

3/12/85  
2/4/85UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD  
OFFICE OF SECRETARY  
DOCKETING SERVICE  
BRANCH

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 )  
 In the Matter of )  
 )  
 VIRGINIA ELECTRIC AND POWER CO. )  
 )  
 (North Anna Power Station, )  
 Units 1 and 2) )  
 )  
 \_\_\_\_\_ )

Docket Nos.  
 50-338 OLA-1  
 50-339 OLA-1

CONCERNED CITIZENS OF LOUISA COUNTY  
 RESPONSE TO APPLICANT'S REQUEST  
FOR PRODUCTION OF DOCUMENTS AND INTERROGATORIES

Interrogatory 1. Identify the person or persons whom CCLC relies upon to substantiate in whole or in part CCLC's positions with respect to Consolidated Contention 1.

**Response:** As of this date CCLC has reached an agreement with one expert witness - Dr. Marvin Resnikoff.

Interrogatory 2. Provide the addresses and educational and professional qualifications of each person identified in CCLC's response to Interrogatory 1.

**Response:** Dr. Resnikoff's address is River Road, Columbia NJ 07832. He has ten year's experience in issues relating to the economics of and safety risks associated with the transportation of radioactive materials. A copy of his professional resume accompanies these responses. See Enclosure A.

Interrogatory 3. Identify those persons listed in response to Interrogatory 1 whom CCLC will or may call as a witness in this proceeding.

**Response:** Dr. Marvin Resnikoff.

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Interrogatory 4. Provide a summary of the views, positions or proposed testimony of each person listed in response to Interrogatory 1.

**Response:** The transportation of spent fuel entails environmental risks, safety risks, and economic costs that are not even hinted at in the Environmental Impact Appraisal prepared by the NRC Staff in connection with this proceeding. In particular, a Surry-to-North Anna transshipment program gives rise to a significant risk of incidents which would lead to substantial personal injury and environmental harm. Among these incidents are sabotage or diversion of a spent fuel cask, and transportation accidents.

VEPCO's and the NRC's apparent willingness to accept these radiological and environmental risks cannot be justified in light of the fact that it would be preferable, from every standpoint, including an economic one, to construct a dry cask storage facility at the Surry Station in lieu of shipping Surry spent fuel to North Anna. The use of dry storage casks at Surry would reduce the occupational radiation exposures from the fuel assemblies involved, and would similarly reduce the possibility of fuel handling, transportation, and other accidents. In addition, reliance on dry storage would produce a short-term economic saving of up to \$50 million, including transportation to, and final disposal at, a geologic repository.

Interrogatory 5. Identify all documents and other material that CCLC intends to use during this proceeding to support Consolidated Contention 1 and that CCLC may offer as an exhibit in this proceeding or refer to in connection with the examination in this proceeding of any witness.

**Response:**

Resnikoff, M., The Next Nuclear Gamble, Transportation and Storage of Nuclear Waste, Council on Economic Priorities, 1983.

NRC, Final Environmental Statement on the Transport of Radioactive Materials by Air and Other Means, 1977, (NUREG-0170)

Battelle Pacific Northwest Laboratories, Opportunities to Increase the Productivity of Spent Fuel Shipping Casks in the United States, 1980 (PNL-3017)

NRC, Potential Crush Loading of Radioactive Material Packages in Highway, Rail, and Marine Accidents, 1980 (NUREG/CR-1588)

Oak Ridge National Laboratories, Cask Designers Guide, 1970 (ORNL-NSIC 68)

E.R. Johnson & Associates, A Preliminary Assessment of Alternative Dry Storage Methods for the Storage of Commercial Spent Nuclear Fuel, 1981 (DOE/ET/47929-1)

R. E. Hoskins, Integrated Cask Storage Systems for Storage, Transportation, and Disposal of Spent Nuclear Fuel, 1984.

Westinghouse Electric Corp., Preliminary Cost Analysis of a Universal Package Concept in the Spent Fuel Management System, 1984 (WTSD-TME-032)

NRC, Transportation of Radionuclides in Urban Environs, 1980 (NUREG-CR-0743)

P. Eggers, Severe Rail and Truck Accidents: Toward a Definition of Bounding Environments for Transportation Packages, 1983 (NUREG/CR-3499)

NRC, Reactor Safety Study, 1975 (WASH-1400)

Interrogatory 6. Identify each document upon which a person listed in CCLC's response to Interrogatory 1 may rely to substantiate his or her views regarding Consolidated Contention 1.

**Response:** See response to Interrogatory 5.

Interrogatory 7. Describe the accidents that could occur during the transportation of spent fuel casks from Surry to North Anna, the probability of each such accident and the consequences CCLC would expect to result from each such accident.

**Response:** By definition, accidents cannot be predicted or quantified in advance. It can be said, however, that among the general types of accidents (each of which would result in loss of cask integrity and possibly significant releases of radioactive materials) that are made possible by the proposed transshipment programs are:

accidents in which the cask being transported is struck by another object, such as another vehicle or a train;

accidents in which the cask itself strikes another object, such as a bridge abutment or a road surface after a fall from a bridge;

accidents involving high-temperature and extended duration fires;

accidents involving sabotage, diversion, or attempted diversion;

accidents involving human error; and

combinations of the above.

The probabilities of these accidents is uncertain. To establish the probabilities of the first three categories listed above, CCLC will rely on data obtained from the Virginia Highway Department or the federal Bureau of Motor Carrier Safety. Probabilities associated with the other categories are discussed below in connection with Interrogatories 9 and 13.

Estimating the consequences of spent fuel transportation accidents involves a high degree of uncertainty due to the large number of variables that come into play, such as number of assemblies involved, overall cladding integrity, length of cooling

time since removal from core, severity of cask and/or assembly damage, atmospheric conditions (particularly wind and precipitation), population density and environmental sensitivity of surroundings, and type of emergency response.

CCLC has yet to calculate the probable consequences associated with an accident involving one of VEPCO's proposed shipments. In the past, however, Dr. Resnikoff has estimated the probable consequences of a similar accident occurring in a rural area. See The Next Nuclear Gamble, cited in response to Interrogatory 5, at chapter VI, particularly pp. 268-278. As this analysis shows, exposed individuals would probably receive inhalation as well as ingestion doses many times the current standards. In addition, farmland within a 1.4-square mile area would be severely contaminated.

Interrogatory 8. Describe the basis for and any data or analyses that tend to support CCLC's responses to Interrogatory 7.

**Response:** See The Next Nuclear Gamble, chapter VI, and authorities cited therein.

Interrogatory 9. Describe the forms of sabotage that could result in accidents occurring during the transportation of spent fuel casks from Surry to North Anna, the probability of each such form of sabotage and the consequences CCLC would expect to result from each such form of sabotage.

**Response:** CCLC has not calculated the probability of possible forms of sabotage. In Dr. Resnikoff's view, however, commonly-available industrial explosives, such as those used for drilling aids and oceanographic cable cutters, would easily penetrate most transportation casks. Such explosive devices are conical-shaped,

weigh less than one kilogram, and can penetrate 355 mm of steel with a hole diameter of 45 mm.

Presumably, the consequences of such an incident would be comparable to other transportation accidents involving breach of cask containment.

Interrogatory 10. Describe the basis for and any data or analyses, that tend to support CCLC's responses to Interrogatory 9.

**Response:** See R.T. Barbour, Pyrotechnics in Industry, 1981 (McGraw Hill), p. 47.

Interrogatory 11. Describe, for each form of sabotage listed in response to Interrogatory 9, what would be required of the saboteurs in terms of planning, equipment, personnel skills, staffing and execution.

**Response:** CCLC has not studied this issue.

Interrogatory 12. Describe the ways in which, and the extent to which, compliance with 10 C.F.R. § 73.37 would be inadequate to prevent a successful sabotage effort.

**Response:** See response to Interrogatory 11. Compliance with regulatory requirements does not assure safety; the risk of sabotage can never be reduced to a negligible level because of the consequences of such an incident.

Interrogatory 13. Describe precisely the respects in which human error by Applicant's employees in preparing casks for shipment could result in accidents occurring during the transportation of spent fuel casks from the Surry Station to the North Anna Station, the probability of each such error and the consequences CCLC would expect to result from each such error.

**Response:** Accidents caused by human error can never be described or evaluated, with precision, before they happen. VEPCO's proposed transshipment programs creates a risk of the following kinds of accidents caused by human error:

- Failure to adequately inspect the shipping cask and/or transport vehicle. A similar failure led to the uncoupling of a truck cab and its trailer, on which was mounted a spent fuel cask, on the Indiana Turnpike in September of 1983.
- Failure to properly seal and prepare the cask after loading it with spent fuel. A similar incident was reported to the NRC by Duke Power Company on December 1, 1981.
- Transport vehicle/escort vehicle driver negligence. Such negligence led to an accident involving a shipment of fuel to North Anna on June 28, 1984.
- Failure to properly secure the cask tie-downs, impact limiters, overpacks, or other shipping paraphernalia.

Interrogatory 14. Describe the basis for and any data or analyses that tend to support CCLC's responses to Interrogatory 13.

**Response:** CCLC has, and will make available to VEPCO, copies of news articles regarding the accidents identified above. Also available is a letter from Wm. O. Parker, Jr., Duke Power Co, to John Davis, NRC, concerning the improperly sealed cask described above.

Interrogatory 15. Indicate the ways in which, and the extent to which, compliance with Applicant's procedures governing the loading, unloading and handling of spent fuel casks would be inadequate to prevent the errors described in CCLC's response to Interrogatory 13.



**Response:** Spent fuel handling procedures do not prevent accidents if they are not complied with. CCLC contends that accidents, like the accidents identified in response to Interrogatory 13, may occur because of failure to follow prescribed procedures.

Interrogatory 16. Indicate whether there are any unresolved conflicts over the use of available resources involved in this proceeding and, if there are any, list them.

**Response:** The resource commitments that are implicated by the proposed transshipment program include the health risks and environmental risks that it poses. Hundreds and perhaps thousands of people, and thousands of acres of farmland are threatened by the selection of the transshipment alternative over the dry cask storage alternative.

Further, the selection by VEPCO and the NRC of the transshipment alternative represents a choice between two fundamentally different approaches to the problems of managing the nation's nuclear waste. Dry cask storage is now accepted as the soundest means of spent fuel management because it is safer, more economical, and it will facilitate the use and management of a geologic nuclear waste repository if and when one is constructed. On the other hand, the alternative of shipping Surry spent fuel to North Anna will entail higher economic costs and will reduce the available storage capacity at North Anna. Thus, dry cask storage represents a commitment of new resources (money, technology, and land) to this promising method of reducing the environmental hazards of nuclear waste storage. The alternative of



transshipment and pool storage represents simply a waste of resources (the existing storage capacity at North Anna).

VEPCO is the first private utility in the nation to seek a license amendment authorizing dry cask storage, and the NRC Staff's treatment of that application, in the context of this proceeding, will have a substantial effect on the storage method that is chosen for the 500 spent fuel assemblies that are at issue in this proceeding, as well as other spent fuel stocks around the nation.

Interrogatory 17. Specify why dry cask storage at Surry is the "safest" method for spent fuel disposal.

**Response:** Dry cask storage at Surry is safer than transshipment to and pool storage at North Anna because there is virtually no accident that can befall a dry storage cask that poses a significant health or environmental risk. There is no form of electrical failure, mechanical failure, or human error which could foreseeably lead to offsite radioactive releases.

Transshipment to North Anna, on the other hand, is attended by numerous risks, such as sabotage, human error, materials failures, etc. Moreover, transferring the shipped fuel to the North Anna pool (and eventually transferring it back out again) involves a risk of fuel handling accidents and will necessarily entail unnecessary occupational exposures. There is a large number of foreseeable incidents at North Anna or its spent fuel pool that would damage the Surry spent fuel and cause offsite releases. Among these are pump failure, chiller failure, fuel or cask handling accidents, and LOCA.

Interrogatory 18. Specify the basis for CCLC's contention that dry cask storage can be "effected in a timely manner."

**Response:** There are several commercially-available casks that are adequate for both shipping and storage of spent fuel. While the NRC Staff has yet to certify such casks, such certification is said to be expected this year.

Interrogatory 19. Indicate the basis for CCLC's contention that dry cask storage is "feasible."

**Response:** Many of the documents referenced in response to Interrogatory #5, e.g., Resnikoff, Johnson, Hoskins, and Westinghouse, conclude that dry cask storage is not only feasible, but the most advantageous form of spent fuel storage yet developed. This method had received substantial testing in West Germany and by the Tennessee Valley Authority.

Interrogatory 20. Identify the documents named in CCLC's responses to Interrogatories 5 and 6 by author, title, date of publication and publisher if the reference is published; if the reference is not published, identify the document by the author, title, date it was written and qualifications of the author relevant to this proceeding, and indicate where a copy of the document may be obtained.

**Response:** CCLC's response to Interrogatory 5 contains all available information regarding these documents. If VEPCO cannot obtain a copy of any of these documents, CCLC will be pleased to provide a copy at \$0.10 per page.

Interrogatory 21. Indicate whether the Staff has erroneously concluded in its Safety Evaluation Report that the probability of a sabotage event is remote and that attempted sabotage, if successful, would not produce serious radiological consequences. If the response is "yes," state the basis for CCLC's response.

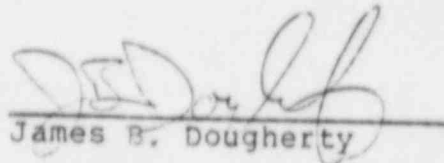
**Response:** Yes. CCLC's position regarding sabotage is set out in its responses to Interrogatories 9, 10, and 11.

Interrogatory 22. Indicate in what significant ways Applicant's proposal is different from the proposal in the Duke transshipment case where the Commission held that the transportation by truck of 300 spent fuel assemblies over a 170 mile distance neither presented a substantial national resources commitment question nor significant environmental impacts (14 NRC at 322).

**Response:** In the Oconee-to-McGuire case the Commission ruled that the record did not show that the proposed license amendment presented significant environmental impacts. CCLC intends to prove this on the record. Moreover, dry cask storage was not held out in that case as a viable alternative to transshipment.

Dated this <sup>12<sup>th</sup></sup> day  
of February, 1985  
NRC 17

Respectfully submitted,

  
James B. Dougherty

Counsel for Concerned  
Citizens of Louisa County

**MARVIN RESNIKOFF**  
River Road  
Columbia, N.J. 07832  
201/841-9529

**PERSONAL:** Date of birth, June 5, 1938; single; height 5'7"; weight 145 lbs.

**EDUCATION:** PhD, Physics, U of Michigan, Ann Arbor, Michigan, 5/65  
M.S., Physics, U of Michigan, Ann Arbor, Michigan, 2/61  
B.A., Phys/Math, U of Michigan, Ann Arbor, Michigan, 6/59

**POSITIONS:**

5/83-12/78-6/81 Co-Director, staff scientist, Sierra Club Radioactive Waste Campaign, Buffalo and New York, NY

6/81-5/83 Project Director, Transportation and Storage of Nuclear Waste, Council on Economic Priorities, New York, NY

9/74-6/81 Part-time lecturer, Rachel Carson College, State University of New York at Buffalo, Buffalo, NY

8/77-11/78 Project Director, Environmental Protection Agency grant for research on the economics of uranium, plutonium recycle, Rachel Carson College, State University of New York at Buffalo

9/75-6/77 Staff scientist, New York Public Interest Research Group, State University of New York at Buffalo

2/73-1/74 Fulbright lecturer at Universidad de Chile, Santiago, Chile (terminated 10/73 by military coup)

2/67-1/73 Assistant Professor of Physics, State University of New York at Buffalo

Summer 68/69 Director, Neighborhood Science Centers, Board of Education, City of Buffalo; New York Research Foundation Fellowship; Invited lecturer, Summer Theoretical Physics Institute, Boulder, Colorado, '68

9/65-8/67 Research Associate, Department of Physics, University of Maryland

Summer 65 National Science Foundation participant, Latin-American School of Physics, Mexico City

8/62-5/65 Research Assistant, Department of Physics, University of Michigan

**ACADEMIC GRANTS:**

National Science Foundation grant for Research in Elementary Particle Physics, with M. Ram, 6/69-6/71, \$34,500. Renewed from 6/71-1/73 for an additional \$20,000; Environmental Protection Agency grant for research on the economics of uranium, plutonium recycle

## CONSULTANTSHIPS:

- 1975 New York Attorney General, to prepare testimony on hazard of shipping plutonium from Kennedy International Airport
- 1978 Illinois Attorney General, to review application by General Electric to expand Morris, Illinois spent fuel pool
- 1979 Illinois Attorney General, to prepare testimony on hazard of re-racking spent fuel pool at Zion 1 and 2 nuclear reactors
- 9/78-4/79 State of Lower Saxony, West Germany, to review plans of West German nuclear industry to reprocess nuclear fuel, solidify and dispose of high-level waste, and decommission facilities at Gorleben
- 9/82- Town of Wayne, N.J., to advise on cleanup of thorium waste dump
- 5/83- Southwest Research and Information Center, Albuquerque, N.M., to prepare testimony on transportation impacts of WIPP facility for federal court case
- 1/84- Town and Country Planning Association, London, England, to prepare Proof of Evidence for the Sizewell "B" Public Inquiry on transportation of irradiated nuclear fuel through London

## TESTIMONY/COMMENTS/POPULAR ARTICLES (post 1974):

- 1974-1978 Comments on all draft EIS and proposed criteria and regulations by Federal agencies related to reprocessing and waste management on behalf of Sierra Club (e.g., "Comments on Generic Environmental Statement on Mixed Oxide Fuels," Oct. 1974; "Comments on WASH-1535, LMFBR Program," Joint NRDC-Sierra Club Comments, April 1975; "On the Report by the Interagency Review Group on Nuclear Waste Management," Nov. 1978; "On Criteria for Radioactive Waste, EPA," 1979)
- 1975 "Occupational exposures at the West Valley nuclear fuel reprocessing plant," American Public Health Association paper
- 1975 testimony, US District Court, Southern District of New York, New York Attorney General, on the hazard of shipping plutonium from Kennedy International Airport
- 1975 testimony before the State Siting Board, Sterling Nuclear Plant on the cost of nuclear fuel and waste disposal, on behalf of Ecology Action of Oswego, NY
- 1976 invited paper, American Nuclear Society meeting, Toronto, Ontario, "Dispersion of plutonium due to an air transport accident"
- 1977 testimony, hearings on plutonium recycle, NRC docket no. RM-50-5, on U.S. commercial reprocessing experience, on behalf of the Sierra Club, 172 pages

- 1978 testimony, hearings on environmental impact of waste management, NRC docket no. RM-50-3, on radiation releases from commercial reprocessing operations, on behalf of the Sierra Club
- 1978 testimony before the State Siting Board, Jamesport Nuclear Reactor, on the status of radioactive waste disposal, on behalf of the Oil Heating Institute of Long Island
- 1979 testimony, hearings on reracking the Zion nuclear reactors spent fuel pool, NRC docket nos. 50-295, 50-304, on the possibility and consequences of spent fuel pool boiling, on behalf of the Illinois Attorney General

"Expensive Enrichment," Environment, July/Aug 1975, pp.28 (on the economics of uranium and plutonium recycle)

"The Cost of Turning It Off," Environment, Dec 1976, pp.17 (on decommissioning nuclear reactors)

"Nuclear Waste: Myths and Realities," Sierra Club Bulletin, San Francisco, July/Aug 1980

"57th Street and Broadway: Hiroshima," Op-Ed piece, The New York Times, Feb 1982

"No One's Ready for a Nuclear Spill," Op-Ed piece, USA Today, August 18, 1983

"When Does Consultation Become Co-Optation? When Does Information Become Propaganda? An Environmental Perspective," in The Politics of Nuclear Waste, edited by William Colglazier, Pergamon Press, 1982

The Next Nuclear Gamble, Transportation and Storage of Nuclear Waste, Council on Economic Priorities, New York, March 1983

"Shipping Flasks in Severe Rail Accidents," in UTIF Conference Proceedings, Macmillans, London, Dec 1983

"Review of Nuclear, Inc.," Sierra Club Bulletin, San Francisco, Nov/Dec 1983

- 1984 Proof of Evidence, Sizewell "B" Public Inquiry, The Maltings, Snape, England, on the transportation of irradiated fuel through London, England, on behalf of the Town and Country Planning Association, 65 pages

In collaboration with M. Hamilton, the following in-depth popular articles, called fact sheets, of the Sierra Club Radioactive Waste Campaign:

- Feb 1984 "'Low-Level' Nuclear Waste: Options for Storage," on alternatives for storing nuclear waste, 8 pages
- Nov 1980 "Shipping Casks: Are They Safe?", on the safety of irradiated nuclear fuel shipping containers, 8 pages
- Sept 1979 "On the Job at NFS," on occupational hazards in commercial nuclear fuel reprocessing, 6 pages



April 1979 "Salt Will Not Work," on problems of disposing of high level waste in a salt geologic medium, 4 pages

In collaboration with Lisa Finaldi, the following fact sheet of the Sierra Club Radioactive Waste Campaign:

Dec 1985 "A 'Low-Level' Nuclear Waste Primer," background information on "low-level" nuclear waste, 8 pages

#### COURSES TAUGHT AT SUNY/BUFFALO:

67-68	Phys 501-2 Phys 521R	Introduction to Mathematical Physics Advanced Topics in Elementary Particle Physics
68-69	Phys 501-2 College A	Introduction to Mathematical Physics Non-Authoritarian Community Schools
69-70	Phys 107R Phys 608 College F	General Physics High Energy Physics Consciousness and Society
69-71	EPIS	Remedial Math Courses
70-71	Phys 307-8	Mechanics
71-72	Phys 103 Phys 307-8	Physics for Poets Mechanics
72-73	Phys 103	Physics for Poets
74-77	RCC 404	Environmental Action
75-76	RCC 254	Electric Utilities and the Consumer
77-78	RCC 180	Energy, Employment and the Environment
78-81	RCC 130	Energy for the Future

#### SCIENTIFIC PUBLICATIONS:

"The General Coupling Coefficients for the Group  $SU(3)$ ", J. Math Phys. 8, 63 (1967).

"The Recoupling Coefficients for the Group  $SU(3)$ ", J. Math. Phys. 8, 79 (1967).

"A Few Comments on the Representations of  $SU(3)$ ", Rev. Mexicana de Fisica 15, 255 (1966).

"A Useful Relation Among Casimir Operators", Phys. Letters 19, 596 (1966).

"Mass Formulas for the 405 Multiplet of  $SU(6)$ ", with RR Silbar, Phys. Rev. 148, 1341 (1966).



"Are the Positive Parity Mesons in the 405 Multiplet?", with RR Silbar, Phys. Rev. 149, 1245 (1966).

"The  $U(n) \supset R(n)$  Problem. I.", Nucl. Phys. 83, 632 (1966).

"Matrix Products and the Explicit 3,6,9,12-j Coefficients of the Regular Representations of  $SU(n)$ ", with I. Kaplan, J. Math. Phys. 8, 2194 (1967).

"A General Class of  $SU(3)$  Recoupling Coefficients", U of Maryland Technical Report No. 676, May 1967. Not for publication.

"The Symmetric Quark Model of Baryon Resonances", with O.W. Greenberg, Phys. Rev. 163, 1844 (1967).

"Analyticity Requirement for Regge Poles and Backward Unequal-Mass Scattering", with Y.S. Kim, Phys. Rev. 169, 1288 (1968).

"Applications of the Poincare Group", U of Maryland Technical Report No. 706, July, 1967. Review talk presented at Faculty Seminar.

"On the Representation Theory of the Inhomogeneous Lorentz Group as a Foundation of Quantum-Mechanical Kinematics", by Hans Joos, Fortschritte der Physik 10, 65-146 (1962). Translated and circulated as an unpublished monograph.

"The Representations of  $U(4) \supset U(2) \otimes U(2)$ ", with M. Brunet, J. Math. Phys. 11, 1474 (1970).

"Branching Rules for  $U(n) \supset SO(n)$ ", with M. Brunet, J. Math. Phys. 11, 1471 (1970).

"The Representations of  $U(4) \supset U(2) \otimes U(2)$  and the Nuclear Quasi-Spin Model". Talk presented at the Summer Theoretical Physics Institute, U of Colorado, Boulder, Colorado. Published in the Proceedings, Vol. XID, Mathematical Physics (Gordon & Breach Science Publishers, Inc.) (1970).

"Degeneracy of the  $SU(3)$  Direct Product and the Symmetric Representations of  $SU(6) \supset SU(3) \otimes SU(2)$ ", J. Math. Phys. 11, 1885 (1970).

"The Representations of  $U(n) \supset SO(n)$ ", SUNY/Buffalo preprint, May 1969, with M. Brunet, J. Math. Phys. 12, (1971).

"Extension of the Mass Operator in the Symmetric Quark Model for Negative Parity Baryon Resonances", SUNY/Buffalo preprint, June, 1970, Phys. Rev. (1971).