UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

(UCLA Research Reactor)

Docket No. 50-142

(Proposed Renewal of Facility License)

DECLARATION OF DANIEL O. HIRSCH

I, Daniel O. Hirsch, do declare as follows:

1. I am President of the Committee to Bridge the Gap, Intervenor in the above-captioned proceeding.

2. I and colleagues from the Committee to Bridge the Gap witnessed a contaminated shipment of spent reactor fuel (HEU) from UCLA on June 20-21, 1980. Thereafter I coordinated a document acquisition effort to obtain further details of the contamination incident.

3. On September 18, 1982, I was invited to present testimony to the California High Patrol Hearings on Proposed Regulations Regarding Transportation of Radioactive Materials. A copy of that testimony, including photographs taken of the contaminated truck while being prepared for loading at UCLA and once it had left the Applicant's property, is attached. I attest that the contents of that testimony are true to the best of my knowledge and belief.

4. As indicated in that testimony, UCLA permitted a shipment of spent fuel to leave its control in highly contaminated condition. As the Department of Transportation investigation reported cited in my testimony reveals, the truck was contaminated at least at the time it left UCLA, and UCLA's radiation monitoring sweeps failed to detect the contamination. Thus, a contaminated shipment was released into uncontrolled areas because of failure of the Applicant's monitoring system to detect the contamination and take appropriate measures.

5. Furthermore, as indicated in the attached testimony, there is considerable evidence now available that UCLA, in addition to missing the contamination in its monitoring, may have been responsible for the contamination. As indicated in the testimony, it is now known that UCLA has had within the Nuclear Energy Lab several leaking Cobalt-60 sources, and at least one of the leaking sources had been stored in the spent fuel storage holes, where spent fuel is kept prior to removal for off-shipment.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Daniel O. Hirsch

Executed at Los Angeles, California, this 12 th day of January, 1983

Statement of Professional Qualifications

DANIEL C. HIRSCH

My name is Daniel C. Hirsch. I am President of the Committee to Bridge the Gap and a Visiting Lecturer at the University of California at Los Angeles.

At CBG I am Project Manager for the technical review of the UCLA reactor license renewal application. In that capacity I participate in and oversee the scientific review of the UCLA application, the Staff analyses, and the materials produced through discovery.

I helped found CBG in 1970 and have been associated with it since that time. In addition to the UCLA application, I have been Project Manager of the environmental assessment of the radioactive waste dump in Brentwood being considered by the City of Los Angeles as the site of a proposed park; review of past accidents at the Atomics International facility in Santa Susana, in particular the Sodium Reactor Experiment (SRE) partial meltdown and subsequent assessment of consequences attendant thereto; review of the potential for criticality accidents at the Atomics International fuel fabrication facility in Canoga Park; review of past ocean disposal of radioactive waste and potential environmental impacts of proposed renewal of the practice by the United States, particularly with regards submarine reactor vessels.

I am a member of the Ad Hoc Scientific Advisory Committee to the Joint Committee on Fisheries and Aquaculture of the California Legislature, assessing the impacts of past and proposed ocean radwaste disposal off the California coast; the Hazardous Materials Task Force Advisory Committee of the City of Los Angeles, assessing local zoning and other regulation of radioactive materials; and the Executive Board of the Southern California Federation of Scientists. I have provided technical review of SCFS studies on conversion of partially-completed nuclear power plants, emergency planning at California nuclear power plants, and initiators of accidental nuclear war.

I chaired one of the two panels on public health impacts of the nuclear fuel cycle at the first "science court" conducted by the American Public Health Association, at its annual convention in 1981. I am co-author, with Professor Jackson Davis, Professor John Van Dyck and colleagues of his at the University of Hawaii, of "Ocean Disposal of Radioactive Wastes: An Assessment," the technical background documents submitted by several Pacific island nations to the upcoming London Dumping Convention.

I received my B.A. from Harvard University in 1972, magna cum laude, in Special Studies, an interdisciplinary program. Since spring 1975 I have been a Lecturer at the University of California at Los Angeles, in an interdisciplinary program called the Council on Educational Development, a program of the UCLA Academic Senate. I am currently teaching "Energy Alternatives and Public Policy," which crosses technical and policy lines on nuclear and related issues.

In August, 1981, I was approved by the Atomic Safety and Licensing Board in the UCLA reactor proceeding as an "expert interrogator" under 10 CFR 2.733 (LBP-81-29, 14 NRC 353). I have presented invited testimony on nuclear matters before the U.S. Radiation Policy Council, the Subcommittee on Energy, Environment, and Natural Resources of the Government Operations Committee of the U.S. House of Representatives, the Joint Committee on Fisheries and Aquaculture of the California Legislature, and numerous other governmental bodies.

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REPORT ON CONTAMINATED LOS ANGELES RADWASTE TRANSPORTATION INCIDENT

Statement by Daniel Hirsch [1]
Before the California Highway Patrol
Hearings on Proposed Regulations Regarding Transportation of Radioactive Materials
Los Angeles, California
September 18, 1982

The Committee to Bridge the Gap, a Los Angeles-based environmental organization, is today releasing the results of a two-year investigation into a radioactive contamination incident involving transport of spent nuclear reactor fuel through certain highly populated areas of Los Angeles. The investigation was based upon extensive documents obtained under the Freedom of Information Act, as well as accounts of and photographs taken by eyewitnesses to the incident, including one individual who followed the contaminated shipment on part of its trip. The investigation raises serious questions about the adequacy of current regulations and the enforcement of those regulations in protecting public health and safety from the hazards associated with the transportation of such uniquely dangerous materials. [2]

Our investigation has revealed that a shipment of highly enriched spent reactor fuel, without prior notification of the required officials, took an unauthorized route through Westwood Village and other highly populated areas of Los Angeles, reportedly because the truck driver wanted to pick up his girlfriend and take her with him to Las Vegas, where the truck was apparently left unattended overnight in a casino parking lot. Furthermore, we have learned

that the shipment was subsequently discovered to have been highly contaminated during the entire week it had been on the road, with both the shipper and receiver missing the contamination during their radiation sweeps of the truck and trailer. And lastly, review of the incident by the U.S. Department of Transportation and the Nuclear Regulatory Commission appears to have been less than thorough, seemingly being more concerned with protecting the licensees they are to regulate than determining the cause of the incident and taking correct measures to prevent its recurrence. The details follow.

In June of 1980, UCLA shipped some highly enriched[3] spent fuel from its nuclear reactor to Exxon Nuclear's facility in Idaho Falls, Idaho, for reprocessing. The shipment went less than smoothly.

UCLA arranged to ship the material because it was, by its own admission, in violation of its special nuclear materials possession limit[4] and did not have adequate security to protect that amount of material[5].

Despite a requirement to notify officials along the route in advance of the shipment[6], UCLA failed to do so.[7] And despite the requirement to keep plans for such shipment secret from the public as a security precaution, UCLA published its intent to ship the material and an approximate date in a public document well in advance of the shipment taking place,[8] enabling members of the press as well as the public to observe.[9]

The regulations in effect at the time required such shipments to follow only authorized routes, selected to avoid to the maximum extent possible highly populated areas.[10] In this case, that approved route was to be up Montana Avenue to the San Diego Freeway and then north through the Mojave Desert. However, the shipment failed to take the required route, going instead through Westwood Village, then up Wilshire Boulevard[11] and onto the San Diego Freeway going south, transferring thereafter onto the Santa Monica Freeway headed east

toward downtown Los Angeles.[12] This unauthorized route resulted in the shipment going through roughly two extra hours of highly populated parts of Southern California.

Those regulations forbid unauthorized passengers and any stopovers other than for refueling or taking on of provisions.[13] Yet it appears that the reason for the improper route was that the truckdriver wanted to pick up a female companion and take her with him to Las Vegas, where the truck apparently was left unattended at least one night in a casino parking lot while the driver and his friend entertained themselves within.[14] Fifty-eight hours after leaving UCLA the shipment arrived at Exxon Nuclear's Idaho facility.[15]

Several days later, when the truck arrived at General Electric's Vallecitos Nuclear Center to return the shipping cask which had been leased for the transport operation, it was discovered that the entire vehicle was extensively contaminated with radioactive Cobalt (Cobalt 60).[16] Contamination of up to 100,000 counts per minute were detected; normal "background" is about 10 cpm. Contamination was found on the trailer, tie down chains, throughout the tractor cab, and on the driver's gloves.[17]

The Department of Transportation, which has certain responsibilities for such incidents, was apparently not informed of the contamination incident until a week later, and then it learned of the problem not from any of the licensees involved but rather from a Los Angeles reporter inquiring into the matter.[18] However, once learning of the incident, DOT seems to have been more concerned with diverting the reporter from the story than in thoroughly investigating the incident.

In a memorandum[19] from the Associate Director for Hazardous Materials Regulation, Alan Roberts, to the Director of the Materials Transportation Bureau, Roberts reports on how he provided essentially no information in response to

the inquiries of the journalist and "then proceeded to hold a diversionary conversation with him."[20] Apparently worried that the media might decide, in Roberts' words, to "make a big thing out of it"[21] but before he knew whether it was a big thing, Roberts made sure he wired a report to his superiors detailing his conversation with the reporter and boasting of his "diversionary conversation." Throughout its investigation, DOT seemed more concerned with containing press interest than in locating the cause of the incident.

In response to the reporter's inquiry, however, DOT began an investigation[22] which consisted entirely of asking spokespeople for each of the four involved institutions (GE, Tri State Trucking, UCLA, and Exxon Nuclear) if they were responsible for the contamination. Not surprisingly, all denied it.

It was, however, determined that the contamination existed at least as early as the time the shipment left UCLA, and that UCLA (and Exxon Nuclear) had failed to detect the contamination during radiation surveys of the truck.[23] This failure of five radiation surveys to detect significant radioactive contamination raises serious questions about the adequacy of such monitoring.

The failure to do more than merely ask each licensee if they were responsible for the contamination itself caused the DOT investigator to miss certain potentially relevant information. For example, UCLA assured DOT that it couldn't have been the source of the contamination because it doesn't have Cobalt 60 as a corrosion product and had no unsealed Cobalt 60 sources.[24] These statements were less than candid.

UCLA reactor annual reports routinely report Cobalt 60 as a primary corrosion product in the reactor's liquid effluent.[25] And there have been at least three leaking Cobalt 60 sources stored at the reactor facility, including at least one stored in the spent fuel storage holes where spent fuel is kept

prior to shipment.[26] In fact, as of a few months ago, there was a Cobalt 60 source still in those storage holes.[27] Because of DOT's failure to investigate thoroughly, we'll never know if there is more than coincidence involved.

The Nuclear Regulatory Commission's performance was little better. There has been no enforcement action taken by NRC in this matter.[28] The NRC Staff has argued that any failure to obey the regulations then in effect was excusable because UCLA had asked for direction from the Staff prior to the shipment and then followed what turned out to be erroneous advice. As Administrative Law Judge Emmeth Luebke said during one of the proceedings considering UCLA's application for license renewal,

> JUDGE LUEBKE: I would like to ask: this advice that the Staff gave to the applicant, was that in writing?
>
> MS. WOODHEAD [Counsel for NRC Staff]: No, sir.
>
> JUDGE LUEBKE: Telephone?
>
> MS. WOODHEAD: Right.
>
> JUDGE LUEBKE: Must have been a bad connection.[29]

UCLA's position as to why no enforcement action was taken by NRC was apparently that nothing really so bad happened:

> JUDGE LUEBKE: ...the Board [the Atomic Safety and Licensing Board] I would think would come up with some conditions concerning this terrible thing that happened so it wouldn't happen again in the future.
>
> MR. CORMIER [Counsel for UCLA]: Dr. Luebke, could we explore what terrible things happened? Nothing terrible happened.[29]
>
> JUDGE LUEBKE: You don't ship things in contaminated trucks. . . .

Conclusion

What lessons can be learned from this incident? One, radioactive materials are potentially quite dangerous and therefore require great care in

handling. And two, the one reliable characteristic of human beings and human institutions is that they make mistakes.

It takes little predictive ability to see that the hazards of these materials and the inevitability of Murphy's Law are on a collision course. You can bet your life on it.

Our world is filled with a multitude of hazards, so many in fact that often it all seems overwhelming, creating a common feeling that nothing whatsoever can be done to improve the situation. It is precisely that despair about the potential for changing things coupled with a widespread lack of sense of responsibility for initiating such changes that represent the real hazardous cargoes our society is transporting. If our society does go under, it will be these toxins that have done it. But it need not be so.

Albert Camus, speaking thirty years ago about a parallel situation, once said, "Perhaps we cannot create a world in which children are not tortured. But we can reduce the number of tortured children. And," he continued, "If you do not help us do this, who in the world will help us do this?"

I say to you today: Perhaps we cannot create a world where there are no hazards. But we can reduce the number and magnitude of those hazards. And if you--responsible officials and the public both--do not help us do this, who in the world will help us do this?

# # #

FOOTNOTES

1/ Daniel Hirsch is President of the Committee to Bridge the Gap.

2/ A shipment of high level waste from a nuclear power plant contains hundreds of thousands of Curies of radioactivity. A Curie is that amount of radioactive material undergoing 37 billion disintegrations per second. To put those quantities in perspective, it should be noted that legal limits for public exposure to such materials are measured in pico Curies, or millionths of millionths of Curies.

3/ 93% enriched uranium--nuclear weapons grade. Unlike fuel from a power reactor, fuel from certain research reactors such as UCLA's can be used directly in an atomic bomb. It is therefore imperative that such material be protected against theft or diversion.

4/ Letter, Professor Ivan Catton, Director UCLA Nuclear Energy Lab, to C.A. Berger of Department of Energy, March 1, 1979: "We are presently in technical violation of our SNM /Special Nuclear Materials/ limit, and further delay could invite a Notice of Violation by the Nuclear Regulatory Commission."

5/ Letter, Professor Catton, to Mr. George Rogosa, Department of Energy, November 9, 1978: "...regarding the return of irradiated fuel elements to the US Government. The return will reduce our fuel inventory to a level commensurate with our security provisions and will eliminate an 'unresolved item' noted by a Nuclear Regulatory Commission inspector during a recent routine security inspection."

6/ Title 10 of the Code of Federal Regulations, Part 73.37(a)(2), cited hereafter as 10 CFR 73.37(a)(2). The regulation applicable at the time of the shipment has since been altered, relaxing further the safeguards required. At the time of the shipment, notification of local agencies who might be called on for emergency response along the route was required for such a shipment.

7/ See "UCLA Ships Nuclear Material" by Adam Dawson, Daily News (then Valley News), June 22, 1980.

8/ See Application for License Renewal, February 1980, page III/1-4

9/ In addition to the Daily News reporter and photographer responsible for the article supra, several CBG members witnessed the shipment. Having read in the license application of the approximate time for the proposed shipment, CBG kept an eye out for it; when the truck arrived, volunteers "staked it out," both on June 20 and 21, until it was ready to leave UCLA, at which time Howard Cushnir followed it in his car. Photographs are available both of the time while at UCLA and after leaving UCLA.

10/ 10 CFR 73.37(a)(1) and (3)

11/ perhaps the busiest section of street in California

12/ See photographs taken by Howard Cushnir documenting the route taken by the truck as he pursued it.

13/ 10 CFR 73.37(a)(4) and (5) and (b)(1)

14/ See memo, July 3, 1980, from Associate Director for Hazardous Materials Regulation of DOT to Director, Materials Transportation Bureau; CBG has received independent confirmation of this allegation; the DOT investigation report that contains the above-cited memorandum mentions the trucking company's assertion that the stop-over was due to "a problem with a brake airline", but indicates no efforts made to determine which of the two explanations for the Las Vegas stopover was the correct one. Author of the DOT investigation, John Spivey, indicated in a personal communication with Mr. Hirsch that he did not investigate the matter of the reported unauthorized female passenger and unauthorized stopover. The failure to investigate such allegations of failure to follow proper procedures, especially in light of the contamination episode, is disturbing.

15/ DOT Memo, "Hazardous Material Incident--Radioactive Contamination" November 18, 1980, from Regional Administrator, San Francisco, page 2

16/ id

17/ id

18/ id at 1, reporting a phone call from Mr. Warren Olney, then of KNBC TV

19/ cited at fn. 14

20/ id at 1

21/ id at 2

22/ 11/18/80 DOT Memo, Supra.

23/ id at 5, indicating two surveys by UCLA and three by Exxon Nuclear all missed the contamination

24/ id at 3 and 4; also letter, UCLA's Jack Hornor to DOT's John Spivey, 7 August 1980

25/ see, e.g., 1976 annual report, "Liquid effluents - Isotopes identified by gamma spectra techniques as liquid effluents...include only cobalt-60 for the year 1976. The low concentration of cobalt-60 is from both corrosion products in the primary coolant and decontamination waste."

26/ id; also AEC inspection reports of March 1, 1962 and May 2, 1963; NRC inspection report 76-02; UCLA interrogatory answers to CBG questions, answers dated 5/20/81; Note that although some of the leaking sources were stored twenty years ago, contamination from such leakage would still remain unless decontamination was undertaken.

27/ pointed out by Nuclear Energy Laboratory to CBG on a recent inspection; also, see UC interrogatory answers of 11/9/81

28/ so said UCLA and NRC Staff at Pre-Hearing Conference of February 5, 1981; see Transcript at 456--"JUDGE LUEBKE: I don't find identification of the enforcement action. Can it be identified?

MR. HIRSCH: There has been none that we know of at all. We believe this to be a violation, but the enforcement and inspection division has not filed any notice of violation.

JUDGE LUEBKE: Oh, that's very interesting.

MR. CORMIER: There is no notice of violation on anything here connected with shipments.

JUDGE LUEBKE: So there is no IE [NRC Inspection & Enforcement division] report? That raises the next question. How did you get all these details? [addressed to CBG regarding how we learned so much about the incident if NRC itself did no investigation.]

29/ Transcript of February 5, 1981, proceeding before the Atomic Safety and Licensing Board, at page 459

30/ id at 462

Acknowledgments: The attached photographs of the trailer and shipping cask while at UCLA were taken by Dr. Sheldon C. Plotkin, a professional safety and systems engineer associated with the Committee to Bridge the Gap.

The photographs of the truck after it had left UCLA were taken by Howard Cushnir, shooting through the window of his car with one hand while he drove with the other.

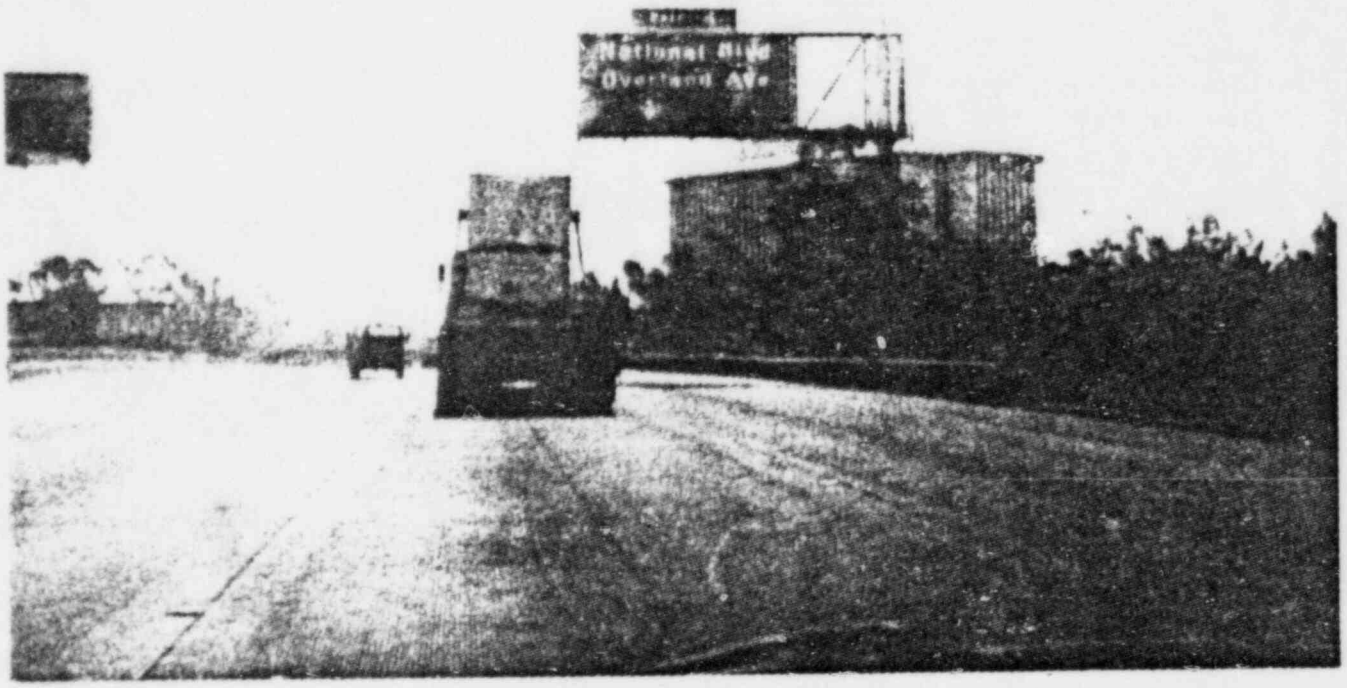
The documents obtained under the Freedom of Information Act were obtained by Mr. Cushnir in response to his FOIA requests.

Mr. Hirsch on June 20, 1980, and Yvonne Gilmore on June 21, also participated in "staking out" the shipment location during the incident in question.

CBG gratefully acknowledges the assistance of the Liberty Hill Foundation, the CS Fund, the Povorello Fund, and the Shalan Foundation for support for the research upon which this investigation was based.

T*H*E W*R*O*N*G W*A*Y

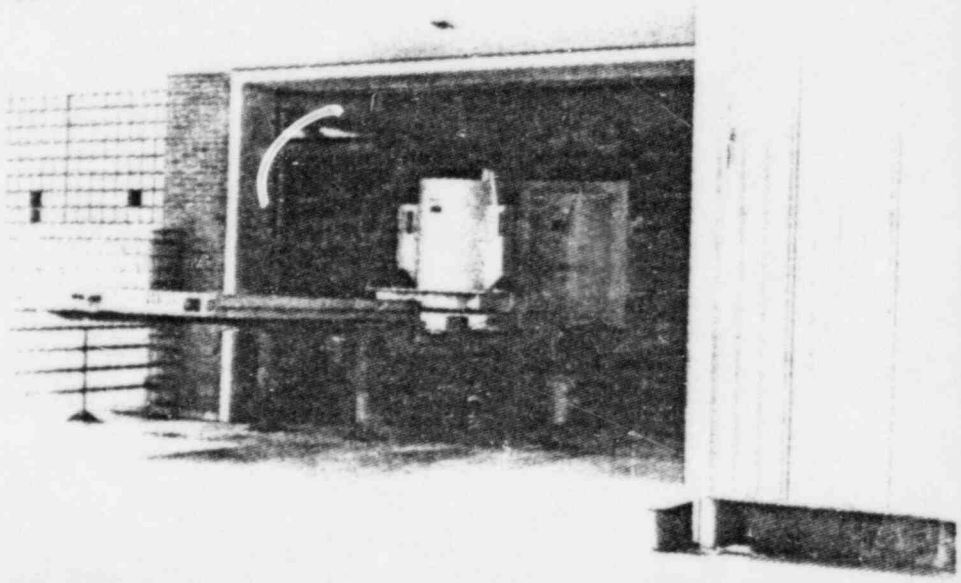
To Ship Radioactive Materials



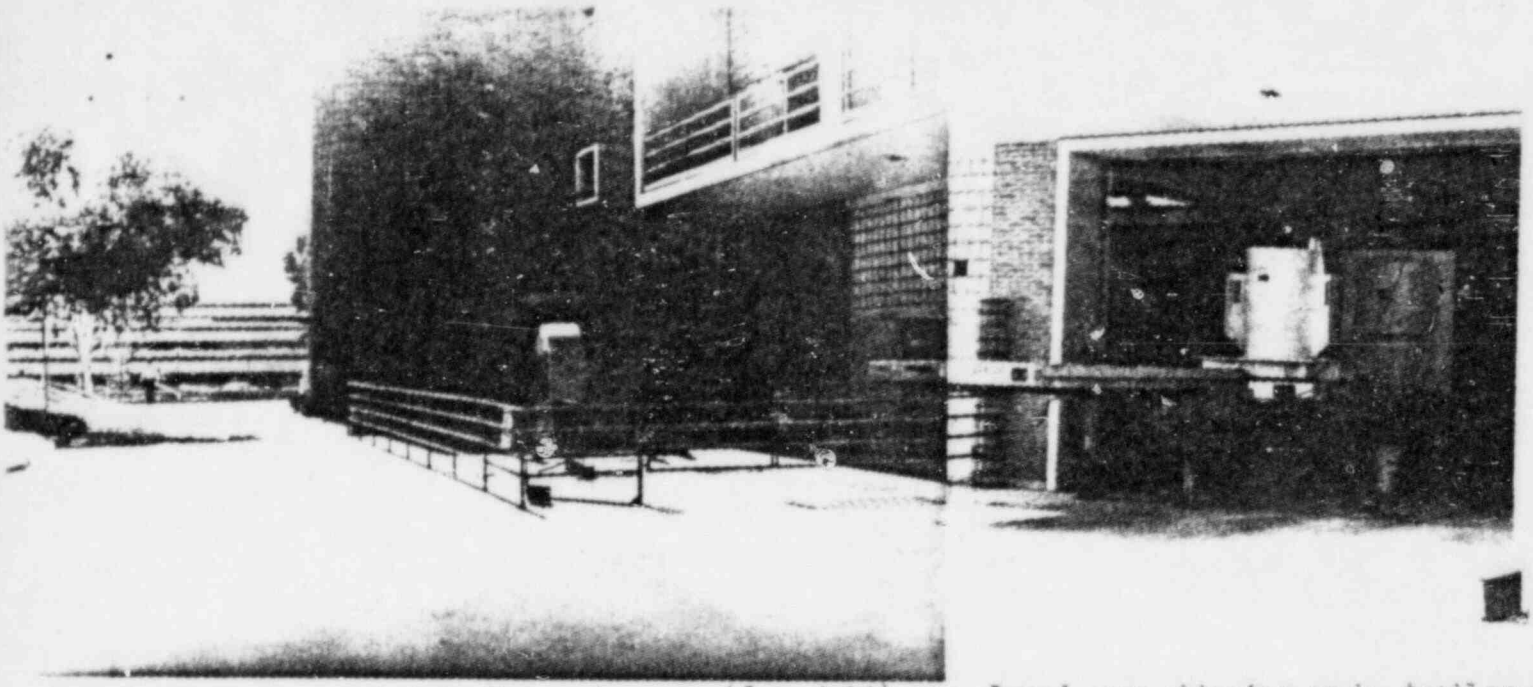
Contaminated Shipment of Highly Enriched Spent Nuclear Reactor Fuel
on Santa Monica Freeway eastbound towards downtown Los Angeles
(unauthorized densely populated route)

View of UCLA Engineering Bldg. from the south during shipment loading phase; truck trailer with shipping cask at center.

Closer view.



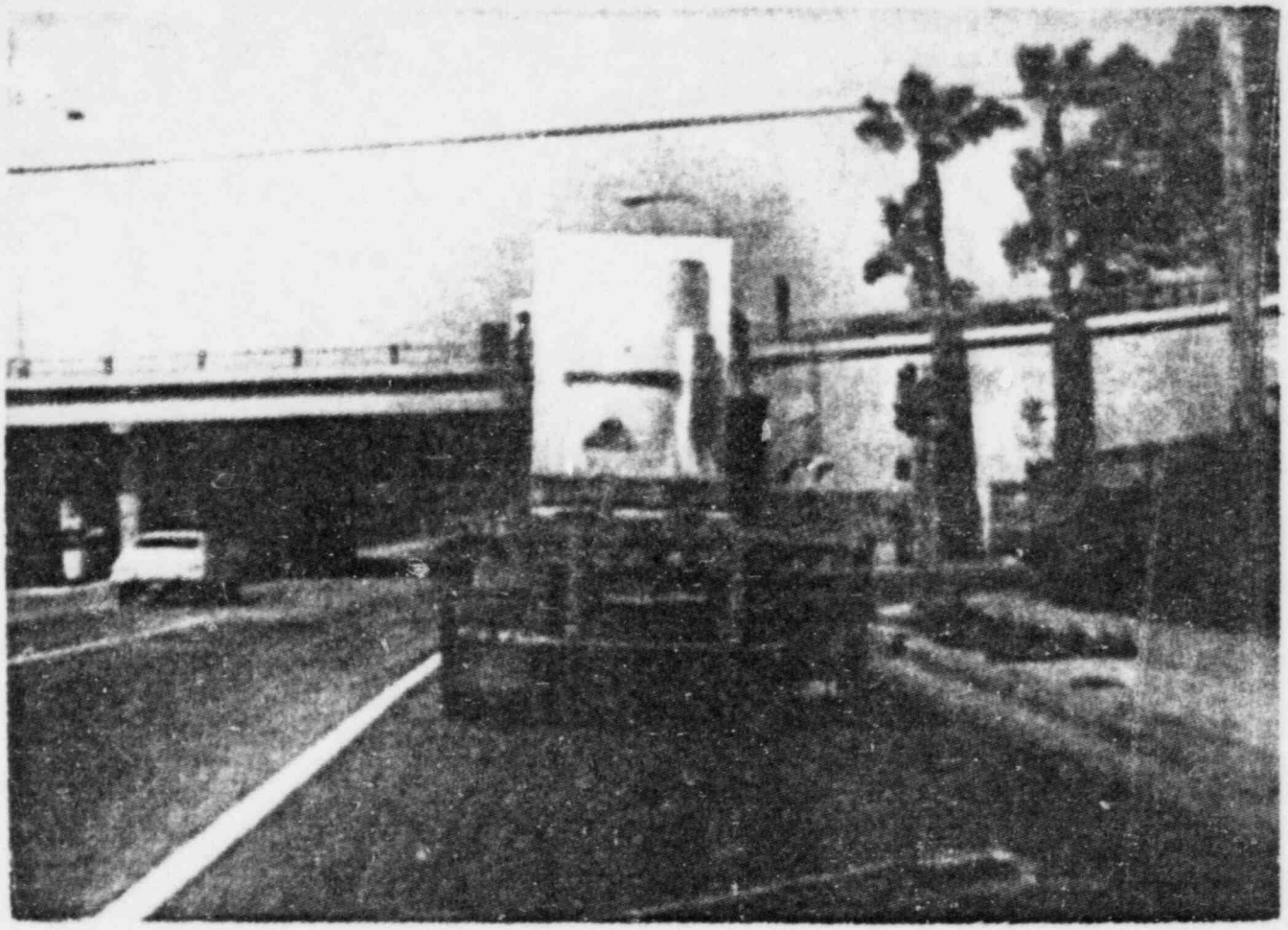
Close-up of trailer and cask; note pool of liquid on ground.



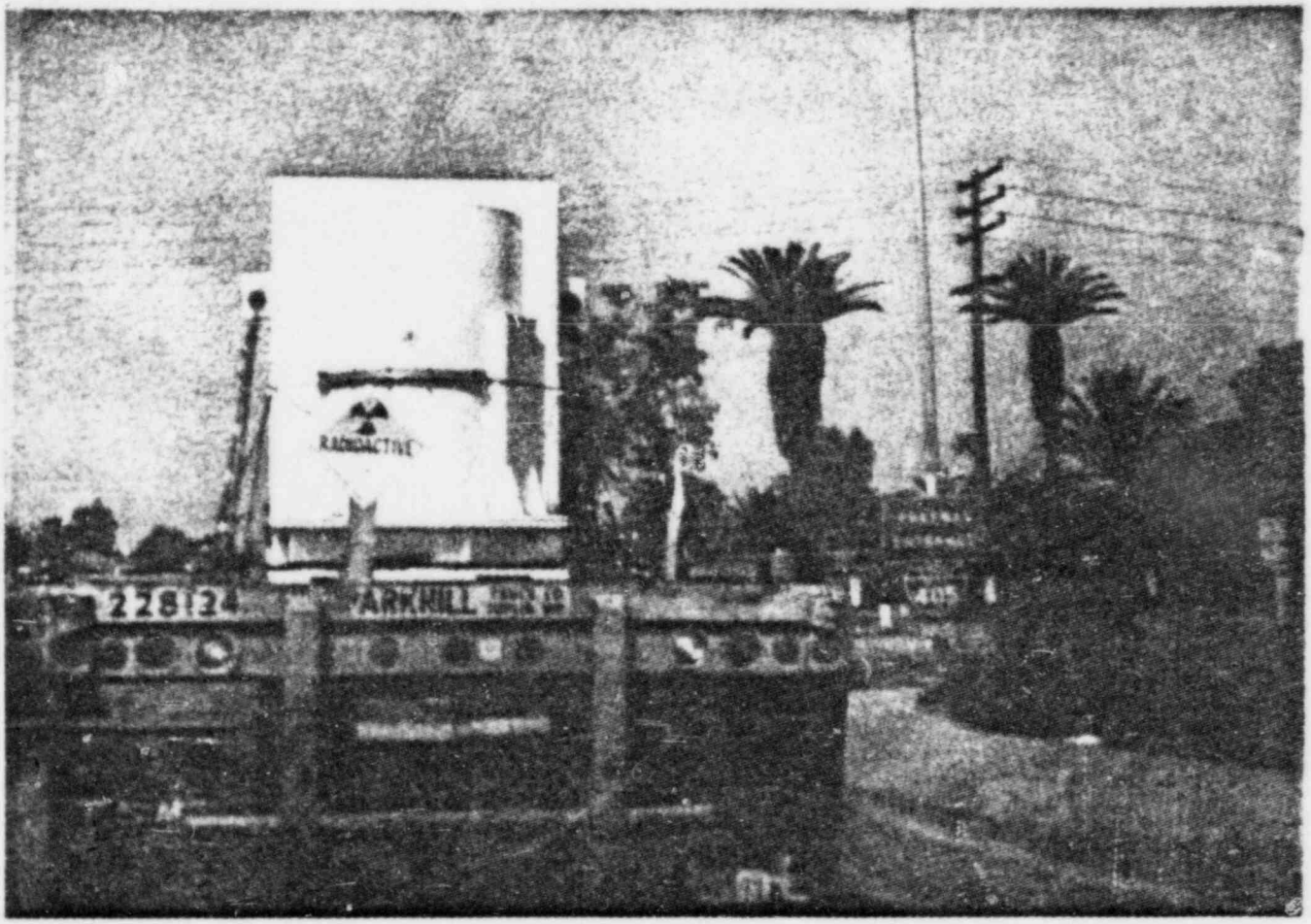
When loading was completed, the cask cover (far right) was placed over shipping cask, trailer was hitched to Tri-State truck, went up alley to left,

turned this corner onto Westwood,

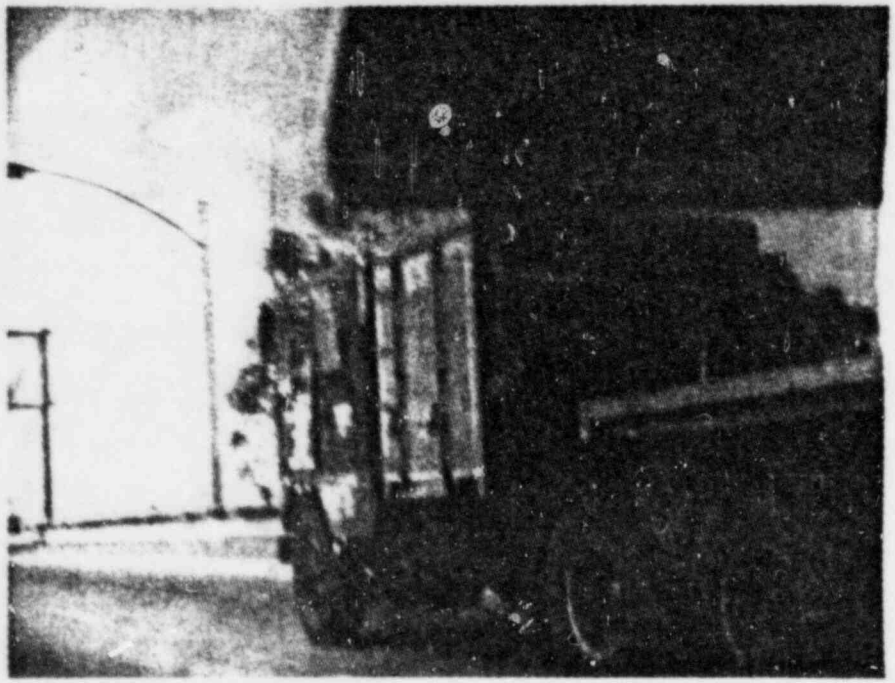
and eventually onto Wilshire.
(this photo was taken at Wilshire & Gayley; truck is in center of photo, a block ahead on Wilshire).

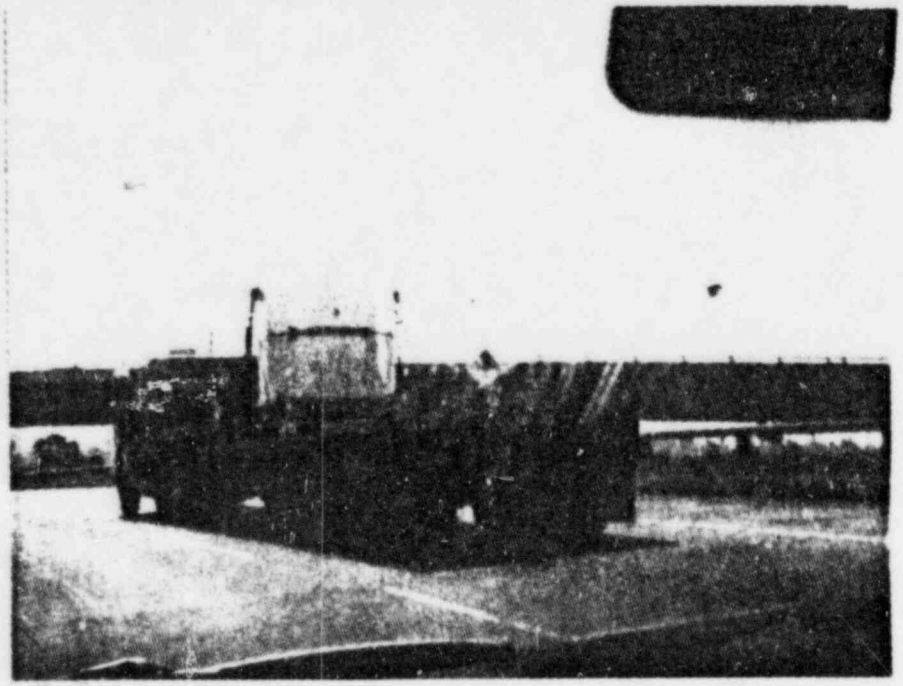


THE RADWASTE SHIPMENT AT THE CORNER OF WILSHIRE AND SEPULVEDA BOULEVARDS



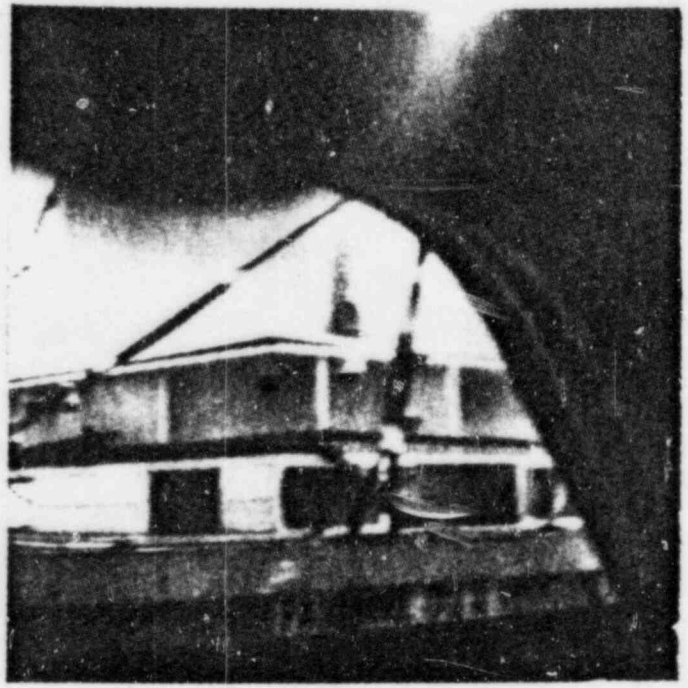
GETTING ON SAN DIEGO FREEWAY SOUTHBOUND AT WILSHIRE ENTRANCE



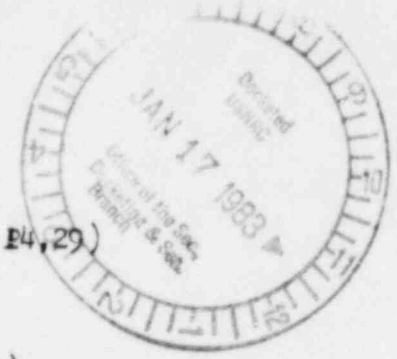


Once on the San Diego Freeway, the truck turned eastbound onto the Santa Monica Freeway, headed towards downtown LA

Close-ups of the



contaminated tie-downs.



CONTENTION XII

RESPONSE TO STAFF ASSERTED "MATERIAL FACTS"

1. DISPUTED. (Kaku, P3,83-6; Norton, P75-6,78; Dupont, P4,29)

2. NOT DISPUTED.

3. DISPUTED. (Plotkin as to XII, P6,7,10; Norton, P78,80;)

4. DISPUTED (Plotkin as to XII, P8; Pulido, P33)

5. DISPUTED (Plotkin as to XII, P9; October 8, 1982 application amendments)

6. DISPUTED (Plotkin as to XII, P6,7,11; Norton,P69,78,80; Pulido,P28,27)

7. DISPUTED (Plotkin as to XII, P12)

8. DISPUTED (Plotkin as to XII,P13; Norton, P57,61

9. DISPUTED (Plotkin as to XII,24; Norton, P 69; Kaku, P3,86)

10. DISPUTED (Plotkin as to XII,P14; Foster, P24-26; Pulido,P10-12)

11. DISPUTED (Plotkin as to XII,P14-15; Foster,P24-26; Application, III/5-5)

12. DISPUTED (Plotkin as to XII,P17)

13. NOT DISPUTED

14. DISPUTED (Norton, P61-68; Kaku, P80-81)

15. DISPUTED (Plotkin as to XII, P19; Kaku, P71-74; Norton, P69)

16. DISPUTED (Plotkin as to XII, P 20)

17. DISPUTED (Plotkin as to XII, P 16-17,20-21; Norton, 53,60)

18. DISPUTED (Plotkin as to XII, P21; Norton, P60)

RESPONSE TO UCLA ASSERTED MATERIAL FACTS

19. DISPUTED (Pulido, P32)

20. DISPUTED (Plotkin as to XII, P22; Pulido, P29)

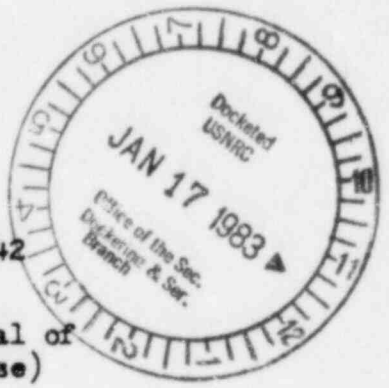
21. DISPUTED (Plotkin as to XII, P22; Monosson, P6,13,23)

22. DISPUTED (Plotkin as to XII, P17; Norton,P73)

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD



In the Matter of

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

(UCLA Research Reactor)

Docket No. 50-142

(Proposed Renewal of Facility License)

DECLARATION OF DR. SHELDON C. PLOTKIN AS TO CONTENTION XII

I, Sheldon C. Plotkin, declare as follows:

1. I am President of S.C. Plotkin and Associates, a consulting engineering firm specializing in safety and systems engineering. A statement of professional qualifications is attached to my declaration for Contention I.

2. I serve on the Executive Committee of the Southern California Federation of Scientists, and have participated in and coordinated the activities of the SCFS review group assessing reactor safety matters related to the UCLA reactor, particularly with respect to providing technical assistance to the Committee to Bridge the Gap in responding to Staff and Applicant motions for summary disposition.

3. That review has included site visits to NEL and its environs; examination of the available architectural and mechanical drawings for the reactor and the reactor complex; the application and amendments thereto and related safety analyses thereon; and an examination of operating logs, engineering change orders, experimental safety analyses, maintenance logs, Radiation Use Committee minutes, and related records for the reactor.

4. The purpose of this declaration is to respond to the Staff and Applicant motions for summary disposition as to Contention XII.

5. It is concluded that significant releases could result from the maximum credible accident at the UCLA reactor. Declarations by my colleagues Warf, Dupont, Pulido, and Aftergood indicate some of the credible scenarios and predict potential consequences. Declarations by Boyd Norton and Michio Kaku further expand on accident scenarios capable of large releases; the declaration by Dr. Beyea confirms the very large doses that would result.

6. As indicated in the above-mentioned declarations, the extraordinarily large doses to members of the public, as well as the high potential for large population doses, is due in large measure to the lack of exclusion zone and lack of containment structure and other features to reduce fission product release to the environment, once the fuel integrity is breached. Essentially the only barrier to fission product release is the thin, low-melting cladding. As indicated in the Beyea and Aftergood declarations, release of even small fractions of the inventory of just the radioiodines would produce unacceptable public consequences.

7. For these reasons, the engineered safety features identified in CBG contention XII.1 and 3, which are lacking at UCLA, are essential to reduce potential consequences of an accident at the facility. Those consequences would be very significant; lack of features to contain, remove, filter, and hold radioactive material released in an accident to prevent it from reaching the public poses a serious threat to public health and safety. Because of the lack of inherent safety of the facility, and the extraordinarily large consequences in case of accident, these features are essential from a safety standpoint.

8. The reactor is supposed to be kept at negative pressure by an exhaust fan of 14,000 cfm. As indicated in the inspection reports and the declarations of Dr. Lyon and Mr. Pulido, the university has for substantial periods of time failed to obey that requirement of its technical specifications. More importantly, however, the reactor interlock systems are set to shut down the ventilation system upon indication of high radiation, so there would be no negative pressure during accident situations. As Mr. Pulido has indicated, overpressure is likely and the large pathways for effluent release from the uncontained reactor room pose serious public safety exposure potential.

9. The stack monitor was originally designed to serve as a back-up for the high radiation monitor system. The applicant has now amended its application (October 8, 1982) removing the redundancy in the system. There is now no back-up. The inadequacies of either monitor are not compensated by a back-up system; a single failure is sufficient to endanger the public.

10. The UCLA reactor is not inherently safe. It has significant potential for major accidents. The low operating temperatures, as indicated in the declarations by my colleagues Warf and Dupont, produce substantial danger of Wigner-energy-induced fire or fuel melting from accidental release of substantial heat. As Mr. Pulido and Dr. Kaku indicate, potential for fire is significant; and as Professor Warf has demonstrated, failure to prepare for safe methods of protecting the fuel without resort to water or CO_2 could be devastating in case of fire. There are numerous scenarios indicated in the Warf, Dupont, Kaku, and Pulido declarations where safe methods of core emergency cooling would be necessary to prevent fuel melting or ignition and substantial fission product release.

11. Because of the potential for significant radioactivity release in case of accident, the potential for accident scenarios involving significant elevation of core temperatures sufficient to threaten fuel integrity, and the potential for a range of reactivity incidents in which additional reactivity control could be needed*, the features listed in Contention XII.3 are required and necessary at the UCLA reactor in order to provide reasonable assurance of no undue risks to public health and safety.

12. Water and graphite are the moderators in the Argonaut core.

13. As indicated in Boyd Norton's declaration, partial loss of water produces an increase in reactivity due to overmoderation above the core. Significant accident potential exists in scenarios in which core level partially drops (e.g., as has happened due to non-failsafe failures of the dump valve system) and then can surge back, resulting in potentially significant reactivity insertions. And as Mr. Norton indicates, reduction in cooling that leads to boiling can result in significant reactivity oscillations and potential for damage.

14. The concrete shield surrounding the reactor provides insufficient shielding to protect people in the reactor room from significant exposure, let alone the public nearby. On one of our tours, we noted the great trepidation exhibited by members of the reactor staff when we requested that we be accompanied to certain areas in the reactor room. Geiger counters were taken out, and we were essentially asked not to make them go to those areas. A review of the drawings for the reactor indicates it is not a monolithic shield, but rather a pile of concrete blocks, with numerous penetrations, which significant potential for streaming radiation. And it was designed for a 10 kw reactor, rather than the current one with a ten-fold increase in radioactive inventory. And, as indicated in Mr. Pulido's declaration, shielding above the reactor appears especially insufficient, due in part to the lack of construction above the reactor when the facility was first designed. The shield is inadequate.

15. The interlock systems are inadequate at the facility. There is no interlock system to prevent operation of the reactor with someone in the high radiation areas of the reactor room. More importantly, the interlocks that do exist (particularly those for the third floor machine room and the 1st floor rabbit room) are so crude as to be non-existent. RUC minutes indicate workers have already been accidentally irradiated because of the lack of an adequate interlock system. The "system" for the third floor is essentially just a key and lock; personnel in that area while reactor operations are ongoing, though forbidden, can readily occur due to the poor design of the interlock system. Likewise with the rabbit room. More importantly, the scram interlocks are quite primitive, readily bypassable or able to malfunction. For example, a number of the systems require a recording pen to trip a set trip point; but stuck pens are common. The interlock systems are inadequate or non-existent.

* See declarations by Boyd Norton and Michio Kaku

16. The control blade drive mechanisms are exterior to the reactor shield, and readily accessible and manipulable manually--all of which are very poor features from a safety standpoint in terms of accidental or intended manipulation of these crucial safety features. Boyd Norton has indicated the potential for power excursion due to stuck blade and manual efforts to free; such manual torquing and a history of control blade sticking have already occurred at UCLA.

17. The design of the drive shaft and the location of portions exterior to the shield make possible mechanisms for accidental manipulation of the control blades through some external object rapidly impacting the drive mechanism. A shield block, or experiment, or other object such as waste drum, falling on or impacting against the drive mechanism creates a mechanism for rapid removal of control blades from the core unintentionally. The lack of conventional missile shields protecting the control blade drive mechanisms thus is a safety concern.

18. Likewise the lack of spare control blade motors for the four blades. UCLA appears to only have one such motor, quite old, and of a variety not readily obtainable. Proper control of blade withdrawal speed, and proper operation of the control blades so that stuck rod scenarios leading to rapid manual withdrawal in an effort to free them, or other makeshift efforts because of control blade motors can be quite serious. This is just one example of a lack of key spare parts that are not readily obtainable because of the age of the facility and the lack of a vendor still in the reactor business.

19. The danger from fuel failures is significant. Poor calibration of the resistivity meter, for example, could result in failure to detect fuel failures until too late to do anything about it. The inadequacies in the secondary coolant monitor make it, by UCLA's own admission in the RUC minutes of 12/10/79 incapable of detecting effluent concentrations less than ten times the legal limit, and was sufficient for "post accident monitoring" only. Totally ineffective in preventing such an accident. The same minutes indicate the area monitors were defective, obsolete, and "very difficult to replace." The primary coolant is batch sampled by hand at extended intervals and monitored by the health physicist; my colleague Dr. Cooperman's comments about the apparent competence of the health physicist, as evidenced by recent inspection reports, are enough to make clear that catching fuel failures in time to do anything about them would be a matter of luck, not design. And, as indicated in Mr. Aftergood's declaration on contention XIII, concern has been generated at other reactors using the same kind of fuel about the integrity of the clad after long-term contact with water. The need to replace the aluminum primary piping assertedly because of corrosion after ten years makes clear the potential failure of the thinner aluminum clad after twenty, thirty, or forty years. The systems to detect and prevent such failure at UCLA are inadequate and/or nonexistent.

20. The control blades have had continuous operational problems over the last twenty years. On numerous occasions they have become jammed, requiring core disassembly or manual torquing, both risky endeavors. During operation of more than a few hours they have tended to warp, reducing shutdown speed and occasionally make insertion of blades impossible. This has also led to reluctance on the part of the NEL staff to perform at the required interval or for the required length of time the heat balance calibration because of fear of control blade warping or sticking during the time required to do the calibration. The control blade drive logic has had several extraordinary failures, where the system refused to respond as directed and responded in ways opposite to the direction given. Because of the lack of sufficient supply of spare parts, make-shift parts (like a bicycle chain) appear to have been used, also contributing in the past to control blade failures. This makes safe repair or replacement difficult, and leads to potentials described above for makeshift or otherwise unsafe temporary efforts that can contribute to safety problems. Furthermore, the low melting temperature of the cadmium makes them unsuitable for a reactor which has the potentials this one does for the relatively modest temperature rise in an accident necessary to melt the control blades.

21. Both the control blade system and the dump valve system have had frequent problems. Chugging, as described by Mr. Norton in his declaration, could result in severe damage if control blades failed and the dump valve system as well (common mode failure, such as in earthquake, is possible); also, as indicated by Dr. Kaku, the dump valve system is too slow-acting to be of use in certain accident situations.

22. UCLA does not have HEPA filters in the exhaust stack. It has no liquid holdup tanks for emergency use, nor a radioactivity removal system for emergency use.

22. The numerous bypassing of interlocks that have occurred at NEL over the past licensed period, a number of which have been cited as violations by AEC/NRC, have posed substantial risk to members of the public. Bypassing safety systems, scram mechanisms, reactor interlocks, and the like, is extremely poor safety practice and has unnecessarily and substantially and repeatedly put at risk the public.

23. Fuel warping, cladding damage resulting in fission product release, and tie bolt failures have occurred during a substantial portion of the license period. The assertion that there have been no subsequent tie bolt failures is undemonstrated in that I am unaware from the available records of any fuel examination since the early nineteen seventies. Tie bolt failures, given the reactivity effects of increased plate spacing known in part through the vibration tests, have substantial safety significance.

24. In conclusion, the UCLA research reactor is substantially lacking in safety features. Based upon a premise of inherent safety which was not correct, and which has been further weakened since initial licensing by numerous changes to the reactor, the reactor is of a primitive design with little consideration of or inclusion of safety features. The features identified in Contention XII are important for the safe operation of this facility; their inadequacy or non-existence substantially increases both the risk of major accident at the facility and the consequences attendant thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Sheldon C. Plotkin

Executed at Los Angeles, California, this 12th day of January, 1983

Minutes
Radiation Use Committee
10 December, 1979

Members Present
I. Catton (Chairman)
V.K. Dhir
J.W. Hornor
G.C. Pomraning
A. Zane

Guests
C.E. Ashbaugh
T. Collins
N.C. Ostrander

The meeting was called to order by Dr. Catton. A reordering and extension of the agenda had been requested by Mr. Hornor.

1. Machine Room Key Control

Mr. Hornor stated that key control of the third floor maching room was unsatisfactory, that we have had two cases of potential exposure to Facilities personnel (unbadged). He added that there was no real exposure, but that it was our good fortune rather than adequate control.

Dr. Pomraning asked how the people entered the area; how do they get the key? Mr. Hornor said the key was given out by the secretary, and that she had reported this fact to the reactor operator prior to his start-up. However, he forgot that fact. When the flashing red area warning lights came on, the secretary called Mr. Ostrander. Mr. Ostrander reported that he immediately went to the machine room, evacuated the workmen, and returned to the control room to find that the reactor was still at one watt.

Dr. Catton asked whether Mr. Hornor had a solution to the problem. Mr. Hornor said yes, he proposed both a temporary solution and a long term solution. The temporary solution, already in force, is to make the reactor operator responsible for key issuance, and tie the key to the reactor console key with a tag. The tag reminds the operator that he must not start-up if the machine room key is not at the console. The long term solution would be a unique key, necessary to enable the reactor and to permit access to the machine room. As a one-of-a-kind key, it could only be in one place or the other. The Committee approved both the interim and long term solution.

2. Argon Hold-Up System

Mr. Ostrander stated that the argon hold-up system was proposed as a method of reducing emissions and necessary in responding to the increased demand for reactor services. He stated that geometrical constraints suggested three horizontal tanks, vertically stacked against the south wall of the reactor room, and contained within a one foot thick concrete shield. The tanks would be constructed of 24 inch pipe, 18 feet long, and capped with standard end caps. At 150 psig, and an estimated concentrate flow rate of 200 SCFH, the tank volume would permit the accumulation of concentrate for approximately 9 hours.

Dr. Pomraning inquired as to the argon-41 half-life. Mr. Ostrander replied 1.83 hours, and cited an example cycle of accumulating concentrate for 9 hours, holding for 14 hours, and venting in one hour. He said that if "all" of the

argon-41 generated is captured in the concentrate, then this cycle would keep the instantaneous concentration (at the point of release) below the Maximum Permissible Concentration for release to an uncontrolled area. He did not know what fraction of the argon-41 was captured in the concentrate, the fraction could be increased by increasing the flow rate of concentrate, and that an optimization problem was apparent.

Dr. Pomraning asked whether a cost factor was involved. Mr. Ostrander said he thought that the whole job could be done for less than six thousand dollars. Mr. Collins suggested funding the project by increasing the reactor recharge rate. Dr. Catton said that increasing the rate would discourage users, and that the modification should be viewed as an investment with cost recovered by increased reactor utilization.

Dr. Pomraning indicated that financing was not a concern of the Radiation Use Committee, but he felt that the project should go forward. Dr. Catton concurred, indicating that the laboratory recharges might cover a substantial portion of the cost. Mr. Ostrander was instructed to improve the cost estimate. Dr. Pomraning asked whether a Committee approval was now required. Mr. Hornor said no, except that he wanted approval of the concept and of certain experiments to be performed in respect to the optimization question. Mr. Hornor added that he had reviewed the shielding calculations and believed that a concrete shield, one foot thick was quite adequate.

The Committee approved the concept. Mr. Hornor said that the proposed experiments, to be done during the course of the annual heat balance check, involved throttling the flow of concentrate to the stack. He said that throttling the flow would probably increase the argon-41 concentration in the reactor high bay, that the experiment was non-hazardous, but that he desired Committee approval. He said that the reactor had operated that way in the past without undue exposure to personnel. With some further explanation and discussion, the Committee approved the proposed experiment.

Messer's Hornor and Ostrander described the accidental discovery of an apparent water seal in the line which vents the dump tank to the stack. Tentatively attributing a downward trend in argon-41 concentrations to the existence of this water seal, they sought Committee approval of the installation of a visible U-tube water seal in that line. The Committee approved.

3. Stack Radiation Monitor

Mr. Zane described a monitor that would observe the stack concentration and to sense an abnormal radiation level that might arise from a leak in the delay tank system. The abnormal level will shut down the ventilation system, and would scram the reactor if it is operating.

Dr. Catton noted that this matter had been discussed earlier. Mr. Zane agreed, saying that he now had the instrument and proposed to install it. Mr. Hornor added that he proposed a trip-point equal to four times the maximum level, and he sought Committee approval of that trip-point. The Committee approved installations and trip-point.

4. Emergency Evacuation Alarm

Mr. Zane described a new evacuation alarm system consisting of nine whooper sirens located throughout the laboratory. Training will be accomplished with the aid of a portable siren of the same kind. Future drills will be unannounced and all personnel are to evacuate according to the existing plan. Mr. Hornor said that he will revise the requalification program, a change that does not require Committee approval. He did ask for Committee approval of the hardware change (from a bell system to the siren system). Approval was given.

5. Safety Amplifier

Mr. Zane reported that the new Safety Amplifier had been received, but that the power supply was not correct for the control rod magnetic clutches. Payment for the amplifier is currently withheld pending the vendors correction of the problem. This subject is for information only, no Committee action is required.

6. Reactor License Renewal

Mr. Ashbaugh presented a preliminary status report and spoke of the request submitted to extend the present license. No Committee action was requested.

7. Fuel Shipment

Mr. Ashbaugh said that the spent fuel shipment was currently stalled by our failure to supply a required Quality Assurance document. Mr. Ostrander took the responsibility, noting that the document had been returned to him with a number of questions and that he was working on it. No Committee action was requested.

8. Secondary Effluent Monitor

Mr. Ostrander said that the secondary effluent monitor was unrecognized by the present Technical Specifications. He further said that the differential pressures between primary and secondary sides of the heat exchanger were such that a leak would cause flow into the primary side. He questioned the need for, or value of, a secondary effluent monitor. Mr. Hornor said that the secondary cooling water constituted an effluent from a reactor facility and hence must be monitored. Dr. Catton concurred. Dr. Pomraning asked why the question even arose. Mr. Ostrander replied that the question arose in connection with the license renewal and a rewrite of the Technical Specifications. He added that contamination of the secondary water could only arise as a result of massive contamination of the primary system, and that such primary contamination would be detected long before any evidence would be found in the secondary system. Dr. Catton rejected that argument. The Committee opinion was that the monitor should be included in the revised Technical Specifications.

Mr. Ashbaugh asked whether the description should be that of the present system or some up-graded version. Upon questioning, Mr. Zane indicated that the instrument sensitivity left something to be desired, and Mr. Hornor added that he felt the instrument could see 10 times MPC. Dr. Catton said that was sufficient for emergencies only, post accident monitoring. The Committee agreed.

9. Rabbit Procedures

Mr. Hornor reported finding the rabbit closed door open and the door interlock (to the console) non-operative during a routine operation. Discussion with the user revealed that he thought the interlock was malfunctioning. Clearly the door must be opened to load and remove samples, but should not be open when a rabbit is in transit. The interlock was designed to prevent the return of a rabbit if the door is open. It initializes the system cycle if the door is opened when there is a rabbit in the core.

Prevention of rabbit return is desirable, but initializing the system is not. There is nothing intrinsically wrong with opening the door to fill the automatic loader when there is a rabbit in the core, but that possibility was not anticipated when the interlock system was integrated into the automated turret. The interlock had been repaired and the rabbit user had agreed to keeping the door closed when the sample is in core.

Mr. Zane remarked that the user operates on a tight schedule of closely sequenced rabbit insertions and removals, and has asked for procedural and design changes that would permit operation with the door open. In response to Dr. Pomraning, Mr. Zane said that design concepts had been discussed, but specific details have not been developed.

Mr. Hornor said that the essential safety feature of the present system is the negative pressure of the closet relative to the surroundings, and that the hazard arose in connection with the air, potentially contaminated, that was released upon return of the rabbit. The bulk of that air is filtered and passed to the reactor stack without escaping into the closet. One proposed design change would depressure the tube sooner by sensing the passage of the rabbit at a specific location. The Committee agreed that this might be satisfactory, but that a concrete design would be necessary before approval could be considered.

Dr. Catton recalled discussions of a diverter system in which the rabbit would be returned directly to a counter instead of passing through the load-return turret. Mr. Hornor agreed that this was the ultimate system. It was estimated that the system would probably cost about five thousand dollars and the user had volunteered to make that investment.

Dr. Catton and Mr. Zane both indicated that the rabbit system should belong to the SEAS, and that the laboratory should not be vulnerable to equipment removal by a dissatisfied user. Dr. Catton noted that this was not properly a radiation safety question, that Messer's Ostrander, Zane, and Hornor should design the system, and then the Committee would have something to review. The money question would preclude any substantial expenditure in the current academic year, but the design should go forward.

10. Area Radiation Monitor

Mr. Hornor said that the area monitor in the rabbit room was defective. Mr. Zane said that the design was obsolete and the GM tube (a General Electric product) was very difficult to replace. The people working in the rabbit room do use a portable survey meter, but the remote read-out at the reactor console is meaningless.

Dr. Pomraning suggested scrapping the instrument. Mr. Hornor agreed, but said that an upgraded replacement should be procured. He added that the whole present four channel area monitoring system should be replaced by a

six channel system. The cost would run about one thousand dollars per channel. The sixth channel would be used in connection with the argon holdup system. Mr. Ostrander explained that the radiation level inside of the shield should be proportional to the argon-41 concentration in the tanks, and the signal could be used as a go, no-go visual or mechanical constraint upon tank venting.

Mr. Ashbaugh said that he had scheduled a meeting with Atomics International on December 17, that they were shutting down a reactor, and might have surplus monitors. Dr. Catton instructed Mr. Ashbaugh to follow up on that idea.

The meeting was adjourned.

A. Zane
Secretary
Radiation Use Committee

AZ:jk

CONTENTION XIII

RESPONSE TO NRC STAFF ASSERTED MATERIAL FACTS

1. "The 93% enrichment level of fuel in use by the UCLA reactor is necessary to maintain the optimum flux because of the reactor design."

DISPUTED

(Dr. Taylor declaration for XIII, P11,16; Aftergood declaration for XII, P3, 8-9)

2. "The amount of SNM at the UCLA reactor facility is less than 5 kg."

DISPUTED*
(Application, p. 5; chart of SNM inventory since 1970, prepared by UCLA's Ostrander, submitted as interrogatory clarification on August 26, 1982; Letter, October 28, 1974, UCLA's Ashbaugh to AEC's Goller)

3. "No low-enriched fuel plates sufficient for the Argonaut UTR design are available."

DISPUTED

(Aftergood declaration for XIII, P3-11; Attachment A, p. 11; Attachment B, p. 1,5; Attachment D, p. 2; Attachment E, p. B-2; Taylor declaration for XIII, P16-23 ; also, citations to CBG Facts 11 & 15, CBG Motion for S.D. on XIII)

4. "Some excess reactivity is required at an Argonaut UTR to overcome inherent neutron reaction poisons, burnup trade-offs, personnel safety in fuel element manipulations and negative reactivity experiments."

NOT DISPUTED

5. "The UCLA reactor excess reactivity limit in the proposed technical specifications is $3.00."

NOT DISPUTED

6. "A $3.00 excess reactivity limit provides a conservative margin of safety."

DISPUTED

(Norton declaration for V, entire; Kaku declaration for XIX, P19-54; Dupont declaration for XIX, P4, 22, 26-29)

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* The issue of whether UCLA now meets the 5 kg SNM threshhold is the subject of the 10 CFR 73.60 vs 67 debate that has not yet been resolved. CBG is still to file a supplemental brief on the matter when its FOIA request is completed. The citations given indicate (a) that UCLA is over the 5 kg limit when the plutonium source is added in, and (b) that a discrepancy between the current inventory records provided by UCLA's Ostrander and historical records indicate matiral unaccounted for of about half a kilo, which would likewise push UCLA over the 5 kilo limit. For details, see CBG's 9/7/82 73.60 brief, p.7-9, and CBG's Motion for Summary Disposition on contention XIII, p. 17-18)