal with the problem of nuclear-waste disposal.

For more than a year, the Carey administration has been trying to get the Federal Government to accept responsibility for the nuclear waste that has been at the plant since its shutdown, posing what some fear is a possible health hazard to nearby residents.

The highly radioactive material at West Valley consists of 170 tons of "spent" or used-up nuclear fuel rods in storage pools; 100,000 cubic feet of solid waste, primarily leftover hardware, and, perhaps the most hazardous substance, 600,000 gallons of highly radioactive liquid waste drained from the reprocessing operations.

Also at West Valley, buried in trenches, are two million cubic feet of low-level "radioactive trash" — rags, clothing, dead laboratory animals and other material that had been exposed to X-rays.

Recently, a small hole was discovered in a catch-pan lying beneath the underground tank holding the liquid waste, and the state ordered Nuclear Fuel Services to repair it immediately as a potential safety hazard. Because the agreement with the Federal Government disclosed today cannot take effect until sometime in the future, the accord does not lessen the hazards posed by the leak or the need to repair it, according to state officials.

Under existing arrangements, the exact nature of the state government's responsibility for West Valley is in dispute, and Governor Carey has been pressing the State Energy Commissioner, James L. Larocca, to reach an agreement for the Federal Government to intercede.

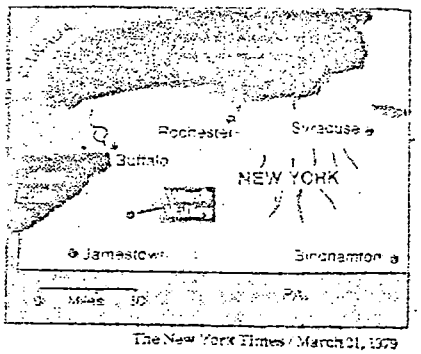
When word got out today that Mr. Schlesinger and Mr. Larocca had reached a tentative agreement, with many details remaining to be ironed out, Senator Daniel P. Moynihan, Democrat of New York, disclosed that he had received assurances some time ago from Mr. Schlesinger on West Valley.

"A year and a half ago, Secretary Schlesinger and I reached an agreement in principle that the Federal Government would eventually assume responsibility for the high-level wastes at West Valley and would undertake to remove them," Mr Moynihan said. "Last week he called me to inform me that this week he would be taking the matter up with O.M.B."

The Senator was referring to the Federal Office of Management and Budget, which would have final say on the price tag of any such effort. Estimates on the cost of decontaminating and "decommissioning" West Valley range from $200 million to $1.1 billion, depending on the plans proposed. Mr. Moynihan said in an interview that he never announced his agreement with Mr. Schlesinger because

U.S. in Accord on Nuclear Wastes

Continued From Page A1



The New York Times / March 21, 1979

Mr. Schlesinger "was not in a position to move on it then."

"He is now, and it would do us no harm to show due appreciation," said Mr. Moynihan.

At the Energy Department, a spokesman for Mr. Schlesinger would say only that "no final plans" had been agreed upon. John M. Deutch, acting assistant secretary for energy technology, also declined to comment, saying that "some progress" had recently been made in resolving the problems.

Accord Covers Cleanup Costs

Others suggested that Federal energy officials did not want to label their preliminary accord as complete because of the need to persuade the Office of Management and Budget to accept a long-term assumption of responsibility by the Federal Government, which could take 10 years.

As described by knowledgeable officials, the Schlesinger-Larocca agreement would call for the Federal Government to assume almost all the cost of disposing of the high-level waste.

The 600,000 gallons of waste would be solidified through a still-undecided process. For example, a $5-million demonstration project for such a venture is being advanced by Representative Stanley N. Lundine, a Jamestown Democrat, in Congress, with the apparent backing of the Energy Department.

DOCKETED USNRC APR 2 1979 Office of the Secretary Docketing & Service Section

Exhibit A

The boric acid has presented some problems in regard to ion exchange operation to maintain water purity. However, ion exchange resins have been developed which continue to absorb species such as chloride ion while heavily loaded with boric acid.

In most cases, pool and fuel bundle materials have appeared to function satisfactorily in boric acid fuel pool chemistry, but very few detailed analyses of the materials are available. Aluminum corrosion behavior has been substandard in some borated pools. One utility had 6061 aluminum canisters residing directly on the stainless steel liner at ~110°F. Substantial corrosion developed on the aluminum canisters, forming aluminum borate ($Al_4B_2O_9$) which flaked off. Considerable aluminum corrosion also occurred in crevices on the canisters, perhaps due to oxygen concentration cells. Insulators between the canisters and the liner minimize galvanic corrosion of the aluminum. Cypress wood and teflon were first used as insulators. However, both were deficient. The cypress deteriorated in water, and the teflon did not meet the criterion of resistance to 10^8 rad of radiation exposure. The cypress insulators are being replaced with alumina and the teflon is being replaced with silicone resin.

FUEL POOL AND FUEL ROD TEMPERATURES

Heat generated in spent fuel by radioactive decay is dissipated in the fuel pools, elevating the water temperatures. The decay heat at three days after discharge is about 0.3% of the full power heat release. After five years the value is only ~0.06% of the full power value.[23]

Reactor pool specifications generally call for fuel pool temperatures of ≤ 120°F (40°C) with full heat exchange capacity; ≤150°F (66°C) with one heat exchanger and aged fuel and 212°F (100°C) with freshly discharged fuel and loss of heat exchange capacity. However, there are no reports that pool temperatures have approached 100°C. The maximum actual pool temperature reported in the survey was 43°C.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

AFFIDAVIT OF GREGORY C. MINOR

On Behalf of Intervenors

Mr. & Mrs. Alfred Coleman

Regarding

CONTENTIONS 2, 6, 9 and 13

In the Matter of

PUBLIC SERVICE ELECTRIC AND GAS COMPANY, et. al.

Salem Nuclear Generating Station Unit No. 1

Proposed Amendments to

Increase Spent Fuel Storage Capacity

Docket No. 50-272

March 26, 1979

I. INTRODUCTION

My name is Gregory C. Minor. I am a partner in MHB Technical Associates, a consulting firm located in Palo Alto, California. My educational background is in electrical engineering (B.S., University of California at Berkeley, 1960, M.S., Stanford University, 1966). In addition, I participated in General Electric's 3-year Advanced Course in Engineering,

graduating in 1963. A full description of my experience and background is attached at the end of this affidavit.

During the period between 1960 and 1976, I was employed by General Electric Company in engineering and management positions involving the design of components and systems for use on nuclear reactors. These systems included reactor monitoring, control, and safety systems. Between 1972 and 1976, I was Manager of Advanced Control and Instrumentation Engineering; responsible for designs of new safety and control systems whose first application will be on BWR-6 plants.

I am presently a consulting engineer with MHB Technical Associates, consulting on nuclear power issues for public and private organizations at a state, national, and international level. I am also a member of the Nuclear Power Plant Standards Committee for the Instrument Society of America.

II. STATEMENT AND DISCUSSION REGARDING INTERVENOR'S CONTENTIONS 2 AND 6

The following is a statement of the Coleman's Contentions 2 and 6. Because they are treated together in the Motion for Summary Disposition, we will also treat them together:

> 2. The licensee has given inadequate consideration to the occurrence of accidental criticality due to the increased density of compaction of the spent fuel assemblies. Additional consideration of criticality is required due to the following:

A. deterioration of the neutron absorbtion material provided by the Boral plates located between the spent fuel bundles;

B. deterioration of the rack structure leading to failure of the rack and consequent dislodging of spent fuel bundles;

6. The licensee has given inadequate consideration to qualification and testing of Boral material in the environment of protracted association with spent nuclear fuel, in order to validate its continued properties for reactivity control and integrity.

There are a number of issues of material fact which apply to these contentions and which are not adequately addressed in the Applicant's documentation.

A. While there is experience with the materials of the proposed high density storage racks for Salem, significant uncertainty exists as to the corrosion effect and associated life of the storage racks, including the stainless steel and Boral material.

B. There has been degradation of the Boral/stainless steel racks installed at Monticello and Connecticut Yankee reactors. The Applicant claims these problems have"limited relevance to the issues in the proceding" (Liden at paragraph 12). However, there is no evidence presented that assures these same or similar problems will not occur in the proposed racks for Salem.

C. Very little in-service experience is available in storage pool racks with vented cells, as cell venting was not anticipated until leakage and associated swelling recently required modification at the Monticello plant.

D. The expedient of venting as a way to deal with the leakage problem is a major cause of much of the concern over the rack material performance questioned in this contention. The basic design and materials evaluation leading up to this specific design intended utilization of leak tight, encapsulated Boral. (Liden at paragraph 6). However, the Applicant has discussed venting at some length. (Applicant's Motion at 7, 8, and Liden at paragraph 8). There does not appear to be sufficient analysis by the Applicant of the operation and effectiveness of the racks in the event the cells require venting.

E. The September, 1977 report by Battelle Northwest's A.B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage", BNWL-2256, substantiates that the Boral cell venting decision may have significant corrosion consequences. To quote from page 36 of this report:

"In most cases, pool and fuel bundle materials have appeared to function satisfactorily in boric acid fuel pool chemistry, but very few detailed analyses of the materials are available. Aluminum corrosion behavior has been substandard in some borated pools.---Considerable aluminum corrosion also occurred in crevices on the canisters, perhaps due to oxygen concentration cells." (emphasis added)

This experience seems clearly to indicate the possibility of corrosion problems with the design as currently anticipated and is certainly an issue of material fact.

F. The NRC in their SER on Salem make the following observation regarding swelling and venting:

"Upon exposure of the Boral plates (B_4C/Al Matrix) to the spent fuel pool water, galvanic coupling between the aluminum-Boral liner, aluminum binder and the stainless steel shroud could occur.....the hydrogen produced by corrosion of the aluminum will be released by venting to minimize bulging." (SER at 2-15).

In this instance, it appears the NRC analysis assumes the cells are already vented which is contradictory to the Applicant's assumption (Liden at paragraph 9).

G. Based on the above, there are sufficient issues of material fact regarding the possible degradation of the rack material to require that these contentions be considered in the hearing process.

III. STATEMENT AND DISCUSSION

REGARDING INTERVENOR'S CONTENTION 9

The following is a statement of the Coleman Contention 9:

> The Licensee has given inadequate consideration to alternatives to the proposed action. In particular, the Licensee has not adequately evaluated alternatives associated with the Nuclear Regulatory Commission adopting the 'no action' alternative for licensee's application, which would implicate the following:
>
> A. expansion of spent fuel storage capacity at reprocessing plants;
>
> B. licensing of independent spent fuel storage installations;
>
> C. storage of spent fuel from Salem No. 1 at the storage pools of other reactors;
>
> D. ordering the generation of spent fuel to be stopped or restricted (leading to the slow-down or termination of nuclear power production until ultimate disposition can be effectuated).

The following are issues of material fact which pertain to the above contention:

A. The Morris Operation has applied for an amendment of their license which would expand their storage facility to 1800 MTHM. However, the NRC in their review of the Applicant's alternatives only considers the existing 750 MTHM capacity of M.O. Although they acknowledge that hearings for the 1100 MTHM addition are temporarily halted, they could resume hearings at

at anytime the M.O. owner (EIA at 14) decides to do so.

B. The NRC mentions several alternatives which could be available in time to take fuel from the Salem site if a nominal amount of transhipment is employed (EIA at 14, 15, and 16). These possibilities do not appear to have been adequately considered by the Applicant.

C. These facts should be explored in hearings on this contention.

IV. STATEMENT AND DISCUSSION REGARDING INTERVENOR'S CONTENTION 13

The following is a statement of the Coleman Contention 13:

> The Licensee has failed to give adequate consideration to the cumulative impacts of expanding spent fuel storage at Salem Nuclear Generating Station Unit 1 in association with the recently filed proposed amendment to the application for an operating license at the sister unit, Salem Unit 2. (See Amendment No. 42, Docket No. 50-311, filed April 12, 1978 which proposes modifications of spent fuel storage which the intervenor believes are similar in scope to the Salem Unit 1 application.) For example, the Licensee assumes an increase in releases of Kr-85 by a factor of 4.5--due to the factor of 4.5 increase in spent fuel (Licensee's application, at 10). A similar increase, absent exceptional controls, can be expected at Salem No. 2, resulting in a cumulative increase in Kr-85 emissions by a factor of 9--almost a full order of magnitude increase. (If similar spent fuel increases are postulated for the companion units, Hope Creek 1 and 2, now under construction, the cumulative increase could rise by a factor or 18, or almost two full orders of magnitude.

The following are issues of material fact related to this contention that should be reviewed in a hearing process:

A. The Kr-85 releases discussed in the SER and Applicant's Motion appear to be normal leakage values and do not cover the magnitude of release due to an accident in the pool (such as a cash drop accident) when there is more than four times the amount of fuel stored. The NRC includes an arbitrary 114 ci/yr release but does not quantify that in terms of an accident or deterioration of the fuel. (EIA at 7)

B. Applicant's Motion for Summary Disposition states that Zircalloy clad fuel has been stored in U.S. reactors spent fuel pools for up to 18 years (Liden at 3). This is only marginally true. As reported in the Johnson report (BNWL-2256, Sep. 1977, page 14), only one zircalloy fuel bundle of pressurized water reactor design has been stored in a pool since 1959, and that one is not at a commercial reactor site. Johnson's report also states (on page 3) that "detailed, systematic examinations of fuel bundle materials have not been conducted specifically to define storage behavior, because of the expectation that the fuel would be reprocessed after relatively short pool residence." Johnson recommends that additional investigation

be performed, "particularly if the stored fuel inventory is expected to move into the twenty to one hundred year time frame." The potential impact of longer term storage on radiological releases should be evaluated and discussed by the Applicant.

C. The NRC states that there is a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool. and, the radiological consequences of such an impact (SER at 2-6). This should be evaluated for Salem as it may represent a much greater release than discussed by the Applicant or the NRC.

D. The Applicant and the NRC take credit for four years of discharges of reactor fuel (see for example, EIA at 6) but the Applicant admits that maintaining Full Load Discharge capacity "is prudent from an operational standpoint."* Such a capacity may also be necessary for safety reasons if major core internals or vessel leakage requires rapid repair to reduce radiological releases to the environment. Therefore, the Applicant's analysis should consider maintaining Full Load Discharge capability and thereby the incremental storage in the new racks is one year old fuel, not four years old.

---

* (Liden at 25)

E. The Morris Operation Consolidated Safety Analysis Report (CSAR) reports an experience of radioactivity release from spent fuel at the Morris Operation in 1975 which caused the radiocesium reading to reach 30 times the maximum permissible concentration in water, MPCw (occupational). (CSAR 7-8). This appears to contradict the NRC statement that "there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO)" (SER at 6). The possibility of such a leakage and possible release to the environment should be evaluated for Salem.

F. The Applicant has not specified any in-service inspection requirements to verify on-going acceptable performance of spent fuel materials and possible leakage/degradation.

G. The Applicant has not indicated any contingency plan for emptying the pool in case of serious degradation or pool leakage.

H. Based on the above issues of material fact, the Intervenor's Contention 13 should be addressed in the normal hearing process.

V. CONCLUSION

Based on the issues raised in Sections II, III, and IV of this affidavit, there are material facts regarding Intervenor's (Coleman's) Contentions 2, 6, 9 and 13 which need to be resolved in the license amendment hearings for Salem 1 reracking.

Gregory C. Minor

GREGORY C. MINOR

Subscribed and sworn to before
me this 18th day of July 1979

Notory Public

My commission expires [illegible]

OFFICIAL SEAL
[illegible]
NOTARY PUBLIC-CALIFORNIA
PRINCIPAL OFFICE IN
SANTA CLARA COUNTY
My Comm. Expires Oct. 2, 1981

RESUME

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EXPERIENCE

1976 - Present

- MHB Technical Associates, Palo Alto, California. Engineering and Energy consultant to numerous state, federal and private organizations. Major activities include studies of safety and risk involved in energy generation, providing technical consulting and expert witness to legislative, regulatory, public and private groups. Recently completed co-editing a critique of the Reactor Safety Study (WASH-1400) for the Union of Concerned Scientists and a major risk analysis for the Swedish Energy Commission.

1972 - 1976

Manager - Advanced Control and Instrumentation Engineering, General Electric Company, Nuclear Energy Division, San Jose, California.

Managed a design and development group of thirty engineers, two clerical and two technicians in designing systems for use in the measurement, control and operation of nuclear reactors. Involved coordination with other reactor design organizations, the Nuclear Regulatory Commission and customers, both overseas and domestic.

Responsibilities included coordinating and managing the technical control systems, safety systems and new control concepts for use on the next generation of reactors. The position included responsibility for standards applicable to control and instrumentation, as well as the design of short-term solutions to field problems. The disciplines involved included electrical and mechanical engineering, seismic design and process computer control/programming.

1970 - 1972

Manager - Reactor Control Systems Design - General Electric Company, Nuclear Energy Division, San Jose, California.

Managed a group of seven engineers, one technician and one clerical in the design and preparation of the detailed system drawings and control documents relating to safety and emergency systems for nuclear reactors. Responsiblity required coordination with other design organizations and interaction with the customer's engineering personnel, as well as Regulatory personnel.

1963 - 1970

Design Engineer - General Electric Company, Nuclear Energy Division, San Jose, California.

Responsible for the design of specific control and instrumentation systems for nuclear reactors. Lead design responsibility for various subsystems of instrumentation used to measure neutron flux in the reactor during startup and intermediate phase. Performed lead system design function in the design of a major system for measuring the power generated in nuclear reactors. Other responsibilities included on-site check out and testing of a complete reactor control system at an experimental reactor in the South West. Received patent for Nuclear Power Monitoring System.

1960 - 1963

Advanced Engineering Program - General Electric Company, Assignments in Washington, California and Arizona.

Rotating assignments in a variety of disciplines:

- Reactor maintenance and instrument design, engineer, KE and D reactors, Hanford, Washington. Circuit design and equipment maintenance coordination.

- Design Engineer - Microwave Department, Palo Alto, California. Work on design of cavity couplers for TWT's.

- Design Engineer - Computer Department, Phoenix, Arizona. Design of core driving circuitry.

- Design Engineer - Atomic Power Equipment Department, San Jose, California. Circuit design and analysis.

- Design Engineer - Space Systems Department, Santa Barbara, California. Prepare control portion of satellite proposal.

- Technical Staff - Technical Military Planning Operation. (TEMPO), Santa Barbara, California. Prepare analysis of missile exchanges.

During this period, completed three-year General Electric program of extensive education in advanced engineering principles of higher mathematics, probability and analysis. Also completed courses in Kepner-Tregoe, Effective Presentation, Management Training Program and various technical seminars.

EDUCATION

University of California at Berkeley, BSEE, 1960.

Advanced Course in Engineering - 3-year Curriculum, General Electric Company, 1963

Stanford University, MSEE, 1966.

HONORS AND ASSOCIATIONS

- Tau Beta Pi Engineering Honorary Society
- Co-holder of U.S. Patent No. 3,565,760, "Nuclear Reactor Power Monitoring System", February 1971.
- Member: American Association for Advancement of Science.
- Member: Nuclear Power Plant Standards Committee, Instrument Society of America.

PERSONAL DATA:

Born; June 7, 1937
Married, three children
Height: 5'8", Weight: 165 lbs.
Health: Excellent

PUBLICATIONS AND TESTIMONY

1. Testimony by G.C. Minor, D.G. Bridenbaugh, and R.B. Hubbard before the Atomic Safety and Licensing Board, Sep. 25, 1978, In the Matter of the Black Fox Nuclear Power Station Construction Permit hearings, Tulsa, Oklahoma.

2. Presentation by G.C. Minor before the Federal Ministry for Research and Technology (BMFT), Meeting on Reactor Safety Research, Man/Machine Interface in Nuclear Reactors, August 31 and September 1, 1978, Bonn Germany.

3. Testimony by G. C. Minor before the California Legislature Assembly Committee on Resources, Land Use and Energy, AB 3108, April 26, 1978, Sacramento, California.

4. Testimony by G. C. Minor before Wisconsin Public Service Commission, February 13, 1978, subject: Loss of Coolant Accidents: Their Probability and Consequence.

5. Swedish Reactor Safety Study: Barsebäck Risk Assessment, MHB Technical Associates, January 1978. (Published by Swedish Department of Industry as Document DsI 1978:1)

6. The Risks of Nuclear Power Reactors: A Review of the NRC Reactor Safety Study WASH-1400 (NUREG-75/014), H. Kendall, et al, edited by G. C. Minor and R. B. Hubbard for the Union of Concerned Scientists, August 1977.

7. Testimony of G. C. Minor before the Cluff Lake Board of Inquiry, Regina, Saskatchewan, Canada, September 21, 1977.

8. Testimony of G. C. Minor regarding the Grafenrheinfeld Nuclear Plant, March 16-17, 1977, Wurzburg, Germany.

9. Testimony of G. G. Minor and R. B. Hubbard before California State Senate Committee on Public Utilities, Transit, and Energy March 23, 1976.

10. Testimony of D. G. Bridenbaugh, R. B. Hubbard, G. C. Minor to the California State Assembly Committee on Resources, Land Use, and Energy, March 8, 1976.

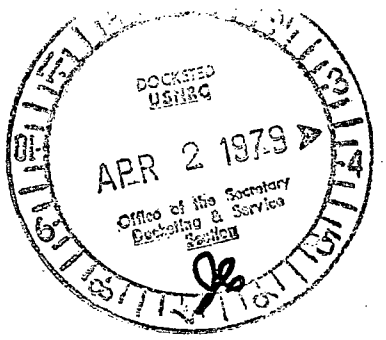
11. Testimony of D. G. Bridenbaugh, R. B. Hubbard, G. C. Minor before the Joint Committee on Atomic Energy, hearings held February 18, 1976, and published by Union of Concerned Scientists, Cambridge, Massachusetts.

PUBLICATIONS AND TESTIMONY

12. G.C. Minor, W.G. Milam, "An Integrated Control Room System for a Nuclear Power Plant", NEDO-10658, presented at International Nuclear Industries Fair and Technical Meetings, October 1972, Basle, Switzerland.

13. The above article was also published in the German Technical Magazine, NT, March 1973.

14. G. C. Minor, S.E. Moore, "Control Rod Signal Multiplexing," IEEE Transactions on Nuclear Science, Vol. NS-19, February 1972.



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
PUBLIC SERVICE ELECTRIC & GAS COMPANY, et al.,	)	Docket No. 50-272
	)	(Proposed Issuance of Amendment
	)	to Facility Operating License
(Salem Nuclear Generating Station, Unit 1)	)	No. DPR-70)
	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of Memo. and Supporting Affidavit in Opposition to the Licensee's Motion for Summary Disposition, in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, this 29th day of March, 1979.

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