



June 16, 1982

Region I
U.S. Nuclear Regulatory Commission
Att: Mr. John D. Kinneman
Chief, Materials Radiological
Protection Section
631 Park Ave.
King Of Prussia, Pennsylvania, 19406

Re: Special Nuclear Materials Licence No. SNM - 1681
Docket No. 70-02243 Inquiry No. 82-01

Dear Mr. Kinneman:

Special Nuclear Materials License No. SNM-1681 issued to New Jersey Institute of Technology (formerly Newark College of Engineering) inadvertently was allowed to expire. This letter of application for reissuance of the license is submitted in accordance with Section 70.22 Title 10 Code of Federal Regulations.

The applicant institution is:

New Jersey Institute of Technology
323 High Street
Newark, NJ 07102

Dr. Saul K. Fenster, President and Principal Official of the Institute, is a citizen of the United States.

Application is for possession of 160 grams (5 curies) of plutonium in the form of sealed plutonium beryllium neutron sources (essay by weight percent: 91.446% Pu-239, 7.752% Pu-240, 0.75% Pu-241, 0.049% Pu-242). The sources were manufactured by Monsanto Research and are permanently located in a Nuclear Chicago Subcritical Reactor Model No. 9000-1 and a Nuclear Chicago Neutron Howitzer Model No. NH-3.

The material will be used solely for the operation of a nuclear engineering laboratory where the experiments being performed are typically those found in an undergraduate laboratory course.

The only personnel involved with the use of the material itself are faculty people usually with PH.D.'s in the nuclear area or who at least have

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previous experience in the nuclear area.

The Institute has the following survey equipment:

- (a) Nuclear Chicago (N.C.) Model 2510 Ionization Survey Meter, range 0-290mr/hr. to be calibrated once a month as specified by N.C.
- (b) N.C. Model 2571 Neutron Survey Meter, range 0-2500 n/cm² - sec. to be calibrated once a month as specified by N.C.
- (c) N.C. Model 2672 Alpha Survey Meter, range 0-150,000 cpm. to be calibrated once a month as specified by N.C.
- (d) N.C. Model 1619 G.M. Survey Meter, range 0-2000 cpm (coupled with audio output).
- (e) N.C. Dosimeters, specifications on file with N. R. C. (see below).

Some years ago our personnel monitoring equipment consisted of pocket dosimeters in addition to a film badge service. Prolonged readings of 0 induced us to save the expense of the film badge service and the pocket dosimeters are now used only to acquaint students with their use.

The services are locked permanently in their places which themselves provide adequate shielding and are removed only twice a year for their semi-annual check for leaks. Wipes for these tests are sent to Health Physics Assoc., Inc., in Illinois.

Specifically,

- a) Activities to be performed:

Our 160 grams of plutonium is now being used to fulfill the laboratory requirements of an undergraduate program in nuclear science and engineering. These requirements consist of a single undergraduate course and an occasional project or thesis centered around a sub-critical nuclear reactor and neutron howitzer which permanently house the plutonium. These pieces of equipment are both contained in a single room in the basement of Tiernan Hall on the NJIT campus. The plutonium is removed from the equipment only for the purpose of conducting semi-annual leak tests. The experiments in the course and in the projects consist of the placing of probes or activation foils in the equipment. Data from these placings are procured in the same room.

- b) Technical Qualifications of Personnel:

The only person who directly supervises the use of the equipment is Benjamin H. Stevenson, Jr., Associate Professor of Physics and Director of the Nuclear Laboratory. Dr. Stevenson holds two degrees in the nuclear area: a Master's from Cornell where, in addition to using

equipment identical to that at NJIT, routinely handled enriched uranium and worked with two critical assemblies, and a Ph.D. from New York University where he was involved with the same equipment plus Van de Graaf and pulsed neutron equipment. His mathematical and calculational background basic to the use and measurement of radioactivity are what one would expect of a Ph.D. in nuclear engineering. While having never taken a course entirely devoted to dosimetry or health physics, a substantial part of his training at both Cornell and N.Y.U. has adequately prepared him in these areas. He has been Director of NJIT's Nuclear Laboratory since January 1968.

c) Description of Equipment, Facilities and Instrumentation:

As mentioned above, the single activity with which the plutonium is involved is educational and this activity is done at a single sight. Remote handling of the plutonium is accomplished using a stainless steel device hinged toward one end which screws into the aluminum containment of the source and allows the handler to be one meter away from the source when removed from its permanent equipment placement. This removal is done only once every six months and then only to conduct leak tests.

The plutonium is permanently stored in the equipment in which it is used, i.e., in a cadmium lined, parafin filled aluminium barrel which is 60 cm. in diameter and 90 cm. tall (Nuclear Chicago Neutron Howitzer Model NH3) and in a subcritical natural uranium-water reactor which is 125 cm. in diameter and 150 cm. tall (Nuclear Chicago Sub-Critical Reactor Model 9000-1) in each location. The source is locked in place and the keys are in the possession of the equipment-use supervisor. The use of special devices, protective clothing, auxiliary shielding and air sampling equipment is not necessary in daily use of the equipment because of the ways in which the plutonium is stored and the ways in which the equipment is used. The laboratory in which the equipment is permanently located is in the basement of Tiernan Hall at 161 Warren Street, Newark, New Jersey, on the NJIT campus and is a room approximately 32 ft. by 45 ft. No chemical or physical processing is done in the room and, hence, it is not equipped with fume hoods, glove boxes or other more sophisticated equipment. The only piece of radiation detection equipment (except for experimental apparatus) which is used on a regular basis for monitoring purposes is a Nuclear Chicago Labitron Model 1619A which is sensitive to betas and gammas, and has a sensitivity range of from zero to 20,000 cpm and a window thickness of 1.4 mg/cm^2 . Other survey equipment which is available but not generally used (all manufactured by Nuclear Chicago) is -

- 1) Model 2510 Ionization Survey Meter, Range 0-250 mr/hr;
- 2) Model 2671 Neutron Survey Meter, Range 0-2500 $\text{n/cm}^2\text{-sec}$;
- 3) Model 2672 Alpha Survey Meter, Range 0-150,000 cpm;
- 4) Dosimeter (pocket) with specifications on file with N.R.C.

When in regular use, the above equipment is to be calibrated monthly as specified by Nuclear Chicago.

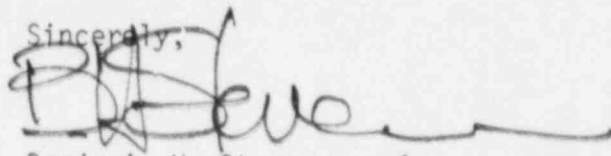
Some years ago, our personnel monitoring equipment consisted of pocket dosimeters in addition to a film badge service. Prolonged zero-readings induced us to save the expense of the film badge service and the pocket dosimeters are now used only to acquaint students with their use. In spite of the fact that survey equipment is not used on a daily basis, it is, nevertheless, kept in good repair by the manufacturer.

d) Procedures to Protect health and Minimize danger:

The qualifications of the individual having radiation safety responsibilities have been specified in b) above. No personnel monitoring equipment is in regular use at NJIT. This is because at a time when we had a film badge service, regularly used pocket dosimeters and utilized equipment in the same way we do now, all readings showed zero. All operations at NJIT involve only sealed sources in devices which do not have "on-off" positions. Hence, no air sampling, waste disposal or environmental program need exist. Records which are kept involve licensing information, leak test records and inventories. The person responsible for keeping and reviewing these records was identified in part b). Should the sources need to be transported, the original shipping containers which were provided by Monsanto's Mound Laboratory are available. The semi-annual leak tests are performed by Health Physics Association, Inc. in Illinois. NJIT has no procedures for the training of personnel. Should the director of the laboratory need to be replaced, his position would have to be filled by a person whose job description would require that he have qualifications similar to those of the present director.

If you require any additional information, please do not hesitate to call me.

Sincerely,



Benjamin H. Stevenson, Jr.
Associate Professor
Director of Nuclear Laboratory
Telephone: (201) 645-5297

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Synopsis of Resume for
BENJAMIN H. STEVENSON
December 1981

Department of Physics
NEW JERSEY INSTITUTE OF TECHNOLOGY
323 High Street
Newark, New Jersey 07102

Professional Experience

- 1981 - Present Consultant--Washington Public Power Supply System (WPPSS), Richland, Washington. Evaluation of Education Facilities in the area of Nuclear Engineering.
- 1980 - Present Consultant--Board of Regents, the State of New York, Albany, New York. Evaluation of In-house Educational Facilities of Industrial Concerns and suitability for college level credit.
- 1980 - Present Consultant--State of New Jersey, Thomas A. Edison College. Consultant in the area of Nuclear Engineering.
- 1962 - Present Associate Professor of Physics, NJIT; Chairman, Engineering Science Program (NJIT, formerly Newark College of Engineering) previous positions: Mathematics--Assistant Professor; Physics--Assistant Professor, Assistant Professor II, Instructor, Assistant Instructor, and Adjunct Instructor. Development of course curricula and conduct of instruction for undergraduate programs in Engineering Science, particularly in the area of Nuclear Engineering. Coordination of Nuclear Studies Program at the Institute and Director of the Nuclear Laboratory.
- 1969 - 1972 Research Collaborator at Brookhaven National Laboratory, Upton, L.I., New York; work in Reactor Physics Group, Division of Nuclear Safety; was involved with the development of computer code to simulate a reactor accident of short duration and look at the space-time neutron flux spectrum.
- 1964 Consultant--Gmelin Institute, Larchmont, New York. Analysis of functions performed by firms doing work in the nuclear industry.
- 1962 Consultant--Berger Associates, Orange, New Jersey; Harrisburg, Pennsylvania. Design and Analysis of sites for possible involvement in national fall-out shelter program.

Synopsis of Resume for
BENJAMIN H. STEVENSON
December, 1981

Education

- 1971 New York University
Degree: Ph.D.
Dissertation Title: On the Use of a Modified
Prompt-Jump Approximation
in the Numerical Solutions
of Space-Time Reactor
Dynamics Problems.
- 1966 Cornell University
Degree: M.S.
Thesis Title: The Feasibility of Performing an
Experiment to Measure the Doppler
Coefficient of the Cornell Zero-
Power Reactor.
- 1962 Newark College of Engineering
Degree: B.S.

Publications and Oral Presentations

University Credit for Training Experience in the Nuclear Industry, with Reilly, Lengthy invited presentation at the Work Shop Seminar at The U.S. Nuclear Regulatory Commission, Bethesda, Maryland, September, 1981.

Energy Alternatives, Social Requirements and Quality of Life-The Nuclear Alternative, Invited panel at Centennial Symposium and Lecture Series, New Jersey Institute of Technology, Newark, NJ, April, 1981.

The Flow of Newtonian Fluids over Spillways, Presentation at the Annual Meeting of the American Physical Society, Washington, D.C., April, 1980.

Elastic Neutron Scattering--A New Approach to an Old Problem, Half-hour Presentation at Annual Meeting of The American Nuclear Society (ANS), Atlanta, Georgia, June, 1979. Paper subsequently published in The Transactions of the ANS, Vol. 32 (1979) pp. 94-5.

Classical Neutron Scattering and Oscillating Targets, Presentation at the Annual Meeting of the American Physical Society, San Francisco, California, January, 1978.

Economy and Safety of the Plutonian Fuel Cycle, Invited lengthy keynote presentation at the Regional Meeting of the Institute for Electrical and Electronics Engineers (IEEE), Morristown, New Jersey, October, 1977.

Neutron Economy and Nuclear Reactor Design Concepts, Invited lengthy keynote presentation at the Regional Meeting of the Institute for Electrical and Electronics Engineers (IEEE), Morristown, New Jersey, October, 1976.

Synopsis of Resume for
BENJAMIN H. STEVENSON
December 1981

Publications and Oral Presentations continued

A Bubble Chamber for Detecting Neutrons and Demonstrating Fission, Invited Poster Presentation to NJEA, New Jersey Science Teachers' Association, Teaneck, New Jersey, February, 1976.

Miniature Working Atom Bomb - Swiss Model, Invited Poster Presentation to NJEA, New Jersey Science Teachers' Association, Annual Meeting, Atlantic City, November, 1975.

Asymmetrical Conclusions Drawn by Twins Performing Identical Measurements in Special Relativity, with Gautreau, Am. J. Phys., Vol. 43, No. pp. 834-6, September, 1975.

The Role of Physics in Advanced Level Engineering Curricula, Invited Presentation to ASEE, Physics Division, Annual Meeting, Fort Collins, Colorado, June, 1975.

Space-Time Measurements by Twins in Special Relativity, Presentation at Annual Meeting of the American Physical Society, Washington, D.C., April, 1974.

The Nuclear Power Reactor - What It Is and What It Is Not, Invited Tutorial. Opening Presentation at First Annual Meeting of the American Society for Quality Control, Newark, New Jersey, March 1974. Paper subsequently published in Proceedings of ASQC, March, 1974.

Frequency Dependent Friction for Flow Between Parallel Plates, with Nahavandi and Reisman, ASME Pub #74-FE-11, February, 1974. Paper subsequently presented at meeting of ASME, Toronto, Canada, May, 1974.

Personal

Born: November 23, 1940, Newark, New Jersey

Height: 5'8"; Weight: 155 lbs .

Marital Status: Married, 1970, one daughter, age 7 years,
one son, age 4 years.

Residence: 110 West Hill Road, Colonia, New Jersey, living with
wife (Justine Baumgarten Stevenson), daughter (Victoria
Anne) and son (Benjamin Haynes)

Civic Activities: Explorer Scout Committee; Faculty Advisor.
Committee on Engineering Science Students,
NJIT; Faculty Advisor, Alpha-Sigma Mu-
Alpha Chapter, Veterans Fraternity, NJIT;
Faculty Advisor, American Nuclear Society,
NJIT Student Branch Chapter; DeMolay Advisor

Synopsis of Resume for
BENJAMIN H. STEVENSON
December 1981

Personal

Civic Activities continued

Faculty Advisor, Alpha Nu Sigma,
National Honor Society in Nuclear Science
and Engineering

Hobbies: Musicology, Salt Water Fishing, Old Houses, Antique Automobiles

Professional Affiliations and Honor Societies

Society of Sigma Xi
American Nuclear Society
Chairman, NY Metropolitan Section
1980-81, 1981-82
Executive Committee, Education Division
1981-84
American Physical Society
American Society for Engineering Education
New York Academy of Science
Pi Tau Sigma
Alpha Nu Sigma
Institute for Electrical and Electronics Engineers/
Nuclear and Space Radiation Effects Division,
Arrangements Chairman, 1980.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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7/87

BETWEEN: William O. Miller, Chief
License Fee Management Branch
Office of Administration

Regional License Section
Material Licensing Branch
FCMS, Office of Nuclear Material
Safety & Safeguards

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED

Applicant/Licensee: New Jersey Inst. of Tech.

Application Dated: 5/1/87

Control No.: 128166

License No.: SNM-1899

2. FEE ATTACHED

Amount: _____

Check No.: _____

3. COMMENTS

Signed _____

Date _____

B. LICENSE FEE MANAGEMENT BRANCH

1. Fee Category and Amount: EX 1K

FEE EXEMPT

170.11(9.19)

2. Correct Fee Paid. Application may be processed for:

Amendment _____

Renewal / _____

License _____

Signed J. Kimberly

Date 5/11/87